FOOTBALL EMERGENCY MEDICINE MANUAL 2ND EDITION

FIFA®

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Disclaimer:

this tool does not constitute, and is not intended to constitute, a standard of medical care. These recommendations are not intended to be a substitute for the clinical judgement of the treating medical staff and should be interpreted based on the individual needs of the patient and the specific facts and circumstances presented. Furthermore, certain specific examples of concussion management in competitions are based on FIFA's specific guidelines to be followed at FIFA competitions. FIFA members, professional leagues and amateur leagues are encouraged to develop concussion management guidelines suitable for their own members, competitions, players and teams.

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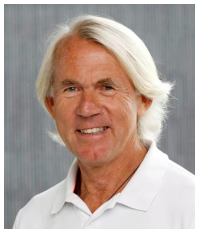

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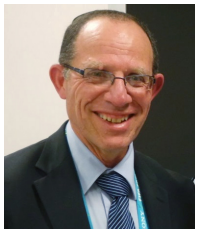

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During any football match, the stadium and the occupants can be compared, operationally, functionally and logistically to any small city. With the presence of tens of thousands in and around the football stadium environment, whether present professionally, commercially or recreationally, the safety, health and welfare of every person has to be catered for adequately and appropriately. To this end and purpose, football emergency medicine has evolved as a clinical subspecialty of football medicine and mass gathering medicine. Aimed at the prevention where possible and management when required, of any medical emergency within and around the football stadium environment, whatever the illness and/or injury, to single or multiple persons, so that recognition, response, resuscitation and referral are undertaken within current internationally accepted norms and standards, the FIFA Medical Committee and the FIFA Medical Assessment and Research Centre (F-MARC) promoted the development of the first edition of the football emergency medicine manual and accompanying training courses in 2009.

With increasing commitment to research into life-threatening medical emergencies on the field of play and the need for practical consistency in recommended management, FIFA set the standard internationally with the introduction of the FIFA Medical Emergency Bag (FMEB) , equipped at an advanced life support level of care, in order to assist those responsible for the health of the players and referees on the field of play to manage life threatening medical emergencies effectively within the first few critical minutes. Used extensively for the first time during the FIFA World Cup Brazil 2014™, the FMEB has provided the much needed consistency, coordination and cooperation between team healthcare professionals and providers internationally at events. The FMEB, its medical contents and related football medical emergency training courses, have all been instrumental in the FIFA Medical Committee and F-MARC decision to incorporate football emergency medicine education and training into the FIFA Diploma of Football Medicine. This has led to the need to revise the football emergency medicine manual into the current evidence and international expert panel consensus based 2nd Edition.

This 2nd Edition has been developed with the assistance of a number of medical specialists internationally who are committed to football medicine, in particular the prevention and management of the acutely ill and/or injured, both on the field of play and in the stadium infrastructure. We are grateful for the energy, effort, experience and enthusiasm which has resulted in the 2nd Edition and which a worthy successor is and update to the 1st Edition of the Football Emergency Medicine Manual published on the occasion of the 2010 FIFA World Cup South Africa with the support of K. Grimm, D. Constantinou, S. Motaung among the editors of the 2nd Edition. It is published at the same time as the "First aid manual and related healthcare issues for football" targeting the first aider and coaches on the football pitch as well as in dressing rooms.

We trust that this updated publication, as a standalone instructive manual or as part of the Diploma in Football Medicine or various football emergency medicine courses, will help to improve the safety and medical care of players, delegations and spectators at football stadiums worldwide.

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1 Traumatic injuries in football

1.1 Head and neck injuries – excluding concussion

Introduction

With the vast number of participants worldwide engaged actively in playing amateur and professional football, it is not unreasonable to expect an equally large number of injuries each year. With football being the only sport where the unprotected head and neck is purposefully used to engage the moving ball, often at high speed and in competition between two players, it is to be expected that the total number of injuries from football each year will include head and/or neck injuries.

Epidemiologically, head injuries account for between 4% and 22% of the total injuries in football, ranging from minor lacerations, abrasions and bruising, to more serious acute concussions and even rare skull fractures and internal cerebral bleeds.

The sight of Petr Cech clad in his trademark protective headgear as he kept goal for Chelsea away to Basel in the UEFA Europa League semi-final first leg is a poignant reminder of the potentially grave consequences associated with head injuries in football. The 80g helmet remains a necessity years after Cech suffered a fractured skull in a collision with Stephen Hunt on 14 October 2006. The damaged bones will eventually fuse back together again, but the process takes years and the 30-year-old will wear the helmet until the end of his career.

In a ten-year review of head injuries in sports in the United States of America (USA), including football, undertaken by Delaney, it was estimated that there were 28,000 injuries from football that were classified as either skull fracture or cerebral bleed (cerebral contusion, cerebral bleed, extradural bleed or subdural bleed). This equated to a rate of 1 to 2 serious head injuries per 10,000 football players per year. Although these figures cannot be extrapolated globally, the incidence is sufficiently large to warrant the institution of protocols to primarily prevent, and when necessary, adequately manage head and/or neck injuries in football. Therefore any player complaining, after suffering an injury, of neurological signs or symptoms, decreased level of consciousness, significant spinal midline pain or obvious spinal column deformity, pain or swelling, alone or in combination, requires careful and gentle spinal column stablisation, immobilisation and transfer.

Whenever head injuries occur, it is standard clinical practice to include cervical neck injuries in the management plan, as the two, having the same mechanism of injury, may occur together. Additionally, it is known that acute spinal injuries with neurological fallout are at increased risk of deterioration during and after the initial management of the patient due partially to various manoeuvres undertaken to stabilise, immobilise and transfer the injured player. To prevent this from occurring, adequate and appropriate, careful and gentle slow movements must be always undertaken when moving the spine-injured player.

Preparation

Head and/or neck injuries in football, although uncommon, must be anticipated, so that if and when they do occur, the responding well-trained medical staff, using adequate and appropriate medical equipment according to standardised management protocols are able to stabilise the player by preventing injury-induced neurological complications from occurring or by preventing further neurological deterioration wherever possible. For this to occur effectively and efficiently, pre-planning is mandatory. This means that all medical staff of any football team, including the team physician and physiotherapist, all members of the field-of-play medical team and venue medical officers should be fully trained in the recognition, evaluation, treatment, immobilisation and transfer of the head and/or neck injured player, both with regard to medical protocols and use of the correct equipment e.g. rigid spinal immobilisation board, scoop stretcher, Stokes-type basket stretcher or vacuum mattress.

Please note that use of the traditional "NATO"- type soft stretcher is no longer acceptable on the football field-of-play.

In addition, it is highly recommended that field-of-play medical teams rehearse the various manoeuvres undertaken to position a player in the spinal-neutral supine position from whatever other position the player may have been found in, e.g. prone, lateral or vertical or a combination of these. Repetitive team exercises prior to each match or

training by the field-of-play medical team enhances uniformity and unity of action when required to move the neck injured player without causing any further harm.

Recognition of injury

The duties of the team physician and the field-of-play medical team include constant observation of the players on the field, so that should any player become ill or injured, it will be immediately observed by the medical staff on duty, who can respond accordingly. With regard to any players who are injured, it is important that the mechanism of the injury be observed, as this will often help the recognition of the likely injuries to be expected.

When responding to the player involved in a potential head and/or neck injury, it is important to observe, on approach, the position of the player including his/her limbs, any movement of the limbs, level of consciousness and any obvious associated injuries or deformities.

The player's level of consciousness can be assessed by using the Glasgow Coma Scale, which is used extensively in trauma to initially assess an injured person's neurological status and then subsequently to monitor improvement or deterioration.

A player with a Glasgow Coma Scale (GCS) of 15 out of 15 is functionally fully awake and orientated for time, place and person. However, any player with a GCS of 14 or less out of 15 is to be regarded as having a head injury that requires removal from the field-of-play, and which, depending on the mechanism of injury, may include a cervical spine injury as well.

Glasgow Coma Scale

Best eye response (E)	Spontaneous--open with blinking at baseline	4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Best verbal response (V)	Oriented	5
	Confused conversation, but able to answer questions	4
	Inappropriate responses, words discernible	3
	Incomprehensible speech	2
	None	1
Best motor response (M)	Obeys commands for movement	6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal (spastic) flexion, decorticate posture	3
	Extensor (rigid) response, decerebrate posture	2
	None	1

On approaching the injured player, one of several of clinical scenarios may present itself:

- Fully alert player with no clinical signs or symptoms
- Fully alert player with neurological signs and/or symptoms
- Confused player, with or without neurological signs and/or symptoms
- Unconscious player who is breathing adequately
- Unconscious player with abnormal or no breathing

Each of these scenarios is to be managed as described below.

Treatment

General management of the head and/or neck injured football player.

A – Airway: ensure that the player's airway is open and protected from obstruction by the tongue and/or mandible or from aspiration of stomach contents, especially if the player is lying in a supine position (on their back) and, due to loss of consciousness, is not able to protect their own airway. In the unconscious player, the airway is opened and maintained by using any of the following, using as little motion on the injured neck as practically and safely as possible:

- Removal of any foreign material in the airway/mouth
- Opening the player's mouth
- Jaw thrust manoeuvre
- Insertion of oropharyngeal tube
- Insertion of nasopharyngeal tube
- Insertion of Laryngeal Mask Airway (LMA)

- Insertion of an endotracheal tube if it is clinically indicated, the necessary expertise is available and the necessary advanced airway equipment is on hand. Insertion of the above airway devices has been shown to result in less movement of the cervical spine than the Jaw Thrust manoeuvre and are therefore to be preferred.

Jaw Thrust Manoeuvre to open the airway.

In the absence of endotracheal intubation, it is important to ensure that some form of adequate suction is available, should the player vomit, which is not uncommon in head injury and its after effects. If this is not possible, one should immobilise the supine player to a long, rigid spinal-type board and turn the board into the lateral position or, if the player is not immobilised, turn the player slowly, gently and carefully into the lateral position. The lateral position prevents the tongue and/or mandible from obstructing the airway as well as preventing aspiration into the lungs during vomiting.

A – Alignment of the spine: All football players with a suspected or clinically symptomatic spinal injury must be adequately and appropriately immobilised so as to prevent the development of or deterioration to a neurological injury to the spinal cord. The basic principles of spinal column immobilisation comprise the following actions:

- Carefully, gently and slowly realign the head into the neutral position relative to the spine and maintain this position thereafter. If this slow, gentle realignment causes any neck or spinal pain, muscle spasm, abnormal neurological signs or symptoms, offers resistance or compromises the integrity of the airway, then immobilise the head in the original found position and transfer the player in this position to hospital on an available appropriate immobilisation device.

Log rolling the supine player onto the side for placement of a rigid spinal board.

- Once the head has been adequately realigned and stabilised, carefully, gently and slowly align the entire spinal column into the neutral position, following the same principles as stated above.

- If the player is lying on their back (supine), the player needs to be immobilised to a long, rigid, spinal-type board (RSB). This may be undertaken with a careful, gentle and coordinated log-roll manoeuvre to turn the player onto their side, placement of the RSB behind the player's back and then a careful, gentle coordinated log-roll to move the player onto the RSB in the supine position for immobilisation. Alternatively, the player may be carefully, gently and with coordination be lifted off the ground by a team straddling the player whilst an RSB is slipped under the player, who is then gently lowered onto the RSB.

- All players strapped to an immobilisation device should be strapped sufficiently such that the device can be urgently turned into the lateral position if the player vomits, without creating movement of the spine as a result.

- If the player is lying on their side (lateral), an RSB can be positioned behind the player's back and the player then carefully, gently log-rolled onto the RSB into the supine position for immobilisation.

Fully immobilised player in the supine position.

- If the player is lying face down (prone), a number of careful, gentle coordinated steps are required by the medical team to first realign the head into the neutral position, then log-roll the player onto his/her side, and finally log-roll the player onto an RSB into the supine position for immobilisation.

- Once the player has been adequately and appropriately aligned in the supine position, anatomically neutral onto an immobilisation device, manual cervical spinal stablisation should be converted into external immobilisation using external devices, e.g. foam-based head blocks


Player turned from the prone position onto the side.


Player turned onto the side from the prone position, ready for placement of a rigid spinal board.

B – Breathing: It is important to ensure that the player with a head and/or neck injury, with neurological signs or symptoms, does not become hypoxic because of its detrimental effects. The player's oxygen saturation, measured by a non-invasive pulse oximeter placed onto a player's finger, should not drop below 90%. If hypoxia occurs, supplemental oxygenation should be administered accordingly.

B – Blood pressure: It is important to ensure that the player with a head and/or neck injury, with neurological signs or symptoms, does not become hypotensive because of the detrimental effects of preventing adequate blood perfusion to the injured neural tissues. Hypotension in the head or neck of the injured player may result from acute spinal shock, heat-related illness and/or internal bleeding. Every effort must be made to keep the systolic blood pressure above 90mmHg, either by positioning the patient appropriately and/or intravenous infusion.

C – Consciousness: On approaching the player, ascertain whether the player is;

- Conscious - fully alert player with no clinical signs or symptoms
- Conscious - fully alert player with neurological signs and/or symptoms
- Unconscious player who is breathing adequately
- Unconscious player with abnormal or no breathing

Each of the above is treated as follows:

- The conscious, fully alert, asymptomatic player may return to play

- The conscious, symptomatic (neurological signs/symptoms) player is removed from the field-of-play with spinal/neck immobilisation as required and transferred to the nearest, most appropriate trauma centre. The symptomatic spinally injured patient is no longer administered high-dose methylprednisolone intravenously as there is little evidence of its efficacy and it therefore remains a controversial treatment

- The unconscious player who is breathing adequately is stabilised, immobilised and transferred by ambulance to the nearest, most appropriate trauma centre.

- The unconscious player with abnormal or no breathing is fully resuscitated, stabilised, immobilised and transferred by ambulance to the nearest, most appropriate trauma centre. NB: Any player who is unconscious and not breathing may require immediate external chest compressions and application of an AED due to the

occurrence of sudden cardiac arrest. Do not feel for a central pulse for longer than 10 seconds in order to decide that CPR is necessary.

C – Cervical spine injury exclusion: It is possible for a team physician to exclude a cervical spine injury clinically in a player, and thus not have to expose the player to a mandatory RSB immobilisation and radiological examination to exclude a fracture. This is in line with the current recommendations of the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma. Players post-injury who fulfil all of the following criteria do not require immobilisation on an RSB:

- Are fully awake – GCS 15 out of 15
- Do not have spine tenderness or anatomic abnormality
- Do not have neurological signs or symptoms
- Do not have serious injuries whose pain could detract from a spinal injury
- Have not had any alcohol or chemical substances

D – Dextrose: Any player who presents any neurological signs or symptoms must have their blood glucose level measured as part of the initial examination, even if trauma is the likely cause of the neurology, because of the possibility that hypoglycaemia may have been partly responsible for the injury. Furthermore, if hypoglycaemia is missed, it can result in further neurological deterioration and prevent effective treatment.

D – Dehydration: Whatever the likely cause of any injury on the field of play, players that have been involved in intense exercise may have varying degrees of dehydration, the effects of which may compound the gravity of the injury. Therefore dehydration must always be factored into the measurement of an injured player's vital signs, be considered clinically present and, if necessary, treated, unless or until it can be proved otherwise.

E – Environment: Heat fatigue or heat stroke must be excluded in a player who presents with a likely head and/or neck injury with neurological symptoms. Heat stroke, because of the neurological signs and symptoms that indicate its presence, may well be the initial cause of the apparent injury due to the player's inability to function adequately physiologically, physically or psychologically. Its delayed diagnosis and consequent emergency treatment, due to the trauma event that takes precedence, may have critical medical consequences. It is therefore mandatory to exclude in a player with any neurological symptoms, similar to hypoglycaemia and its mandatory exclusion, even in trauma.

Conclusion

Head and spinal injuries are uncommon in football. This may result in many team physicians and field-of-play medical teams not being up to date and experienced with the required recognition, diagnostic and treatment protocols that are designed to prevent the development of or deterioration to spinal cord damage from a spinal injury. Therefore training, training and more training in careful, gentle, slow neutralization, stablisation, immobilisation and transfer after a spinal column injury are mandatory before every match or training session, as part of the rehearsed emergency medical plan.

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1.2 Concussion (Jon Patricios, Efraim Kramer)

Introduction

Concussion is a brain injury caused by a trauma-induced change in mental state that may or may not involve loss of consciousness. The acute injury may manifest with any combination of physical, cognitive, sleep and emotional symptom clusters including headache, dizziness, nausea, visual disturbance, amnesia, poor concentration, irritability, depressed effect, fatigue and drowsiness. Whereas previous definitions and classification systems emphasised loss of consciousness and amnesia as the primary manifestations of concussion, the revised definition acknowledges that this form of traumatic brain injury may, and most likely will, present with a wide spectrum of symptoms. Current models of understanding and management incorporate broader definitions, more thorough clinical evaluations, and cognitive testing. Healthcare professionals managing footballers at all levels need to understand these principles, develop a template for managing this type of injury and educate players about the risks of repetitive head trauma and concussion.

Summary of the current international concussion consensus

- Concussion represents a serious neurological injury that may present with a wide spectrum of signs and symptoms.
- Serial clinical assessments, both neurological and cognitive, remain the cornerstones of management.
- Certain categories of footballer require a more specialised and conservative approach; these include paediatric participants (aged 12 and under), those with a history of recurrent concussion, and those with neurological and psychological co-morbidity (e.g. depression, epilepsy and attention deficit disorder).
- Football players suspected of suffering concussion should be immediately removed from play. Before returning to play, the player must be cleared by a medical professional with the appropriate expertise.

Management

The diagnosis and management of concussion in football requires a number of steps to be followed sequentially, from determining the mechanism of injury on the pitch (when possible), to on-pitch evaluation, touchline evaluation, emergency department and/or clinical evaluation, discharge and follow-up instructions, and eventually to supervised, graded return-to-play protocols. This chapter is concerned specifically with the immediate emergency diagnosis and management of concussion on the pitch and management in the acute setting. Subsequent management and discussion of return-to-play protocols may be found in other relevant texts and is beyond the scope of this emergency manual. For FIFA competitions, it is the sole responsibility of the team doctor to make assessments and decisions concerning his/her players. FIFA supports and follows the recommendations of the Concussion in Sports Group (CISG).

What happens in the concussed footballer's brain?

Concussion is a brain injury. There are currently no easily detectable structural changes to the concussed brain, as computerised tomography (CT) and magnetic resonance imaging (MRI) radiological scans are almost always normal. Nevertheless, there is disruption to the concussed brain, which manifests itself as a range of functional disturbances. Possible mechanisms of injury include compressive forces, which may directly injure the brain at the point of contact with the cranium (coup); tensile forces that produce injury at the point opposite the injury (contrecoup) because the axons and nerves are stretched; and finally, rotational forces may result in a shearing of axons. Therefore, the direct force at the point of contact may not be solely responsible for the severity of an injury if a high rotational component with a significant shearing effect occurs. All of the different mechanisms may result in biochemical changes relating to perfusion and the supply and use of energy at the site of injury, which is not well understood but may result from a "mismatch" between the injured brain's increased energy requirements and diminished blood flow. Changes to the chemical flux and blood flow in the concussed brain make the latter vulnerable to further injury until full recovery has taken place.

Key issues relevant to concussion in football

Head injuries in football are most likely to result from a player's head clashing with an opponent's head, elbow, arm or boot, or with the ground or goalpost. Most head clashes occur in the penalty area. Rule changes forbidding high challenges with the elbow raised have resulted in a lower incidence of concussion in football.

Because football is a free-flowing game with no dedicated timeouts, doctors, coaches, referees and players need to be particularly vigilant for players who may show signs of concussion. Players suspected of having suffered a concussion after an on-pitch evaluation are required to be immediately removed from the pitch for further medical evaluation.

There should be no interference from players or team management in a doctor's or trainer's decision to remove a suspected concussed player from the field. Players diagnosed with suspected concussion should be permanently removed from the game or training session and not return to play and undergo a formal medical assessment. Before returning to play, a player must be cleared by a medical professional with the appropriate expertise.

Diagnosis and assessment

The most obvious practical sign of concussion is the mechanism of injury that causes the concussive injury (e.g. did the player receive an elbow to the head?).

The mechanism of injury may place the team doctor or other on-duty healthcare provider(s) on alert for concussion in the player concerned, which may lead to an on-pitch response as indicated by the referee if there is a medical problem. If there is no obvious medical problem, removal from play may be needed, with continued observation and monitoring of the player on the touchline as the match progresses and/or further appropriate neurological evaluation at either half-time or after full time in the team's dressing room. This is important because signs and symptoms of acute concussion may not always be evident immediately post-injury, but delayed onset of symptoms may develop.

If the referee summons the team doctor or other on-duty healthcare provider(s) onto the pitch to attend to an injured player for an assessment of suspected concussion, the three-minute concussion rule may be requested from the referee, whereby the medical team has three minutes with the injured player to assess whether an acute concussion is present or suspected and thereby remove the player from the pitch and from further play, or whether the player may return to play. If an adequate assessment for concussion cannot be undertaken in the three minutes provided, then – when possible – the player should be safely removed from the pitch to the touchline for further evaluation. Medical staff trained in concussion assessments should provide the assessment.

If, at any stage of the concussion assessment, the medical team cannot make a definite decision regarding whether concussion is present or not and a doubt exists, it is recommended that "when in doubt, sit the player out" and he or she should be removed from play.

If concussion is suspected, a number of practical steps should be undertaken on the pitch by the team doctor or healthcare provider:

- Assess the player's level of consciousness in order to ascertain if airway, breathing or circulatory resuscitative interventions are immediately required.

- Assess if neck stabilisation and immobilisation is required by ascertaining the presence of neck pain or tenderness, neck muscle spasms, abnormal alignment, peripheral paresthesia/paralysis or sensory loss.

- Determine the most appropriate and safest manner of transferring the player from the pitch and whether long-board spinal stabilisation is required.

- Establish concussion by determining the presence of any neurological signs or symptoms post-injury. This is undertaken by asking the injured player specific questions that have been clinically validated to demonstrate a decrease in brain function if any of them are answered incorrectly, and thus warrant removal of the player from the pitch.

These standard Maddocks questions are:
- What venue are we at today?
- Which team are we playing?
- What half is it now?
- How far into the half are we?
- Who scored last in this match?
- What team did you play last week/game?
- Did your team win its last game?

If the injured player cannot easily, quickly and correctly answer all of these questions, then concussion should be suspected, and the player should be removed appropriately from the pitch and managed accordingly. He or she may not return to the match.

If there are no signs or symptoms that are evident immediately, continued monitoring may still be required from the touchline while the player remains in the match. Typical signs that may develop in a concussed player on the pitch include confusion about on-pitch calls, repeatedly being out of position, deterioration in play, or self-reported complaints of headache, nausea, dizziness or blurred vision.

Importantly, a player does not have to lose consciousness to be diagnosed with concussion. Fewer than 10% of concussions are associated with loss of consciousness.

Use can be made of the Pocket Concussion Recognition Tool 5 (PCRT5) that was developed for pitch and touchline use. Never be embarrassed to use the PCRT on an injured player in view of others, as it was made for this specific purpose.

CONCUSSION RECOGNITION TOOL 5©

To help identify concussion in children, adolescents and adults

RECOGNISE & REMOVE

STEP 1: RED FLAGS – CALL AN AMBULANCE

STEP 2: OBSERVABLE SIGNS

STEP 3: SYMPTOMS

STEP 4: MEMORY ASSESSMENT

Athletes with suspected concussion should:

ANY ATHLETE WITH A SUSPECTED CONCUSSION SHOULD BE IMMEDIATELY REMOVED FROM PRACTICE OR PLAY AND SHOULD NOT RETURN TO ACTIVITY UNTIL ASSESSED MEDICALLY, EVEN IF THE SYMPTOMS RESOLVE

http://dx.doi.org/10.1136/bjsports-2017-097508

Touchline assessment

Once a player has been removed from the pitch, a touchline assessment provides a good opportunity to adequately assess the player's neurological status and provides the first quantitative assessment of the injury, serving as the baseline measure of what should be a series of clinical evaluations to come.

Neurological evaluation of the injured player on the touchline should use the specially developed Sports Concussion Assessment Tool™ (version 5, SCAT5).

This touchline concussion neurological assessment tool, which may also be used in concussion education, has two main functions, namely:

- Indications for emergency management
  - Glasgow Coma score of less than 15
  - Deteriorating mental status
  - Potential spinal injury
  - Progressive, worsening symptoms or new neurological signs
- Baseline clinical neurological and cognitive assessment

Once again, never be embarrassed to use the SCAT5 on an injured player in the presence of others, as it was made for this specific purpose. The SCAT5 card also has a paediatric version, the Child SCAT5 developed for children 12 years and younger.

Use of the PCRT5 and SCAT5 will identify those players who have clinically recognisable concussion, those that may have more extensive damage and those at possible risk.

Any clinical evidence of concussion or suspicion of concussion should result in removal of the player from the pitch with constant observation and serial neurological evaluation. No return to play may occur that day and medical staff can determine if referral to the nearest, most appropriate emergency department for a full neurological examination and/or radiological investigation is deemed necessary. It is the team doctor's responsibility to ensure that such procedures are in place.

In addition, it is essential to acknowledge that, at any stage, a player may develop worsening signs and symptoms of an intracerebral haemorrhage or brain ischaemia. Should this critical situation occur, the player should be adequately and appropriately resuscitated, stabilised, spinally immobilised and efficiently transferred to the nearest, most appropriate trauma and emergency department for full emergency and neurosurgical evaluation and management.

These signs include:

1. Worsening headaches
2. Severe neck pain
3. Decreasing or altered level of consciousness
4. Inability to recognise familiar people or places
5. Increasing confusion or irritability
6. Obvious unusual behavioural change
7. Repeated vomiting
8. Slurred speech
9. Focal neurological signs
10. Weakness/numbness in limbs
11. Any seizure-type activity

Any player with suspected concussion who has continued neurological signs or symptoms, especially if these are deteriorating or not improving or are developing post-match where no medical doctor is available, should be transferred by emergency services to the emergency department for a fully comprehensive neurological examination, radiological investigation or admission for neurological observation, whichever is appropriate.

Video replay analysis

The advent of video replay technology in football has resulted in additional medical data becoming available to the medical team who are on site, near the injured player, making a clinical assessment for a potential concussion injury. During numerous FIFA competitions, video replays are available at all times to the medical team on site and can provide additional clinical information to supplement what may already be clinically evident from the initial pitchside assessment.

Any signs of concussion that can be immediately gleaned from the video replay may only be evident very briefly and may not still be clinically present in the injured player by the time that the medical team is summoned onto the pitch by the referee. These signs include:

1. **Mechanism of injury** – the mechanism of injury observed indicates a high risk of concussion/head injury;

2. **Loss of consciousness**/lying motionless for a long period – the player's body goes limp and the player does not protect (i.e. brace) themself when falling. The player lies motionless on the ground for a longer period than expected, or shows a lack of visible responsiveness to verbal stimuli. This is an indicator of concussion even if the player exhibited such behaviour for just one second;

3. **Slow in getting up onto their feet** – the player takes longer than usual to return to their feet (e.g. remains on the ground, gets to their knees or haunches, and pauses before standing);

4. **Loss of function of limb(s)** – "floppy position" – player does not use one or more limbs for a variable period of time;

5. **Blank stare** – the player is not visually focused on the team doctor when spoken to and/or appears to be looking off into the distance;

6. **Limb posturing** – tonic posturing of upper limbs;

7. **Seizure-like activity** – tonic/clonic seizure activity;

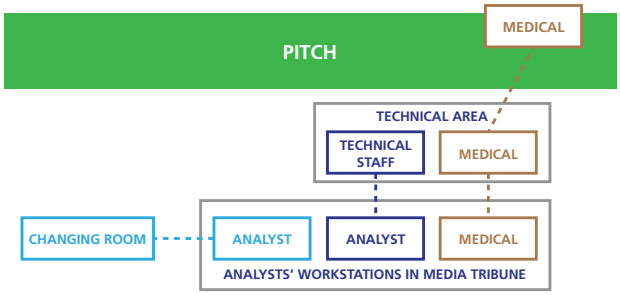
8. **Grabbing/shaking of the head** – the player holds their head in the palm of their hand or hands, or rubs or shakes their head in a manner that appears to demonstrate that they are experiencing discomfort;

9. **Unsteady gait** – unable to stand steadily unaided or walk normally. Upon standing and walking, the player has unsteadiness, wobbly legs, balance problems, stumbles or falls over, or cannot walk straight independently;

10. **Grabbing and holding the neck** – player admits to pain/discomfort in the neck;

11. **Abnormal/aggressive/confused behaviour** noticed in the player anytime post-injury, even if the player is allowed to return to play initially.

Communication flow



The recommended video replay protocol should include the following steps:

1. Each team appoints a medically qualified member whose sole function during matches is to act as a medical analyst. Teams may appoint more than one person for appropriate training and skills acquisition to ensure adequate capacity.

2. The team medical analyst will be located in the media tribune area or other designated area, as per the decision of the Technology department on site.

3. The medical analyst should commence action replay analysis immediately after every relevant injury witnessed on the pitch, with the intention of providing the team doctor with additional clinical information within the three-minute concussion time, if practicable.

4. The video replay information that flows between the medical analyst and team doctor is undertaken via radio.

Pharmacological intervention

The mainstay of the treatment for concussion is removal from the exercise environment plus physical and cognitive

rest. Headaches should be managed with only mild analgesics, e.g. paracetamol/acetaminophen. Non-steroidal anti-inflammatory analgesics should not be prescribed unless intra-cranial bleeds have been excluded radiologically.

Conclusion

Current concussion management emphasises a structured clinical protocol incorporating a thorough history and serial clinical assessments. Adopting policies and protocols in the management of players of all levels is in the best clinical interest of players and helps militate against the possible medico-legal consequences of poorly managed head injuries. Key to the on-pitch management of concussion in football is vigilance, early detection, immediate removal and ongoing evaluation.

Player discharge home following concussion – information handout

Player information – important reminders for the first 48 hours

You are being discharged home after being medically assessed following the concussion you received while playing football.

- Always make sure that you are in the presence of a responsible adult for 24- 48 hours.
- Record and monitor any symptoms of concussion, including nausea, dizziness, fatigue, sleep disturbances, memory lapses, mood swings, poor concentration or any other feeling that concerns you.
- Complete rest and sleep will help recovery.

DO NOT:

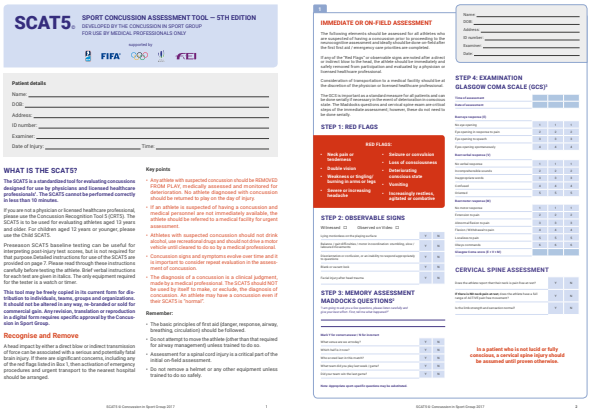
- Drive or use machinery for the first 48 hours or if you have symptoms
- Consume any alcohol for the first 48 hours
- Take any amount of painkillers other than that prescribed on the box and always follow the doctor's orders
- Place yourself in an environment of loud noise and excessive light for the first 48 hours
- Study, watch TV or work with your mobile phone for the first 48 hours
- Work at your computer for the first 48 hours
- Exercise until you have received permission from your treating doctor

Contact the emergency ambulance service or go to your nearest emergency department immediately if:

- Any of the symptoms get worse or you feel worse
- Your headache becomes worse and does not respond to mild painkillers
- You have a seizure (fit)
- You experience excessive irritability
- You experience visual disturbances
- You experience balance problems
- You or anyone else is concerned about your condition

Decisions regarding returning to sport will be made taking into consideration your individual circumstances including your medical history, previous head injuries and current symptoms.

You must receive clearance from a doctor before returning to sport.


SCAT5© SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION
DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY
supported by FIFA
Patient details
Name:
DOB:
Address:
ID number:
Examiner:
Date of injury: Time:
WHAT IS THE SCAT5?
Key points
Recognise and Remove
IMMEDIATE OR ON-FIELD ASSESSMENT
STEP 1: RED FLAGS
RED FLAGS:
Neck pain or tenderness
Double vision
Weakness or tingling/ burning in arms or legs
Severe or increasing headache
Seizure or convulsion
Loss of consciousness
Deteriorating conscious state
Vomiting
Increasingly restless, agitated or combative
STEP 2: OBSERVABLE SIGNS
STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS²
STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)²
CERVICAL SPINE ASSESSMENT
In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

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1.3 Facial injuries

Introduction

As a contact sport, football involve player-to-player contact, player-to-ground contact and, particularly in relation to the goalkeeper, player-to-goalpost contact leading to a range of head and facial traumas. Should facial injuries occur, it is recognised that these injuries, no matter how trivial they may appear superficially, are potentially dangerous and could lead to serious complications if left untreated or unnoticed.

Mechanism of injury

Studies have shown that head-to-head and head-to-elbow contact between players are the most prevalent mechanisms of injury contributing to a range of facial injuries. For medical staff, appreciating the mechanism of injury and energy involved will assist in assessing a facial injury, taking note that the higher the velocity of contact force to the face the greater the potential for associated occult facial fractures, including head injuries and concussion. Many of these occult injuries will not be diagnosed on the field of play or sideline and may require referral to hospital for specialised radiological investigations. It is therefore important that the treating medical professional always gives serious consideration to potential underlying occult injuries when treating a player with an injury to the facial skeleton.

Primary clinical assessment: ABC

All injured players with a facial injury should be initially assessed for any clinical problems to the airway, breathing, circulation or neurological function. Any injured player presenting with a poor cognitive response or reduced level of consciousness should be immediately assessed for concussion or alternative neurological injury that will require specific management in its own right, as discussed in the relevant section of this manual. In this situation, unless the facial injury presents as a life-threatening injury which requires immediate resuscitation, the neurological injury will take precedence and supersede the management of all facial injuries. In general, facial injuries in football are rarely life threatening, with most being adequately managed on the sideline, even if temporarily, and the player returning to the field of play.

Types of facial injuries

Abrasions

An abrasion is a superficial open injury following trauma to the epidermal and dermal layers of the skin. This occurs when the skin is rubbed against a rough surface, shearing off the epidermal layer (top layer of the skin) exposing the dermis (bottom layer of the skin).

Treatment

Treatment aims to prevent infection, promote healing and prevent traumatic "tattooing" from the embedded debris and foreign bodies in the dermis.

1. Irrigate the wound with sterile, normal saline/water using a 20ml syringe
2. Clean the wound and attempt to remove any visible debris and foreign bodies where possible
3. Seal the wound with a dry dressing
4. The player may return to play if no other underlying injuries are suspected

Contusions

A contusion (bruising) is a closed injury following a blunt trauma to soft tissue and may involve injury to the underlying structures. The player may present with pain, a bluish skin discoloration at the site of the injury as a result of localised bleeding under the skin.

Treatment

1. Treat the player in the sitting position and apply ice pack/s to the injury site. The player can be advised to continue the application of ice packs intermittently to reduce the swelling for the first 24 to 48 hours. Note: ice-packs should not be placed directly onto the naked skin for prolonged periods, as this can cause cold-burns on the skin or frostbite.
2. If the player is not removed from the field of play and substituted, but wishes to return to play, ice compression application treatment may have to wait until the player has concluded their involvement in the match.
3. However, any player with a facial injury who may have clinically suspected underlying fractures, due to pain, swelling, bruising or distortion, must be referred to the nearest, most appropriate hospital for radiological investigation and/or specialist consultation.

Haematoma
A haematoma is bleeding into a space or a potential space, such as the muscles and the dermal layer (bottom layer of the skin) and may occur alongside either minor or major wounds. This injury presents as a bluish/black swelling or lump at the injury site.

Treatment
1. Generally, haematomas are classified as minor injuries that resolve naturally over time.

2. Treat the player in the sitting position and apply ice pack/s to the injury site. The player can be advised to continue the application of ice packs intermittently to reduce the swelling for the first 24 to 48 hours. Note: ice-packs should not be placed directly onto the naked skin for prolonged periods, as this can cause cold-burns on the skin or frostbite.

3. If the player is not removed from the field of play and substituted, but wishes to return to play, ice and/or compression bandage treatment may have to wait until the player has concluded their involvement in the match.

4. However, any player with a facial injury who may have clinically suspected underlying fractures, due to pain, swelling, bruising or distortion, must be referred to the nearest, most appropriate hospital for radiological investigation and/or specialist consultation.

5. Any player with an injury to the face who presents with a facial haematoma over the zygomatic (cheekbone) and/or periorbital region should be removed from the field of play and referred to the nearest, most appropriate hospital for radiological investigation and/or specialist consultation.

   Any player who is assessed by the medical professional as having either a haematoma to the pinna of the ear or nasal septum may be allowed to continue play, but should be referred after the match to the nearest, most appropriate hospital for haematoma evacuation to prevent complication, namely a "cauliflower ear" deformity of the affected pinna or nasal septal necrosis.

6. Consider pain management if clinically indicated.

Lacerations
Facial lacerations are open injuries that result from blunt trauma to the soft tissues over the facial bones, usually from head–to-head or head-to-elbow contact between players. Lacerations can be superficial or deep and present as either a linear (straight) or stellate (jagged/burst-type) laceration. Lacerations of the facial area usually bleed profusely due to the rich blood supply to the face.

Treatment
1. Control any bleeding by applying direct pressure with sterile gauze to the injury site.

2. Once the bleeding has stopped, the player should receive a focused assessment of the facial injury and be managed accordingly by either returning to play, being substituted and/or referred for further radiological and/or specialist evaluation.

3. Minor facial lacerations should be irrigated thoroughly with sterile normal saline using a 20ml syringe. Where suturing is not clinically required, cover the wound with a dressing and the player may return to play if no underlying injuries are suspected.

4. In addition, non-suture skin closure strips maybe used to close simple linear lacerations.

5. Major facial lacerations, accompanied by obvious or suspected facial fractures, should be stabilised and the player referred for further radiological and/or specialist evaluation.

6. Consider pain management if clinically indicated.

Anterior nasal bleeding
The majority of nasal bleeding (epistaxis) is the result of trauma to the anterior nasal area and is controlled with adequate compression of the bleeding vessels. If posterior nasal bleeding or severe anterior nasal bleeding occurs, treatment of which is beyond out-of-hospital care, refer the player for further radiological and/or specialist evaluation.

Treatment
1. The medical professional should pinch the cartilaginous, anterior nose (nostrils) closed for 10-15 minutes with two fingers; this usually applies pressure to the bleeding vessels, causing the bleeding to stop. The player may return to play once the bleeding has stopped.

2. If bleeding persists, anterior gauze packing is required and the player may return to play once the bleeding has stopped.

Facial fractures
The medical professional must physically examine all three maxillofacial regions of the face when attempting to diagnose clinical facial fractures:

Physical examination of the lower facial region includes the mandible, maxillary bodies, lips, tongue and cheeks including the underlying dental structures.

I. Mandibular fractures
Mandibular body fractures present with tenderness, swelling, malocclusion with abnormal range of motion, restricted mastication (chewing), intraoral lacerations and, occasionally, tooth avulsions. The medical professional should assess the integrity of the facial nerve in this region by having the player smile broadly, which should be accomplished naturally if no neuropathology exists.

Treatment
1. Monitor the player's cognitive (mental) status for concomitant concussion or head injury. Equally important, assess the player's airway as intraoral lacerations can bleed significantly, avulsed teeth can be aspirated and cause airway obstruction and, following bilateral fractures of the mandible, posterior displacement of the tongue may obstruct the upper airway.

2. If the player is unconscious, open and protect the airway by appropriate means, e.g. suctioning, if clinically indicated, and either place the player gently and carefully on his/her side to protect the airway or make use of an airway adjunct device, e.g. Laryngeal Mask Airway (LMA). If necessary, provide ventilatory support with a self-inflating manual resuscitator device (BVM). Be vigilant for possible concomitant spinal injuries, considering the mechanism of injury and associated kinematics involved in the injury.

3. Establish a large-bore (16G cannula) intravenous infusion with Lactated Ringers solution 500ml.

4. Applying a bandage as per the diagram below can stabilise the fracture.

5. Consider pain management by administering analgesia, if clinicallyrequired.

6. Mandibular fractures can be potentially life threatening and extremely challenging to manage in the pre-hospital setting and may warrant emergency referral to the nearest, most appropriate hospital.

II. Maxillae fractures
Maxillae fractures rarely present in isolation and usually coexist with fractures of the alveolar ridge of the maxilla, anterolateral wall of the maxillary sinus and Le Fort fractures. These midfacial fractures are associated with high impact trauma such as head-to-head and head-to-goal post contact and may present with a combination of different Le Fort fractures bilaterally. Physical examination may reveal midfacial mobility and may have accompanying rhinorrhea (cerebrospinal fluid from the nose) which is symptomatic of a fracture to the anterior base of the skull.

Treatment
1. Always assess the player's cognitive (mental) status and level of consciousness and treat appropriately.

NB: The airway in a patient with midfacial maxilla fractures may be at risk and lead to complete airway obstruction. It is therefore mandatory that cricothyroidotomy equipment be checked, the player's neck be evaluated for the procedure and that the equipment is immediately available should signs or symptoms of impending airway obstruction present.

2. Monitor the player's respiration and prepare for rescue ventilation via a self-inflating manual resuscitator device (BVM), if and when necessary.

3. If the player is unconscious, open and protect the airway by appropriate means, e.g. suctioning, if clinically indicated, and either place the player gently and carefully on his/her side to protect the airway or make use of an airway adjunct device, e.g. Laryngeal Mask Airway (LMA). If necessary, provide ventilatory support with a self-inflating manual resuscitator device (BVM). Be vigilant for possible concomitant spinal injuries, considering the mechanism of injury and associated kinematics involved in the injury.

4. Establish a large-bore (16G cannula) intravenous infusion with Lactated Ringers solution 500ml.

5. Applying a bandage as per the diagram below can stabilise the fracture.

6. Consider pain management by administering analgesia, if clinically indicated.

7. Midfacial maxillae fractures can be potentially life threatening and extremely challenging to manage in the pre-hospital setting and may warrant emergency referral to the nearest, most appropriate hospital.

Physical examination of the medial facial region, which anatomically includes the maxillary process, nose, ethmoid and orbital cavity.

I. Orbital blow-out fractures
Facial injuries of the medial facial region are commonly associated with orbital blow-out fractures. According to a recent study, one third of all blow-out fractures occurred on the football pitch while the other two thirds occurred in other sports. These fractures result from high-velocity, uncontrolled, energetic impacts (blunt trauma) to the eye; that energy is then transmitted to the orbit, increasing intraobital pressure which pushes against the relatively weak inferior orbital wall causing a blow-out fracture. Occasionally these injuries are accompanied by maxillary sinus herniation of the orbital contents. Clinically, the patient may present with differences in pupil size, diplopia (double vision), impaired upward gaze, periorbital ecchymosis (bluish discolouration around the eyes) and an irregular orbital rim edge on palpation.

Treatment
1. Treatment aims to assess and preserve the integrity and function of the associated injured eye.

2. Cover the injured eye with an eye protection shield or polystyrene cup to prevent any increase in intraobital pressure and further exacerbation.

3. These injuries will require the player to be removed from the field of play and be referred urgently to the nearest, most appropriate hospital.

II. Nasal fractures
Owing to an extensive vascularisation of the nose, nasal fractures in most scenarios are accompanied with epistaxis. Besides the epistaxis, nasal/septal fractures or dislocations are also common and will present with associated oedema, deformity, periorbital ecchymosis (bluish discoloration around the eyes), nasal tenderness, crepitus, restricted nasal airflow and possibly rhinorrhea (cerebrospinal fluid from the nose), which is symptomatic of a cribriform plate fracture.

Treatment
1. Anterior epistaxis is usually managed effectively at the touchline by pinching the anterior nose (nostrils) closed with two fingers and holding compression for approximately 10 to 15 minutes.

2. Additionally, one can apply a cold pack to the injury site to reduce swelling if necessary. The decision whether the player can return to the field of play will depend on the clinical circumstances, degree of pain, presence of bleeding and other associated injuries.

3. If epistaxis persists despite manual nasal pinching, then anterior nasal packing is required using either gauze or, alternatively, a commercially produced nasal pack.

4. Players presenting with nasal fractures, persistent epistaxis and rhinorrhea, should be assumed to have suffered a cribriform plate fracture until proven otherwise and must be referred to hospital immediately for further evaluation and medical treatment.

5. Consider pain management by administering analgesia, if clinically indicated.

Physical examination of the lateral facial areas, which anatomically includes the zygomatic arch and temporal bones.

Zygomatic fractures
Zygomatic fractures are fairly common in contact sports like football. These injuries clinically present with diplopia, subconjuctival haemorrhage, global malposition, periorbital ecchymosis, malfunction of the jaw (trismus, pain on movement) and increase the width of the face physically due to the flattening of the cheekbones.

Treatment
1. There is no specific out-of-hospital management for zygomatic fractures.

2. Consider pain management by administering analgesia, if clinically indicated.

3. The player must be referred to the nearest, most appropriate hospital immediately for further evaluation and medical care. These injuries require surgical reduction and commuted zygomatic fractures require internal fixation.

NB: It must be stated that not all facial fractures will require maxillofacial specialist consultation nor hospital referral and may often wait for any visiting team to return home before such consultations are made. However, if in doubt it is always safer to refer a player with a facial injury to hospital for an accurate diagnosis and appropriate medical care if warranted.

Dental emergencies
Dental emergencies are common clinical presentations in sport with football being accountable for an estimated 50% of sport-related orofacial trauma. An Israeli study revealed that 54% of all sport-related traumatic dental and oral injuries were sustained while playing football.

Tooth avulsions
Tooth avulsions are considered one of the most serious and prevalent dental injuries associated with playing football. A recent Brazilian study revealed that tooth avulsions accounted for 59.3% of all dental injuries relating to the sport. This injury is associated with high-impact facial trauma knocking the tooth out of the socket. Treatment aims for the re-implantation of the tooth within the first 30 minutes to 1 hour following the tooth avulsion, as recommended by the International Association of Dental Traumatology. This gold standard has an optimal survival rate of 90%; thereafter, the long-term outcome is poor.

Treatment
1. Attempt to locate the avulsed tooth if possible. If it is just the crown that is broken the root may still be intact leaving the tooth salvageable.

2. Once located, avoid handling the tooth at the root end as this will preserve the periodontal ligament fibers.

3. Do not scrub the tooth or allow it to dry, instead rinse the tooth with sterile normal saline or running water.

4. Do not attempt the re-implantation of the avulse tooth in the presence of a coexisting maxillae or mandible fracture.

5. Once cleaned, the healthcare provider should attempt to replant the tooth by firmly pressing it into the socket if the player is not to return to the field of play. If the player elects to return to the field of play, rather than be substituted and have the avulsed tooth manually re-implanted, the dental consequences of this decision should be explained to him/her, and the tooth should be preserved in an appropriate container and preserved in cold milk or iced salt water if available. Once the match has ended, re-implantation may be attempted.

6. During insertion, a palpable click should be felt, indicative of correct re-implantation of the avulsed tooth. Thereafter, temporarily secure the re-implanted tooth in place using a custom-made mouth guard or sugar-free gum if available.

7. If re-implantation is not possible or fails, the avulsed tooth must be preserved by keeping it either in the cheek or under the tongue of the player, as saliva is the best transportation medium. Alternatively, preserve the avulsed tooth in cold milk or iced salt water if available.
8. If the avulsed tooth is not located, then treatment should aim to control bleeding and physical examination to rule out any coexisting fractures.

9. Consider pain management by administering analgesia, if clinically indicated.

10. After the match, the player should be referred for dental consultation and appropriate management.

Dental fractures
In addition to tooth avulsions, additional types of dental trauma include tooth luxation and dental fractures of the crown, the root and open alveolar fractures. According to a recent Brazilian study, dental fractures account for 71% of all football-related facial injuries.

Crown fractures
This is a simple fracture of the enamel of the crown. Clinically, the player will present with pain with or without sensitivity to cold water or air. The exposed dentin may have an ivory-yellow appearance while a pink blush or a drop of blood in the centre of the tooth will represent pulpal exposure.

Treatment
1. Attempt to locate the tooth fragment if possible and handle only the enamel end.

2. If located, do not scrub the fragment or allow it to dry, instead rinse the fragment with sterile normal saline or running water.

3. Consider pain management by administering analgesia, if clinically indicated.

4. The player may return to play.

5. After the match, the player may be referred for dental consultation but this is not urgent.

Root fractures
A tooth may sustain a root fracture following high-impact dental trauma. The tooth may be intact or mobile; pain may or may not be present, depending on the severity of the fracture.

Treatment

1. Assess the number of injured teeth involved, while simultaneously attempting to control any bleeding with a gauze dressing.

2. Use the adjacent tooth as a splint to secure the mobile tooth using a custom-made mouth guard or sugar-free gum, if available, to stabilise the fractured tooth.

3. Return to the field of play should not be considered under normal circumstances.

4. Consider pain management by administering analgesia, if clinically indicated.

5. After the match, the player must be referred immediately for dental consultation.

Tooth luxation

Tooth luxation is described as the displacement or rotation of the tooth within the socket following significant dental trauma. These injuries are painful, indicating underlying root, neurovascular and periodontal ligament structural involvement or injury.

Treatment

1. Assess the stability and number of injured teeth involved while simultaneously attempting to control any bleeding with gauze dressings.

2. Attempt to reposition the tooth back into its original position.

3. Should this procedure fail or cause excessive pain, the player should be removed from the field of play and referred for dental consultation as soon as practically possible. If the player wishes to return to the field of play, after failure to successfully reposition the tooth or does not wish to have the tooth manipulated, it is up to the player and medical professional to reach a decision, knowing the complications that may result, as this is not a life-threatening injury.

4. Consider pain management by administering analgesia, if clinically indicated.

5. On the other hand, should this procedure be successful, immediate return to play can be considered, provided the player uses some form of mouth guard, even custom made, which is used for dental stability and protection. The medical professional must also rule out any possibility of coexisting alveolar fractures before making this decision. Should the latter occur, the player should be referred for urgent dental/maxillofacial consultation and related management.

Alveolar fractures

Alveolar fractures usually coexist with other dental injuries previously discussed in this section and rarely present on their own. These injuries are diagnosed through careful palpation of the gum line and sockets, identified by increase tenderness and usually accompanied by bleeding.

Treatment

1. Control any bleeding using a gauze dressing and apply gentle pressure around the identified tooth/teeth.

2. If a fracture is suspected, do not attempt to reposition an avulsed tooth and do not remove any displaced alveolar fragments.

3. Consider pain management by administering analgesia, if clinically indicated

4. The player should be referred for immediate dental/maxillofacial consultation and management.

Ear injuries

The most common part of the external ear that is exposed to trauma in football is the pinna, which is well-vascularised. As such, injury to the pinna can result in bleeding between the perichondrium and cartilage, leading to an acute auricular haematoma. This type of haematoma, if not evacuated in time, will eventually cause infection followed by necrosis resulting in a "cauliflower ear" deformity. Besides an acute auricular haematoma of the outer ear, blunt trauma can also rupture the inner ear's tympanic membrane, leading to hearing loss.

Treatment

1. Examination of the outer and inner ear is preferably undertaken in the team changing room, which is a quiet environment, as assessment of hearing integrity is almost impossible at the touchline.

2. Otorrhea (cerebrospinal fluid from the ear), with or without bleeding, is indicative of an underlying base-of-skull fracture, which is potentially life threatening. Players presenting this clinical picture must be referred immediately to the nearest, most appropriate hospital for further evaluation and management.

3. Simple traumatic perforation of the eardrum may not be diagnosed immediately during training or competition unless there is evidence of blood at the outer external meatus, unilateral pain on the affected side, obvious loss of hearing on the affected side, onset of dizziness or vertigo. All of these symptoms may result in the player having to be removed from the field of play and examined with an otoscope. If perforation of the eardrum is diagnosed, non-urgent specialist consultation will be required. Because otitis media may occur following traumatic perforation, players should be advised to keep the ear canal dry in order to prevent precipitation that may lead to this condition.

4. Consider pain management by administering analgesia, if clinically indicated.

5. For a haematoma in a pinna, the treatment is targeted at preventing necrosis of the auricle cartilage. A conservative approach to touchline treatment may include simple needle aspiration of the haematoma followed by application of a firm compressive bandage over the injured ear to arrest the bleeding and prevent the re-accumulation of blood, or a compression bandage only during the match with aspiration performed later. Whichever approach is used, the player should be referred to the nearest, most appropriate hospital for further evaluation and management.

Ocular emergencies

The complex anatomical structures of the face may make the clinical diagnosis of facial injuries quite difficult, especially ocular emergencies. Besides diagnosis, management of acute ocular injuries can be extremely challenging at the sideline. For this to occur adequately, the healthcare provider needs to be skilled in recognising a range of acute ocular injuries, evaluating these with accuracy and then managing them appropriately, aware of the medical limitations in the pre-hospital setting. A recent study revealed that sport-related eye injuries are one of the chief contributors of non-congenital blindness; hence, emergency care efforts aim to prevent vision loss.

Minor ocular trauma

Periorbital contusion ("black eye") is usually the consequence of blunt trauma to the ocular region, leading to periorbital ecchymosis (bluish discolouration around the eyes) and severe swelling of the eyelid. This injury can present bilaterally, rarely on the field of play, in severe head trauma, which is indicative of possible underlying basilar skull fractures.

Treatment

There is no specific treatment for an acute periorbital contusion, but the aim is to prevent any sudden increase in intraocular pressure and the unintended exacerbation of any underlying or missed global injury/herniation. Therefore the medical professional should examine the eye and surrounding soft tissue before oedema develops and note any abnormal finding that may require routine/urgent specialist ophthalmological consultation and management.

Corneal abrasions: A glancing blow from another player's finger or similar object to the eye can easily damage the corneal epithelium, leading to a corneal abrasion. In addition to direct trauma, a corneal foreign body (grit or dust) may adhere to the corneal epithelium or the inner surface of the upper eyelid and lead to a corneal abrasion. During blinking, the foreign body may rub across the cornea, causing an abrasion associated with acute pain.

Treatment

Any foreign body may be symptomatically relieved by its removal using sterile normal saline, or equivalent liquid, irrigation of the cornea using a 20ml syringe, preferably under local anaesthesia.

Corneal abrasions without any obvious foreign body may be treated by the application of a local antibiotic ointment and patch over the affected eye for a 24-hour period, with re-evaluation thereafter. Returning to the field of play during a match will depend on the clinical condition of the eye and its treatment options.

Eyelid lacerations: Blunt trauma to the orbital region may cause the skin over the eye to tear, leading to an eyelid laceration. These injuries usually require cosmetic closure under appropriate hospital conditions.

Treatment

1. Stop any bleeding and examine the injured eye for any orbital injury.

2. Dress the wound with a dry dressing if needed or leave it open until the match is completed if the player wishes to return to play and refer for definitive cosmetic suturing later, if required and available.

Severe ocular trauma

Orbital blow-out fractures: As a consequence of a high-energy blow to the eye and orbital region by a player's elbow, a fist and any other object of an appropriate size and shape that can fit within the orbital rim, an orbital

blow-out fracture can occur. The injury may present clinically with peri-orbital surgical emphysema accompanied with diplopia.

Acute global rupture: On rare occasions, extreme blunt or penetrating trauma to the orbit may lead to acute global rupture, leading to a severe reduction or complete loss of vision and is associated with poor outcomes.

Treatment

1. Prompt accurate assessment, followed by effective clinical interventions of ocular emergencies prevent secondary injury, leading to better outcomes.

- When possible, always treat the player in the seated or semi-Fowler's position, keeping the head upright, and maintain this position even during transportation to hospital.

- Avoid any manoeuvres that will lead to an increase in intraocular pressure by keeping the player calm, reassured and informed at all times.

- Simple vision checks should be undertaken to assess the integrity of the injured eye, by asking the player whether he can see out of the injured eye, counting the number of fingers you display, reading signage and whether the vision is double. Physical findings and accurate visual acuity should be well documented.

- Avoid any pressure to the eyeball (globe) during examination or when applying a protective eye shield over the injured eye. If a protective eye shield or pads are not available, tape the bottom end of a polystyrene or plastic cup over the injured eye. Do not apply eye pads in acute global rupture, only protective eye shields.

- Avoid valsalva manoeuvres by aggressively treating any nausea and vomiting with an appropriate antiemetic, if clinically indicated. Ondansetron is the drug of choice in this instance and should be administered, if available.

- Please note, all ocular emergencies should be treated as life-threatening emergencies and should be urgently referred to the nearest, most appropriate hospital for specialist ophthalmological consultation and management.

Conclusion

Please note, players presenting with the following clinical symptoms or injuries should be considered to be potentially life threatening and should be considered for emergency referral to the nearest, most appropriate hospital, namely:

- Any facial injury that may threaten the airway, breathing, circulation status
- All ocular emergencies
- All facial injuries associated with neurological symptoms and signs

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1.4 Abdominal Injuries

Introduction

Abdominal injuries in football occur infrequently, but are slowly increasing. Due to this relative infrequency, it may go unnoticed for a prolonged period before the injured player is referred to hospital for consultation and treatment. Additionally, abdominal injuries do not present as obviously as many other orthopaedic injuries, because of the internal and concealed locations of the intra-abdominal organs. Strong consideration and knowledge of the mechanism of injury may contribute to earlier diagnosis of acute, serious abdominal injuries.

Mechanism of injury

The two most common mechanisms of injury quoted in the literature on the causes of intra-abdominal injuries in football are contact of the injured player's abdomen with either the knee of another player or a high-velocity moving ball.

Symptoms and signs

The traditional examination of the abdomen, including inspection, palpation, percussion and auscultation, may reveal bruising, tenderness, guarding and loss of bowel sounds, and therefore encouraged.

Initial pain may present after abdominal injury, but this does not always occur, and abdomen pain may be delayed until signs of peritonitis develop, which include abdominal tenderness, rebound tenderness and guarding. These late signs usually occur with the rupture of a hollow organ, e.g. jejunum, which takes time to develop and is not usually a life-threatening medical emergency.

More commonly, blunt trauma to the abdomen may cause injury to the solid organs of the abdomen, namely the liver, spleen or possibly kidneys, resulting in intra-abdominal haemorrhage which may be life threatening, depending on the extent of the haemorrhage. Injured players may present with initial pain and, over time, develop hypovolaemic shock as the haemorrhage increases. It is in this type of patient that resuscitation may be required if shock develops and immediate referral to the nearest, most appropriate hospital will be required.

Treatment

Injured players in hypovolaemic shock are managed like any other shock patient with protection of the airway, supplemental oxygen administration if necessary, intravenous access and limited crystalloid administration sufficient to maintain the blood pressure at 90mm Hg and an appropriate diluted, titrated infusion of an intravenous analgesic with emergency transfer to hospital. Hypotensive resuscitation is preferred in such patients, because injudicious use of large quantities of intravenous crystalloids may increase the blood pressure at the bleeding site and worsen the bleeding. Therefore, the sooner the player is transferred to hospital and is under the care of a surgeon, the better.

All necessary equipment to adequately manage a player post-abdominal injury on the field of play or at the touchline is available in the FIFA Medical Emergency Bag.

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1.5 Chest injuries

Introduction

In football, chest injuries are almost exclusively limited to chest-wall muscle tears and fractured ribs, when such rare events do occur. The mechanism of injury for fractured ribs is contact against a hard object while in motion, e.g. a player's elbow against another player's chest, a hard landing onto the field of play or collision against a goalpost. Whatever the mechanism of chest-wall injury, most injuries cause severe pain, and removal from the field of play is usually warranted, either temporarily or for the rest of the match, unless the chest wall can be adequately strapped to alleviate the pain and allow functionality once again.

Fractured Rib/s

Symptoms and signs

- Obvious mechanism of injury present
- Pain over the affected rib/s
- Pain on breathing, particularly inspiration
- Pain on manual compression of the rib/s over the affected site
- Dyspnoea with/without exertion
- Bruising over the affected fracture site
- Swelling over the affected fracture site
- Assess the player post injury for alertness, adequacy of the airway, breathing and circulation status and initiate resuscitation as required
- Assess the respiratory rate, depth and pattern of breathing and decide whether urgent transfer to hospital is required
- Assess the lung breathing sounds bilaterally to ascertain if a clinical pneumothorax has occurred. A fractured rib/s may tear the visceral pleura and underlying lung and cause a pneumothorax, which may not be clinically detected if small or it may be larger and present clinically with decreased breath sounds found on auscultation and increased resonance on percussion on the affected side. Should this occur, a decision must be made regarding management of the pneumothorax, if at all.

Treatment

- If the fractured rib/s do not present with pain or symptoms and signs of pneumothorax or other associated chest-wall or internal organ injury, the player may be allowed to continue, with or without appropriate chest-wall strapping, and monitored closely for any signs of clinical deterioration, which may require removal from the field of play and referral to the nearest, most appropriate medical facility for radiological investigations and management.

- If the fractured rib/s present symptoms and/or signs of pneumothorax or other associated internal organ injury, then the player should be urgently transferred to the nearest, most appropriate medical facility, with the addition of supplemental oxygen via face mask during ambulance transfer.

- If the fractured rib/s has resulted in a clinical pneumothorax with deteriorating symptoms and signs, the presence of a tension pneumothorax must be considered, clinically sought and, if present, or in any doubt, urgently treated. This rare-but-life-threatening medical emergency is caused by a tear in the lung airways in such a way that, during inspiration, air escapes into the pleural space, while, during expiration, air is trapped inside the pleural space due to a valve-like mechanism. This results in successive volumes of air entering the pleural space slowly compressing the unilaterally affected lung, then compressing the mediastinum until the heart itself is pushed to the opposite side by the increasing pleural pressure. Once the heart is moved, compression and closure of the superior and inferior vena cavae may occur, decreasing venous return to the right side of the heart and thereby decreasing cardiac output, leading to severe hypovolaemic shock and eventually non-output cardiac arrest.

Symptoms and signs of a tension pneumothorax include:

- Dyspnoea at rest
- Tachypnoea at rest
- Severe shock developing post chest injury
- Decreased or absent breath sounds on the affected side
- Hyper-resonance to digital percussion on the affected side
- Distended neck veins
- Displacement of the cardiac apex beat to the non-affected side
- Deviation of the trachea to the non-affected side when felt digitally

NB: if there is clinical evidence or even a suspicion of a tension pneumothorax from the clinical picture of the patient, immediate treatment must be undertaken to decrease the pressure within the affected pleural space. One must never refer the patient for radiological investigation in order

to confirm the diagnosis, because this may lead to cardiac arrest from the delayed release of life-threatening intra-pleural pressure. Tension pneumothorax is always a clinical diagnosis and should never be seen on a radiological investigation.

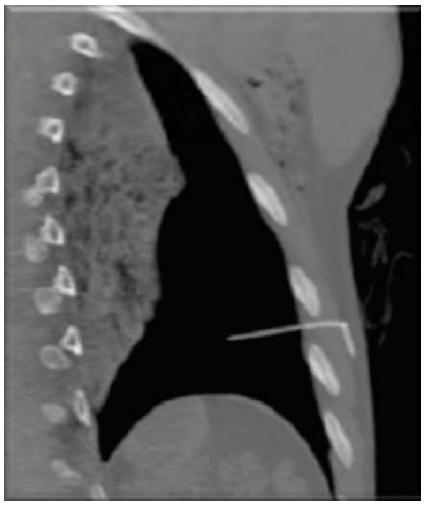
Emergency treatment of a tension pneumothorax

- Treatment of a tension pneumothorax aims to immediately decrease the raised intra-pleural pressure, thereby allowing the displaced heart to return to its original position with the concomitant unkinking (opening) of the superior and inferior vena cavae, and therefore restoration of venous return and cardiac output.

- This is achieved by making a hole in the chest wall into the pleural cavity and thus releasing the entrapped air under pressure.

- This can be undertaken by:
  – Inserting a standard 5 centimetre (cm) long, large bore (16G / 14G) intravenous catheter needle/angiocatheter into the affected pleural cavity in the fourth or fifth intercostal space, immediately above the rib perpendicular to the skin, in the vicinity of the anterior/mid axillary line. [This location is selected because the thickness of the chest wall at the anterior/mid axillary line is 1 cm thinner than that at the traditional second intercostal space, mid-clavicular line].
  – Remove the cap from the top of the angiocatheter so that the air can escape once the pleural space has been entered.
  – As the pleural space is entered, air may be heard escaping from the end of the angiocatheter. Remove the needle leaving the silicon catheter in situ.
  – Secure the catheter in place to prevent dislodgement.
  – Transfer the player urgently to hospital for definitive treatment and possible insertion of a tube thoracostomy.
  – Although air can escape under pressure from the catheter, these are known to kink or displace fairly easily, and therefore the patient must be constantly monitored until safe arrival in the emergency department where radiological investigations can be undertaken to determine the exact diagnosis, and treated accordingly.

NB: The insertion of a needle angiocatheter into the pleural cavity is not a simple procedure and complications can occur, particularly if no pneumothorax is present and the both lungs are fully inflated. It is therefore important to ensure that the clinical symptoms and signs are indeed present and that a diagnosis of tension pneumothorax is clinically evident or highly suspected. Do not insert any needles into any chest without initial chest auscultation, palpation and percussion.



Decompression at the fourth intercostal space, anterior axillary line
Source: http://www.epmonthly.com/departments/clinical-skills/needle-decompression-for-tension-pneumothorax/

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1.6 Fractures and Dislocations

Introduction

Bone and joint injuries are a common complication of football being a contact sport, accounting for 10% of all football injuries, yet rarely are such injuries life threatening. Fractures in the lower extremities (44.4%) are more common that in the upper extremities (27%). This section will confine itself to the diagnosis, management and transfer of players with acute bone and joint injuries in general and will not address the details of each specific injury that may occur. Such detailed information is obtained from textbooks in sports or orthopaedic medicine.

Mechanism of injury

- Fractures are caused by two main types of mechanisms, namely, repeated submaximal loads resulting in fatigue to the bony structure, causing stress fractures or the sudden extrinsic loading resulting in an overt fracture.

- Dislocations occur as a result of sudden overloading of a joint with the result that normal joint architecture is distorted and damaged, with one of the bones of the joint slipping out of the joint cavity. Although dislocations are not common in football, if they do occur, it is mostly the shoulder that dislocates, particularly in goalkeepers. Other joints are less involved, but do occur, e.g. anterior dislocation of the head of the fibula on the tibia.

  Recurrent dislocations occur more often with minimal force as a result of ligament laxity around a previously injured joint.

Symptoms and signs

Observation of the mechanism of injury by on-duty medical professionals is an important part of the assessment of any contact injury in football, especially for those related to fractures or dislocations.

Stress fractures will present with pain as the main symptom and will require removal of the player from the field of play and further medical evaluation at a later time and place as appropriate.

Overt fractures occurring post contact on the field of play are characterised by:

- Severe pain at the site of fracture
- Swelling at the site of fracture
- Deformity at the site of fracture
- Bruising over the site of fracture
- Inability to bear weight on the affected limb

Dislocations occurring post contact on the field of play are characterised by:

- Sudden sensation of the joint "popping out"
- Sudden pain over the affected joint
- Inability to move the affected joint
- Loss or decreased sensation over the affected joint area
- Abnormal surface anatomy around the joint area – possible concavity in the surrounding musculature or a palpable hard swelling locally.

Treatment

Although life-threatening fractures are rare in football, all fracture management first begins with ensuring that the basic airway, breathing, circulation and level of consciousness of the player is fully functional and that no resuscitation and/or stabilisation is required for other life-threatening injuries, before the fracture itself is attended to.

Therefore, always make sure that in the player with a possible fracture:

- the player is fully conscious, with no concussion or injury to the head
- the player does not have a possible injury to the neck or spine
- there is no threat to the player's airway from other injuries to the head or neck
- the player is breathing adequately, without pain or discomfort
- there is no obvious bleeding that needs control

Only once these factors have been adequately assessed and managed if present, should attention be given to the fracture site.

Basic principles of **fracture** management include:

- Controlling any external bleeding from the fracture site appropriately
- Assessing neurovascular function distal to the fracture site and recording this
- Pain control. In acute fractures, intramuscular administration of analgesics is contraindicated because it results in delayed absorption of the analgesic and it may only be absorbed when the player deteriorates into hypovolaemic shock and then complicate the situation further.

Therefore, the most appropriate and effective means of analgesia is the diluted, slow titration of an intravenous analgesic to effect.
- Traction, where necessary
- Realignment/reduction, where necessary
- Immobilisation of the fracture site post reduction
- Elevation of the immobilised fractured limb
- Transfer the player from the field of play adequately
- Transfer to the nearest, most appropriate medical facility.

Traction with reduction of the fracture should only be attempted if there is adequate pain control. Lack of pain control, with resultant increased local muscle spasm, may prevent adequate reduction and should not be attempted outside of the hospital, where adequate pain control can be effectively achieved.

If neurovascular damage is found distal to the fracture site, it is wise to attempt one episode of fracture reduction in order to re-establish vascular flow and/or nervous function. If this is not achieved, splint the fracture comfortably in the position found and transfer the player urgently to the nearest, most appropriate medical facility that can treat this serious medical problem.

NB: Long-bone (e.g. femur and pelvic) fractures can lose a substantial volume of blood into the surrounding soft tissues which may result in clinical hypovolaemic shock requiring intravenous fluid resuscitation in addition to fracture immobilisation and urgent transfer to the nearest, most appropriate medical facility. Do not delay treatment and transfer in these cases of suspected fractures.

Basic principles of **dislocation** management include:
- Assessing neurovascular function distal to the dislocation site and recording this
- Pain control by appropriate means
- It is usually difficult to manually reduce a primary acute dislocation due to the accompanying pain and muscle spasm, unless it is attempted almost immediately before these occur at the site of dislocation. If it is not possible to relocate the dislocation, it should be comfortably splinted and the player transferred to the nearest, most appropriate medical facility.
- Any acute dislocation of the knee joint is a serious, potentially limb- threatening injury because of concomitant injury to the popliteal artery in 29% to 40% of cases, and up to 49% of nerve injury. Therefore, all players with a dislocated knee must be immediately transferred to the nearest, most appropriate medical facility for radiological evaluation of the popliteal artery and definitive corrective surgery, if and when necessary, noting that there is only a six-hour window of opportunity to prevent permanent ischaemic damage to the distal limb.
- No player with a fracture or dislocation should be allowed to continue with play, with the exception of some with recurrent dislocations/subluxations.

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1.7 Field-of-play wound management

Medical professionals frequently encounter bleeding wounds, from abrasions to lacerations during football matches. In fact, skin wounds are the fourth most common injury in youth football. The field-of-play assessment and management of these injuries require a special set of knowledge and skills, as some wounds may present specific challenges in certain circumstances. This chapter will cover the essentials of field-of-play acute wound management with specific reference to scalp and facial lacerations, as these are known to cause excessive bleeding.

Field-of-play assessment:

- Ensure that any football player's tendency for increased bleeding, due to specific medical conditions or medications are known as part of each player's medical history.
- Ensure that the tetanus toxoid immunisation status is known and up to date, as part of each player's medical history.
- Ensure that all known allergies of each football player are known as part of their medical history.
- During the match, attempt to observe the mechanism and the setting of the injury.
- Control the bleeding.
- Inspect the wound to determine the extent and depth of the injury.
- Identify and remove all foreign matter and contaminants.
- Perform an appropriate neurovascular examination.
- Follow all the precautions to prevent wound infection.

The FIFA Laws of the Game: rules concerning bleeding wounds:
Any player bleeding from a wound must leave the field of play.

He may not return until the referee is satisfied that the bleeding has stopped.

A player is not permitted to wear clothing with blood on it.

Classifications of wounds by bleeding pattern:
Wounds with capillary bleeding: these wounds are the most commonly encountered form of bleeding, occurring due to skin abrasions. This type of injury is usually painful and the bleeding is slow but may be persistent. The amount of bleeding is directly proportional to the area of the skin involved. In football, these wounds are most commonly seen when playing on artificial turf.

Wounds with venous bleeding: these wounds occur as a result of either lacerations or deep puncture wounds. The blood flow may be minor to major, depending on the size of the traumatised vein/s.

Wounds with arterial bleeding: this situation is a critical medical emergency and must be promptly recognised and managed. Bleeding is rapid and pulsatile. Once recognised, immediate control of the bleeding must be undertaken using whatever means are available and appropriate, namely:

- Use of ice to manage minor non-penetrating bleeds/ haematomas

- Direct digital counter pressure, using gloved fingers with/without gauze, compression bandage or equivalent material.

- Digital counter pressure near the wound, using gloved fingers.

- Pressure to a pressure point, e.g. palpable pulse area near the wound, using gloved fingers.

- Elevation of a limb with a venous bleed, using gravity to decrease bleeding.

- Closure of the wound using sutures or staples or equivalent in order to stop bleeding.

- Use of an appropriate arterial tourniquet for arterial bleeding, if and when appropriate.

The field-of-play wound kit:

	ITEM	FUNCTION
Medication	Lidocaine 1% or 2%* with appropriate-sized syringe and needle, e.g. 27 gauge needle.	Local anaesthesia
Skin disinfectant	Chlorhexidine or equivalent	Skin preparation
High-pressure irrigation system**	18-gauge needle attached to 35ml syringe OR equivalent using 0.9% normal saline or equivalent fluid	Wound irrigation to remove foreign matter
Skin-closure material	Tape, staples or sutures, whichever is most appropriate and available at the time	Wound closure
Wound-dressing material	Any relevant transparent permeable dressing	Dressing
Prepared suture set	Scissors, tissue forceps, artery forceps, needle holders, washing sponges, gauze swabs, gloves	

Scalp lacerations:
Lacerations of the scalp may present challenges due to excessive bleeding, which may limit thorough physical examination. Understanding scalp anatomy is a prerequisite for adequate management.

Management of scalp wounds:
- Attempt to obtain adequate haemostasis by applying direct, digital pressure or, if appropriate, clamping the bleeding vessel with an appropriate forceps or equivalent.
- Obtain adequate local anaesthesia, if practically possible.
- Examine the wound to estimate the depth and assess the condition of the scalp. Carefully, digitally palpate the scalp to determine the presence of a clinical skull fracture.
- If relevant and appropriate, irrigate a contaminated wound using a hand-operated syringe irrigation system and fluid.
- Apply antiseptic/antibacterial ointment to the wound once bleeding has stopped. If bleeding continues, omit any ointment and proceed to apply gauze swabs over the wound followed by a compression bandage. If appropriate to the circumstances, use may be made of either sutures or surgical staples.
- Deep scalp lacerations should be adequately examined and closed in an emergency department where there is adequate light, equipment and time available, and preferably not in the environment of the football stadium.

Forehead lacerations:
- These are managed similarly to scalp lacerations.

Eyelid lacerations:
- These injuries must be referred to a hospital emergency department for adequate ophthalmic examination and management.
- Initially perform as thorough an ophthalmic eye examination as possible to exclude obvious corneal abrasions, any foreign bodies or the potential for globe rupture.
- Apply antibiotic ointment to the eye of the lacerated eyelid and close the eye with a pad.
- Refer the player to the emergency department.

Field-of-play return criteria:
- Complete haemostasis of any wound must be achieved.
- The wound must be closed and a dressing applied with no risk of blood contamination to other players or officials.
- There must be no concomitant associated injuries, e.g. head trauma.

Human bites:
Human bites are described in trauma literature as occurring either as "a clenched–fist injury" or as an occlusive bite. A clenched-fist injury usually results from one player punching another in the mouth accidently or intentionally. Although rare, this type of wound does occur in football. Human bites can lead to significant injuries either from direct trauma or subsequent infection. It is associated with an infection rate of 10-20%.

Management of human bites:
- *Uninfected wounds:* examine the hand through the entire range of motion to exclude injuries to the joint or joint capsule, tendons or deep spaces. If injuries are evident in these structures, then an immediate referral to a hand surgeon is warranted. If no damage to such structures is suspected then conservative management is the best option. The wound must be thoroughly irrigated, left open to heal and tetanus prophylaxis administered according to the patient's immune status. Prophylactic

antibiotics should be initiated but not to the superficial ones. The wound must be reassessed within 24-48 hours.

- *Infected wounds:* all infected human bites need to be referred to a hand surgeon to consider open irrigation and debridement and initiation of intravenous antibiotics.

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2 Medical Emergencies in Football

2.1 Prevention and management of Sudden Cardiac Arrest in football

Sudden Cardiac Arrest (SCA) is the leading cause of sudden death in footballers on the field of play (FoP) and typically the result of undiagnosed structural or electrical cardiovascular disease. The infrequent-yet-regular occurrence of SCA during football can often be prevented through cardiovascular screening and, if necessary, effectively treated by immediate cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) use.

The majority of SCA in footballers occurs during training or competition because exercise is a trigger for lethal arrhythmia in players with an underlying cardiac pathology.

Incidence of SCA

The frequency of SCA in footballers is unknown, largely due to the absence of mandatory reporting, but a survey of the FIFA Member Associations revealed an unofficial average incidence of SCA in one footballer occurring every month for the past 10 years. With the recent introduction of the FIFA Sudden Death Registry undertaken in conjunction with Saarland University in Germany, it is envisaged that the true incidence will eventually become known.

Causes of SCA

SCA in football is primarily due to structural and electrical cardiovascular abnormalities that are usually undetected (Table 1). The combined prevalence of all cardiovascular disorders known to cause Sudden Cardiac Death (SCD) in young athletes is estimated at 3 per 1,000 (0.3%).

Hypertrophic Cardiomyopathy (HCM)

HCM is among the most common causes of SCA and consists of an asymmetric left ventricular (LV) hypertrophy. A 12-lead resting electrocardiogram (ECG) will reveal abnormal results in up to 95% of patients with HCM, with T-wave inversion and ST depression usually in the infero-lateral leads, or prominent (wide) Q waves. Echocardiography can confirm the diagnosis.

Coronary artery anomalies

Coronary artery anomalies are the second leading cause of SCA, usually due to an abnormal origin of the left coronary artery arising from the right sinus of Valsalva.
If suspected, transthoracic echocardiography can identify the coronary artery origins in 80-97% of patients. Echocardiography can confirm the diagnosis.

Arrhythmogenic right ventricular cardiomyopathy

Arrhythmogenic right ventricular cardiomyopathy (ARVC) is the leading cause of SCA in the Veneto region of northeastern Italy. ARVC is characterised by a progressive fibrofatty replacement of the ventricular myocardium causing wall-thinning and dilatation.

ECG abnormalities include anterior precordial T-wave inversion (V1-V3), QRS duration >110ms, and right bundle branch block. Echocardiography can confirm the diagnosis.

Myocarditis

Acute inflammation of the myocardium may lead to lethal arrhythmias. Although myocarditis may be asymptomatic, symptoms include a prodromal upper respiratory tract viral illness and chest pain followed by progressive exercise intolerance and dyspnea. An ECG may be abnormal and may confirm the diagnosis.

Ion channel disorders

Ion channel disorders such as long QT syndrome (LQTS), short QT syndrome, Brugada syndrome, Wolff-Parkinson-White syndrome (WPW) and catecholaminergic polymorphic ventricular tachycardia (CPVT) are primary electrical diseases of the heart predisposing to lethal ventricular arrhythmia.

Cardiovascular screening

FIFA Pre-Competition Medical Assessment

The goal of cardiovascular screening is to identify players with cardiac conditions at risk of SCA. The FIFA Pre-Competition Medical Assessment (PCMA) involves a focused investigation of player medical history, family medical history, a cardiac specific physical examination and a resting 12-lead ECG.

- An ECG should be performed on all players at the beginning of their playing career and once every year thereafter.

- Echocardiography should be undertaken by an experienced cardiologist when abnormal results are found, and should be considered at least once in a player's early career to better detect structural disorders not routinely identified by ECG.

- An exercise ECG test should be considered in athletes older than 35 years of age to screen for ischaemic coronary artery disease.

History and physical examination
Most players with unknown cardiac disease are asymptomatic. In fact, 60-80% of players who develop SCA have no previous symptoms.

- Warning symptoms, if present, may include: syncope or chest pain with exertion, unexplained seizure, and excessive shortness of breath or fatigue with exercise.

- A family history of a genetic heart condition or premature death in relatives under the age of 50 years requires careful cardiac evaluation.

- Physical examination focus on the detection of murmurs and the physical stigmata of Marfan syndrome.

ECG screening
ECG is more sensitive than history and physical examination in identifying players with an abnormal cardiac disorder.

- It is important to note that current ECG standards of interpretation should be used to distinguish pathological ECG abnormalities from physiological sport-related ECG alterations (Appendix I). Many ECG changes once referred to as "abnormal" are now recognised as physiological sport-related adaptations in players - so-called "athlete's heart".

Emergency medical response

SCA management requires the development of a comprehensive plan that allows rapid response to any life-threatening medical emergency on the FoP. F-MARC has outlined the FIFA 11 steps for the prevention of SCD in football (Table 2).

Emergency response planning

SCA can be effectively treated through prompt recognition, immediate response, early cardiopulmonary resuscitation (CPR), and early use of an automated external defibrillator (AED).

1. Every school, club and organisation that is involved in football should be prepared to respond to a collapsed player who may be suffering a cardiac emergency. A written emergency response plan for SCA with easy-to-follow policies and procedures should be available to ensure an efficient and structured response.

2. Essential elements of the emergency response plan include regular and frequent training of team members and officials in SCA recognition, how to respond on the FoP, early CPR and AED use, how to summon nearby help and the medical emergency services (EMS), how to transfer the collapsed player safely and effectively from the FoP, and practising and reviewing the response plan regularly.

3. The emergency medical plan should be regularly practised and adapted so that any collapsed player on the FoP, if necessary, can be defibrillated within three minutes of collapse.

Recognition of SCA
Prompt recognition of SCA is the first step in an efficient emergency medical plan. SCA should be diagnosed in any player who presents with the following signs on the FoP:

1. **Non-contact collapse:** Any player who collapses on the FoP without having had any contact with another player or the moving ball is to be regarded as suffering SCA with immediate response on the FoP and activation of the emergency medical plan. Because the referee may be occupied with activities involving the ball in play and therefore may not see the player collapse, it is mandatory that once a non-contact collapse in recognised in a player, the on-duty medical professionals, or equivalent persons, enter the FoP immediately, with one previously designated person running to inform the fourth official or shouting to the referee, as is required. The medical professionals or equivalent persons must not in any way wait for the ball to go out of play, allowing the referee to run to the player with a non-contact collapse, evaluate the player's medical condition and only then summon the healthcare team onto the field of play. This will prevent early defibrillation within 3 minutes of collapse. This immediate response on the FoP for a non-

contact collapse was first introduced, with full referee consent, during the 2014 FIFA World Cup Brazil™.

2. The non-contact collapsed player will be totally **unresponsive (unconscious)** to any verbal or painful stimuli.

3. **Initial normal breathing** deteriorating into gasping and/or slow agonal respiration will occur in the first minutes after SCA and must not be interpreted as normal breathing. After 60-90 seconds, all breathing will usually stop. Do not wait for this to happen before starting CPR and AED use.

4. **Slow seizure-like activity** presenting as involuntary arm and leg movements. Therefore, for any player who has a non-contact collapse with this slow seizure-like activity, on arrival at the player's side, must be regarded as a SCA and NOT be mistaken as a seizure.

Medical management of SCA

Medical management (treatment) of SCA on the FoP involves the following six actions:

1. Early recognition of a non-contact collapse

2. Immediate response on the FoP

3. Immediate evaluation and commencement of CPR – hands-on chest compressions. Chest compressions should be started immediately and continued until the AED has been brought to the collapsed player, correctly applied and ready to analyse the cardiac rhythm. Interruptions in chest compressions should be minimised both before and after defibrillation.

4. **Application and use of the AED when necessary as prompted by the AED because players will usually be in ventricular fibrillation**

5. **Activation of the EMS or summoning the ambulance onto the FoP**

6. **Plans to transfer the player from the FoP to the football stadium medical centre or to the nearest, most appropriate emergency department or cardiac catheterisation laboratory**

Once full CPR and AED resuscitative measures are undertaken as required, a decision must be made as to the transfer of the player to a medical centre for definitive diagnosis and treatment. For this to occur safely and effectively, the player will be required to be appropriately transferred, via coordinated logroll or equivalent transfer method, onto a long spinal/trauma board, adequately immobilised so that the long spinal/trauma board, player and AED are immunised as one unit. This is undertaken, because CPR will be required en route and can only be effectively undertaken if the player is immobilised onto a hard board. Once this has been achieved, a further decision has to be made as to whether the transporting ambulance can be brought onto the FoP to the player's side or the strapped immobilised player transferred to the waiting ambulance nearby.

If the strapped, immobilised player is to be taken to an awaiting ambulance, CPR must NOT be interrupted for more than any single ten-second period. Therefore, once the go-ahead has been called to begin moving the player physically and the team are carrying the player, they must count a ten-second period and, once that brief period is reached during physical transfer, they must halt the transfer, place the strapped immobilised player onto the ground and commence external chest compressions for at least another two minutes. Then the transfer team may begin their next set of ten-second physical transfer towards the ambulance, repeating this sequence with total discipline and attention to detail, always aware of the fact that, during the cessation of chest compressions, the player is "dying", yet during chest compressions, the player is "living". This transfer sequence of "Stop n Start" continues until the player is adequately located inside the transferring ambulance.

It must be stated categorically that, contrary to current internationally recommended CPR protocols, which recommend that a patient without a return of spontaneous pulse should not be transferred by ambulance to hospital, because of issues of futility and cost, this DOES NOT APPLY to resuscitation or CPR of the football player. This means that once CPR and defibrillation have been commenced on the FoP or another location inside the stadium, such resuscitative measures are to be continued, if medically indicat-

ed, en route to the nearest, most appropriate emergency department or cardiac catheterisation laboratory by either air or road ambulance with staff that have been adequately trained in performing adequate CPR (manual chest compressions/positive pressure ventilation/defibrillation/drug administration) inside a moving ambulance.

Survival following SCA

SCA in athletes is largely a survivable event through prompt treatment and access to an AED with survival rates as high as 89%.

Rapid cooling and induced hypothermia for 24 hours in SCA victims with VF arrest have shown improved survival and decreased neurologic complications.

The FIFA Medical Emergency Bag

F-MARC developed the FIFA Medical Emergency Bag (FMEB) to promote a standardized level of advanced life support and emergency medical care on the football field.27

- The FMEB is intended for use by all FIFA member associations internationally, for training and competition, as the recommended emergency medical bag for football team physicians, field-of-play medical teams and other medical professionals on duty during football events.

- An FMEB (or equivalent) with an AED must be at the field side before commencement of all training sessions and all games.

Staff training, preparation and management

- Annual CPR and AED training should be undertaken by all team staff.

- An approved football team and football stadium emergency plan should be established and revised/practised at least annually.

- The FoP medical team should review and/or practise retrieval of the AED and other emergency equipment before each match.

- An on-site ambulance staffed with trained crew and comprehensive medical equipment must be on location within the football stadium for all matches.

- Any football player who suffers a non-contact collapse and is unresponsive should be regarded as in SCA until proved otherwise.

CONCLUSION

SCA is the leading cause of fatality in football with compelling justification for the implementation of effective preventive strategies. SCA is caused by a heterogeneous group of structural and electrical cardiac disorders that are largely inherited but challenging to detect through screening. A comprehensive personal and family medical history, physical examination and ECG are recommended components of cardiovascular screening. ECG screening should be conducted using modern interpretation standards to distinguish physiological cardiac adaptations from abnormalities suggestive of an underlying pathology.

Screening programmes do not offer absolute protection from SCA and will never replace the need for proper emergency planning and access to AEDs. The most important factors influencing survival are the presence of a trained rescuer to rapidly recognise SCA, initiate CPR and provide early defibrillation through on-site AEDs. The football community is in a unique position of having trained rescuers

respond immediately to SCA at organised training practices and competitions. Myoclonic activity is common after SCA in players and should not be mistaken for a seizure. High suspicion of SCA should be maintained in any player that has suffered a non-contact collapse and is unresponsive, with the application of an AED as soon as possible for rhythm analysis and defibrillation if indicated.

Table 1. The FIFA 11 Steps to Prevent Sudden Cardiac Death in Football

PREVENTION

1. PCMA – Player medical history (PMH), family history, and physical exam
2. ECG – 12-lead, resting, supine; initially + annually
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) Annual CPR + AED training for team staff and referees
   b) FIFA Medical Emergency Bag available and checked
   c) Emergency Medical Plan – roles and responsibilities allotted; on-field response practised and rehearsed at least once annually
   d) Field-side 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-side medical team in position (games)
7. Ambulance, fully functional, in position (games)

PERFORMANCE OF THE EMERGENCY MEDICIAL PLAN

8. Immediate recognition of a collapsed player
   a) Assume SCA if collapsed and unresponsive
   b) Seizure activity and/or agonal respiration = 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

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2.2 Non-traumatic, non-cardiac chest pain

Introduction

Although the first thought in a football player suffering acute chest pain is usually towards cardiac causes, there are a number of life-threatening, non-cardiac conditions that present with acute chest pain that need to be considered.

Primarily, "non-cardiac" causes of acute chest pain can be differentiated by the origin of the pathology, namely from:
– the aorta, e.g. aortic dissection
– the lungs/pleura, e.g. pulmonary embolism or tension or simple pneumothorax
– the esophagus/stomach/mediastinum, e.g. esophageal rupture, esophagitis
– the musculo-skeletal system, e.g. costochondritis

It should be noted that football players with a potentially life-threatening cause of chest pain may appear initially relatively well, showing neither vital-sign nor physical examination abnormalities. However, whatever the source of the chest pain may be, medical professionals should always focus on the immediate detection of common life-threatening causes of chest pain and treat accordingly.

Some of these non-traumatic, non-cardiac life threatening medical emergencies are listed below and are included mainly for information and completeness.

Acute aortic dissection

The most critical cause of severe aortic-type chest pain is acute aortic dissection, usually due to congenital abnormalities, hypertension or connective tissue disease. The event that may precede a fatal tear/dissection of the vessel may be simple blunt trauma to the chest.

Symptoms and signs:
- chest pain: acute, intense tearing, with radiation to the back, anterior chest, jaw or abdomen depending on the segment of the aorta that is affected
- due to subsequent obstruction of aortic branch arteries, signs may include:
  – angina pectoris-type pain from myocardial ischaemia
  – acute upper and/or lower limb ischaemia
  – acute abdominal pain
  – acute neurologic deficits, e.g. decreased consciousness, syncope, stroke or paraplegia

- clinical signs of life-threatening cardiac tamponade:
  – cardiac shock with hypotension, tachycardia
  – diminished heart sounds
- congestive heart failure due to acute aortic valve regurgitation
- acute haemorrhagic shock

Treatment:
- Diagnosis on the field of play may not be straight forward unless the diagnosis is consciously considered.

- The most important treatment strategy involves blood pressure control in order to reduce the shear stress and pulse flow intensity.

- Therefore, do not administer uncontrolled, large quantities of intravenous fluids or attempt to increase the systolic blood pressure above 90mmHg.

- Administer supplemental oxygen if present.

- If a 12-lead ECG is available, signs of acute myocardial infarction may be present due to obstruction of the coronary arteries. Likewise, pulseless electrical activity (PEA) due to acute cardiac tamponade may be present and require full cardiopulmonary resuscitation.

- Transfer urgently to the nearest, most appropriate medical facility.

Acute pulmonary embolism

Although pulmonary embolism (PE) is thought to be a rare life-threatening field-of-play medical emergency, the exact incidence is unknown. However, it's occurrence is always possible because of the frequent travel, by road and air, that may increase the risk of PE above that of normal.

Symptoms and signs:
- dyspnea and respiratory distress
- tachycardia/tachypnea
- pleuritic-type chest pain, cough
- haemoptysis
- cardiogenic shock
- sudden cardiac arrest

Treatment:
- Unless the diagnosis of acute PE is the primary possibility, treat the player as for acute non-traumatic chest pain, which is the more common pathology.

- If acute PE is the primary possibility (either due to clinical evidence of deep vein thrombosis, which is usually masked by the muscular effort of the lower limbs during a football game OR due to 12-lead ECG signs of PE, namely - sinus tachycardia, S I/Q III pattern, right axis deviation, complete/complete right bundle branch block, T-wave inversions V1-V3), treat the player symptomatically and transfer urgently to the nearest, most appropriate medical facility.

- There is no specific pre-hospital field-of-play treatment for PE.

Exercise-induced bronchospasm/acute asthma

See section - Acute exercise-induced bronchospasm/asthma

Tension pneumothorax

See section - Chest injury

Inflammatory/Infectious causes of Chest Pain

- pleuritis, pneumonia, bronchitis, mediastinitis

These inflammatory/infectious causes of chest pain are rare on the field of play because signs and symptoms would have presented prior to the match or competition.

Symptoms and signs:
- dyspnea/respiratory distress
- productive (bronchitis, pneumonia) or non-productive (pleuritis) cough
- pleuritic-type chest pain
- fever
- peripheral oxygen desaturation

Treatment:
- immediate removal from any further physical exercise
- treat the player as for acute non-traumatic chest pain, which is the more common pathology
- antipyretic drug therapy
- treat the player symptomatically and transfer urgently to the nearest, most appropriate medical facility

Acute gastrointestinal conditions

- gastro-oesophageal reflux, oesophageal spasm, oesophagitis, spontaneous perforation of the oespohagus:

As the cardiac system and the oesophagus share some common neurological innervations, acute pathology in either system can present with classical symptoms of chest tightness, provocation by exercise and pain-release by rest or nitrates. As such it may be difficult to distinguish clinically between cardiac chest pain and pain originating from the gastrointestinal system, e.g. oesophagus.

Symptoms and signs
- chest pain
- painful swallowing
- tachypnea/dyspnoea
- cyanosis, fever and shock may develop rapidly

Treatment:
- immediate removal from any further physical exercise
- obtain intravenous access and administer as required
- treat the player symptomatically and transfer urgently to the nearest, most appropriate medical facility.

Musculo-skeletal system
See section - Chest injury

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2.3 Anaphylaxis

Introduction
Severe anaphylaxis is an acute life-threatening allergic reaction, usually – but not always – mediated by an immunological-type hypersensitivity mechanism that results from the sudden systemic release of mediators from principally mast cells and basophils and a possibly others involved in the immune system.

The risk of anaphylaxis in the football environment, both on and off the field of play, needs to be appreciated, especially when known trigger factors include food, medications, hymenoptera stings, fever and infection such as upper respiratory tract infection, possibly amplified by the presence of cofactors which include non-steroidal anti-inflammatory medications (NSAIDS), exercise and alcohol, all of which may be relevant to the football environment.

The associated travel of football players and fans domestically and internationally into unfamiliar environments, particularly with regard to food and drink consumption, may increase the risk of severe allergic reactions and therefore recognition and immediate management of anaphylaxis must be within the scope of football stadium medical services.

Diagnosis
Prompt recognition and immediate treatment is essential in anaphylaxis. The following clinical criteria, adapted from the World Allergy Organisation Guidelines, are relevant within the football environment:

Anaphylaxis must be considered when any of the following clinical criteria are present:

- Acute onset of illness involving the skin, mucosal tissue or both (e.g. general urticarial, itching, redness, swollen lips, tongue or uvula)

+

- Plus at least one of the following clinical symptoms or signs:
  – Respiratory – dyspnoea, wheezing, stridor, hypoxaemia
  – Cardiovascular – reduced blood pressure, syncope, collapse

OR

- Two or more of the following that occur rapidly after known or possible exposure to a likely allergen:

  - Acute onset of illness involving the skin, mucosal tissue or both (e.g. general urticarial, itching, redness, swollen lips, tongue or uvula)
  - Respiratory – dyspnoea, wheezing, stridor, hypoxaemia
  - Cardiovascular – reduced blood pressure, syncope, collapse
  - Gastrointestinal – severe cramps, abdominal pain, vomiting

OR

- Reduced blood pressure after known or possible exposure to a likely allergen:
  - Children – low systolic blood pressure or greater than 30% decrease from normal level for age
  - Adults – systolic blood pressure less than 90mmHg or greater than 30% decrease from normal level for the person.

Treatment

The key to successful treatment of severe anaphylaxis in the football environment is knowledge of its possible existence, understanding of its life-threatening consequences, the need for immediate recognition and treatment, and conscious prevention of the "denial and delay" that often occurs in life-threatening medical emergencies.

In any situation where any of the above clinical signs or symptoms occur in the context of a possible allergic reaction to food, medication, hymenoptera stings or other chemicals, always consider the possibility of anaphylaxis immediately and treat early rather than await clinical deterioration, as hesitation in the treatment of severe anaphylaxis can be fatal.

The mainstay of treatment of severe anaphylaxis is the administration of epinephrine/adrenaline by whichever route of administration is the most rapid, safe and effective.

Epinephrine (adrenaline) administration

- If an auto-injector, e.g. EpiPenTM, is available, it is used by thrusting the device appropriately against the antero-lateral thigh, through any clothes if necessary, and holding it against the thigh for at least 10 seconds to allow full intramuscular injection of the intended epinephrine dose, which is 0.3mg in an adult injector or 0.15mg in a child injector.

- If epinephrine is only available in ampoule form as a 1:1000 (1mg/ml) concentration (or repeated doses of epinephrine are required without an additional auto-injector being available), administer 0.5mg = 0.5ml of the 1:1000 epinephrine intramuscularly (IMI) into the antero-lateral thigh in an adult or 0.3mg in a child. Before injecting the epinephrine into the thigh muscle, withdraw the syringe plunger to ensure that the needle is not in a vein, as an intravenous concentrated epinephrine injection can have serious cardiac effects. If severe symptoms continue after epinephrine IMI injection, repeat the dose every five minutes. (Do not administer pre-diluted epinephrine 1:10,000 (0.1mg/ml) IMI because 1ml only contains 0.1mg and 5mls of epinephrine is a very painful IMI. The pre-diluted epinephrine is meant primarily for intravenous (IVI) administration, if and when required. However, as a last resort, if the 10ml pre-diluted 1:10,000 epinephrine is all that is availalble, use it either IVI or IMI in serious anaphylaxis.)

- If IMI epinephrine does not reduce the severity of symptoms adequately or intravenous access has been established or is easy to establish, consider administering epinephrine intravenously as a bolus dose of 2.5ml of a 1:10,000 diluted solution, preferably with cardiac monitoring if available. Repeat the dose after five minutes if necessary. A 1:10,000 solution of epinephrine = 1ml of 1:1,000 + 9 mls normal saline or other equivalent diluent.

- If, after epinephrine administration, the patient remains hypotensive, i.e. there is no radial pulse, position the patient supine and elevate the legs. Establish intravenous access as soon as practically possible and consider administering normal saline or equivalent solution, in order to obtain a systolic blood pressure of at least 90mmHg. Colloids may be considered, although there is no evidence to substantiate its use. Note that up to 50% of intravascular volume can be lost within ten minutes in severe anaphylaxis, thus initially requiring potentially large volume replacement.

Beta-2 agonist administration

- In the presence of anaphylactic-induced bronchospasm, in addition to epinephrine administration, consider the use of beta-2 agonist inhalation, either by pMDI (pressurised metered dose inhaler) + spacer or via oxygen powered nebulisation (if available). Repeat as often as necessary.

Antihistamine administration

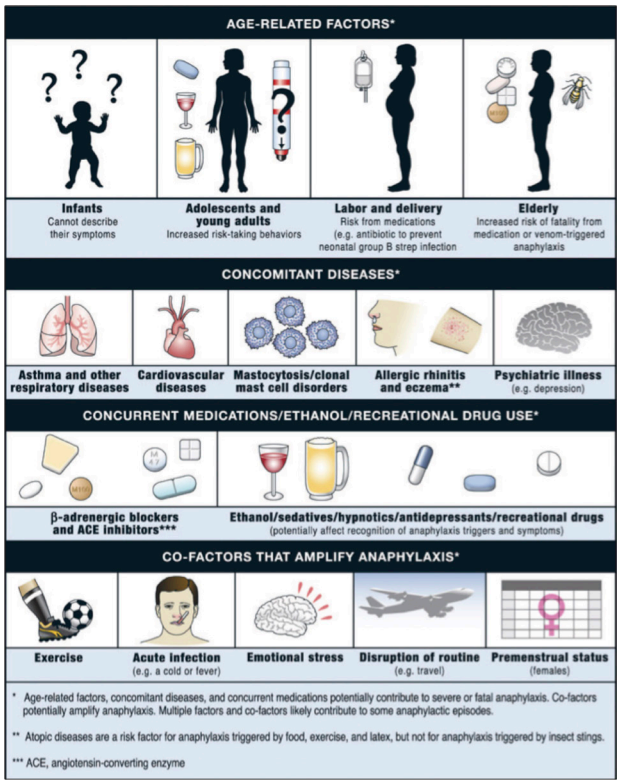
- There is no evidence that the administration of antihistamines in severe anaphylaxis has any beneficial effect in the initial management and is not included for immediate administration. Its administration, once the patient has been transferred to the nearest, most appropriate emergency department, can be considered after a full medical history and examination has been undertaken, possibly for the relief of urticarial and itching symptoms.

Glucocorticoid steroid administration

- There is no evidence that the administration of glucocorticoid medications in severe anaphylaxis has any beneficial effect in the initial management and is not included for immediate administration. Its administration, once the patient has been transferred to the nearest, most appropriate emergency department, can be considered after a full medical history and examination has been undertaken.
  The patient should be transferred to the nearest, most appropriate medical facility as soon as possible after the initial dose of epinephrine has been administered, so that further emergency department support may be administered, if and when necessary.

Follow-up

Outpatient follow-up and educational strategies to prevent further occurrences and treat possible future events may be required by sports medical professionals overseeing the medical treatment of the team member, where relevant.



Patient factors that contribute to anaphylaxis.

Age-related factors, concomitant diseases, and concurrent medications potentially contribute to severe or fatal anaphylaxis. Co-factors potentially amplify anaphylaxis. Multiple factors and co-factors likely contribute to some anaphylactic episodes. Atopic diseases are a risk factor for anaphylaxis triggered by food, exercise, and latex, but not for anaphylaxis triggered by insect stings and medications. Beta-blockers: beta-adrenergic blockers; ACE inhibitors: angiotensin converting enzyme inhibitors.

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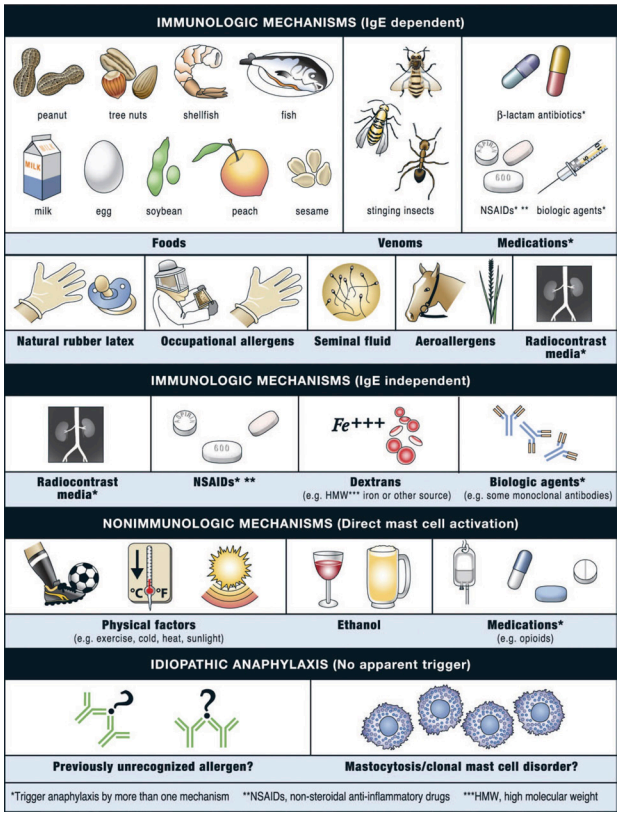

Anaphylaxis mechanisms and triggers. Anaphylaxis typically occurs through an IgE dependent immunological mechanism, most commonly triggered by foods, stinging insect venoms, or medications. Medications can also trigger anaphylaxis through an IgE-independent immunologic mechanism and through direct mast cell activation. Radio contrast media can trigger anaphylaxis through both IgE-dependent and IgE-independent mechanisms. Anaphylaxis triggered by seminal fluid or inhalant allergens is rare, and likely involves some systemic absorption of the allergen. In patients with idiopathic anaphylaxis, the possibility of a novel allergen trigger or of underlying mastocytosis or a clonal mast cell disorder should be considered. NSAID, non-steroidal anti-inflammatory drug; HMW, high molecular weight.

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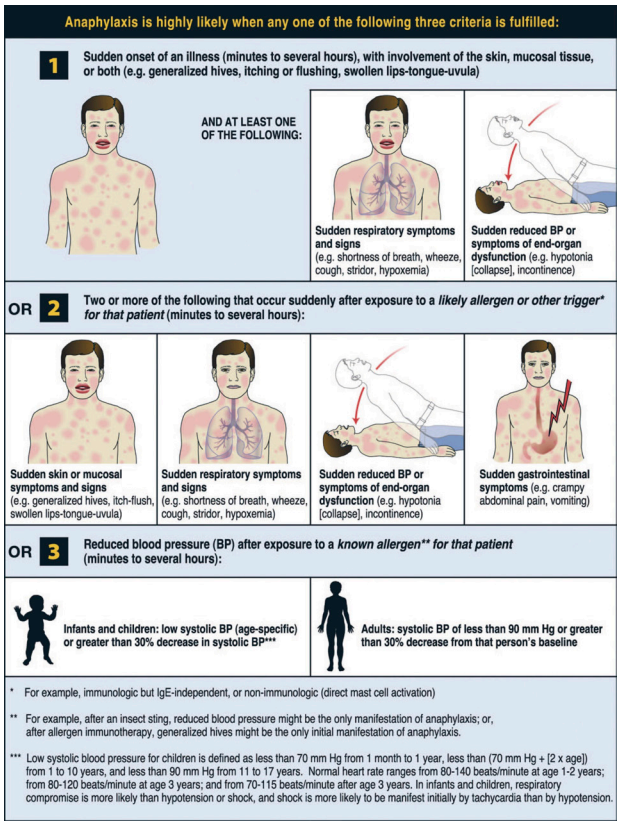

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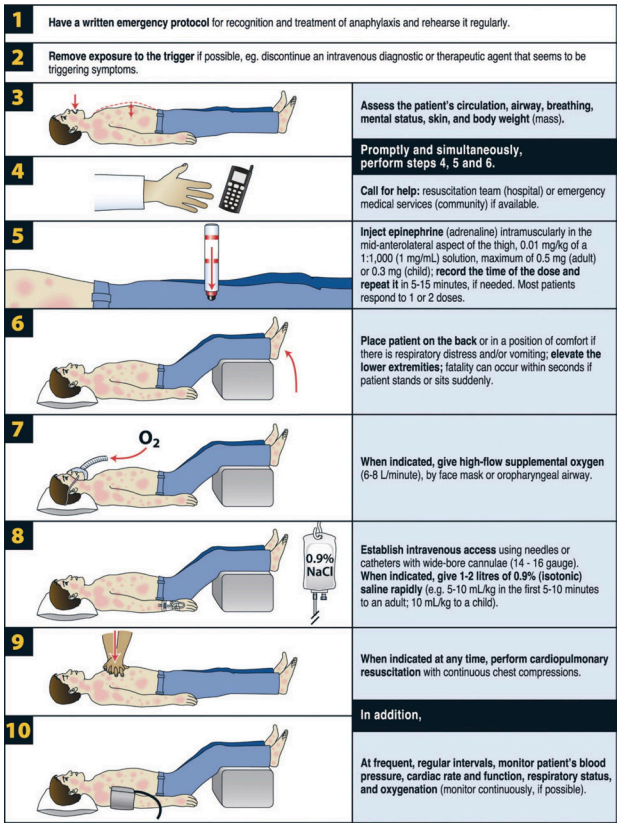

Basic management of anaphylaxis. This figure summarises the basic initial treatment which is relatively inexpensive to implement and should be possible even in a low-resource environment. Steps 4, 5 and 6 should be performed promptly and simultaneously as soon as anaphylaxis is diagnosed. Resuscitation guidelines recommend initiating cardiopulmonary resuscitation with chest compressions only (hands only) before giving rescue breaths. In adults, chest compressions should be performed at a rate of 100–120/minute and a depth of 5–6cm. In children, the rate should be at least 100 compressions/minute at a depth of 5cm. If precious minutes are lost early in the treatment of an acute anaphylactic episode, subsequent management can become more difficult.

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2.4 Acute exercise-induced bronchospasm/asthma

Introduction

Asthma has recently become more prevalent in the general population, including athletes, more severe clinically and more deadly. All clinicians who manage athletes with asthma must be prepared to treat an acute exacerbation, be able to rapidly differentiate mild and moderate from severe and life-threatening symptoms and have pre-planned transfer routines in place. Exercise-limiting pulmonary disorders include exercise-induced bronchospasm (EIB), vocal cord dysfunction (VCD), exercise-induced anaphylaxis, and exercise-induced urticaria. EIB and VCB remain the two most common and disabling acute pulmonary disorders in athletes.

Exercise-induced bronchospasm and exercise-induced asthma are terms that are used to describe the onset of lower-airway bronchospasm in susceptible athletes following exercise. Although EIB may be found in a large percentage of athletes with asthma, up to 10% of healthy athletes who partake in high-performance exercise may develop EIB.

The prevalence of EIB in sport is not uncommon with rates between 10 and 50%. Football is classified as an intermittent sprint sport, undertaken at relatively high physiological intensity, normally on a grass field and in all weather conditions. These conditions present risk factors for EIB which include increased hyperpnoea, increased exposure to cold environments, aeroallergens and irritants during training and competition, either locally or when travelling nationally or internationally. Additionally, EIB-related fatalities have been published in the medical literature.

One of the mechanisms of EIB causation is believed to be the increased minute ventilation of cold, dry air. This may lead to cooling and dehydration of the airway epithelial cells, with the resultant increased osmolarity causing an inflammatory response, leading to symptomatic airway narrowing.

The clinical effects of EIB may be minor and transient; or, as studies indicate, may be fatal. Therefore, all medical professionals involved in caring for football players must be able to recognise, evaluate and adequately manage any player who develops acute bronchospasm on and off the field of play.

Diagnosis

Typical signs and symptoms of EIB:

- Wheezing
- Coughing
- Chest tightness
- Shortness of breath
- Chest pain
- Excessive mucus
- Decreased performance
- Use of accessory breathing muscles
- Unable to complete sentences, phrases or words due to shortness of breath

Atypical signs and symptoms of EIB:

- Headache
- Abdominal pain
- Muscle cramps
- Dizziness
- Fatigue

Exercise-performance-related symptoms of EIB:

- Climate- and/or season-related fluctuations in asthma or asthma-like symptoms that may be related to environmental humidity, aeroallergen content, and airborne irritants.
- Poor performance out of line with level of conditioning/expectations.
- Feeling "out of shape" or having "heavy legs".

Please note that, while there is a considerable number of athletes who are later objectively assessed as having EIB, there may be no obvious sign of wheezing or other symptoms, or the athlete may actually subconsciously depress or ignore symptoms.

In EIB, provocation occurs after 5 to 10 minutes of high-performance exercise, symptoms peak during the 5 to 10 minutes after the exercise has stopped and disappear after 30 minutes.

Vocal cord dysfunction (VCD) may be misdiagnosed as EIB, because symptoms include noisy breathing, shortness of breath, wheezing, coughing, and sensations of upper-airway obstruction. However, symptoms are localised to the upper trachea with clear lungs on auscultation, unless there is coexistent EIB. Throat tightness rather than chest tightness is present, including voice changes. In VCD, symptoms occur abruptly during exercise and resolve after exercise has stopped. Although the symptom complex is clearly different

for EIB and VCD, they are often not clearly differentiated in the acute setting on the field of play and are therefore misdiagnosed and mistreated.

Treatment

The treatment of acute bronchospasm within the football stadium environment will depend on the severity of the attack, available locations for treatment, treatment resources, availability and level of care of the attending emergency medical staff and the logistics of the nearest medical facility to the football stadium.

- Severity of the attack: minor to moderate EIB may be adequately treated on site if the indicated medications are present. Severe or life-threatening EIB should have acute management initiated, but the athlete should be referred to the nearest medical facility for further evaluation and treatment before being discharged.

- Location of treatment: minor episodes of EIB may either be initiated at the touchline of the field of play or in the team changing rooms, although the most appropriate location for evaluation and treatment of an EIB player is the fully dedicated, equipped and appropriately staffed player medical centre (PMC), if such a facility is available within the football stadium. Inside the PMC, the player can be adequately assessed in privacy and confidentiality, including with a Peak Flow Metre reading, effectively treated via oral, inhalational or intravenous medications, as medically indicated, and either discharged to the bench or referred to the nearest medical facility.

- Treatment resources: due to the known critical complications of EIB that may occur on the field of play in football players, it is mandatory that the minimum level of emergency medical care services available inside a football stadium be advanced life support, with EIB emergency medication availability and the scope of practice to administer, if and when required. This minimum level of care may either be provided by the attending football stadium ambulance emergency medical service and/or venue medical officer and associated medical staff located in the various stadium medical centres.

Pressurised oxygen supplementation for EIB is always universally recommended but may not always be available logistically at all football stadiums. If not available, transfer to the nearest, most appropriate medical facility should be considered earlier in the treatment protocol unless pulse oximetry is available to constantly monitor the oxygen saturation and ensure that it remains between 94% and 98%.

Emergency EIB Medications

- Beta-2 agonist administration

Beta-2 agonists are the first level of emergency medications administered for acute bronchospasm and should be administered as early as possible.

In non-life-threatening bronchospasm, the use of oxygen-driven nebulised beta-2 agonists are as effective as pressurised metered multi-dose inhalers (pMDI) with appropriate volume spacer. In the football stadium environment, where portable pressurised oxygen or air is not always available, the use of pMDIs with spacer is the initial administration method of choice. If a commercial volume spacer is not available, one can make a volume spacer using a ~500ml plastic soft drink bottle. Cut a hole in the bottom of the plastic bottle, slightly larger than that of the spray head of the pMDI. Eight puffs of the pMDI are dispensed into the spacer chamber, allowing the player to inhale the medication at their own pace placing their lips around the screw-top end of the bottle and inhaling – see photos below.

Repeat doses of beta-2 agonists can be administered at 20-minute intervals for up to four hours. If, however, there is little or no improvement or deterioration with the use of pMDI + spacer, the player's treatment should be converted to beta-2 agonist administration via pressurised oxygen-driven nebulisation and/or transferred to the nearest medical facility for further treatment.

Inhaled beta-2 agonists are as efficacious and preferable to intravenous beta-2 agonists in adult players in most instances.

The most frequent side effects of beta-2 agonist inhalation are tachycardia, muscle tremors, headache and irritability.

It must be noted that regular use of short-acting beta-2 agonists or long-acting beta-2 agonists may cause tolerance to the bronchodilator effects of the medication, thus having a potential negative effect on acute rescue therapy.

If beta-2 agonists are not available, for whatever reason, subcutaneous epinephrine (adrenaline) should be considered for severe exacerbations. Inject 0.3–0.5mg every 20 minutes for three doses subcutaneously.

- Anticholinergic medications

Anticholinergic bronchodilators, e.g. Ipratropium bromide, may be added to the beta-2 agonist nebulisation or volume spacer in severe exacerbations or with poor response to beta-2 agonist treatment. This combination is known to produce significantly greater bronchodilation than a beta-2 agonist alone, leading to faster recovery.

When administered by pMDI + volume spacer, dispense eight puffs every 20 minutes into the volume spacer in synchronisation with the beta-2 agonist administration.

Commercial combinations of beta-2 agonist + anticholinergic pMDIs (or nebulisation mixtures) are available for use and are logistically easier for storage and administration by travelling football teams.

- Systemic corticosteroids

Corticosteroid administration is routinely indicated during acute EIB exacerbations as it reduces mortality, relapse exacerbations, further hospital admissions and beta-2 agonist usage. It may be administered either orally or intravenously, with neither route of administration being more efficacious than the other. Therefore, there is no advantage of intravenous administration, unless intravenous access is already established for additional reasons or there are potential problems with gastrointestinal transit or absorption. Alternatively, intramuscular methylprednisolone 160mg may be administered.

Prednisone 40-80mg orally as a single dose, OR

Hydrocortisone 400mg as an intravenous bolus
For convenience, consider use of 2 x 25mg oral tablets rather than 10 x 5mg tablets.
Corticosteroids can be administered at any point in the treatment regime of the acute exacerbation, whether prehospital or in the emergency department.

Continue prednisolone 50mg oral administration daily for at least five days post exacerbation or longer, if required for recovery.

- Fluid administration

Athletes with EIB may require rehydration either orally or intravenously, whichever is most appropriate, and potentially correction of electrolyte imbalance resulting from beta-2 agonist and corticosteroid-induced hypokalaemia.

- Other medications

In locations where intensive medical care levels of treatment can be delivered, additional medications can be administered under senior or specialist supervision, including intravenous beta-2 agonists (seldom used – no additional benefit to inhalation), intravenous magnesium infusion (often used) or intravenous aminophylline (seldom used due to serious side effects).

Hospital referral criteria
- – Severe or life-threatening signs and symptoms
- – Poor response to directed treatment
- – Limitation of medical resources
- – Previous admissions to hospital in recent past
- – Persisting or worsening hypoxia
- – Increasing hypercapnia
- – Exhaustion, fatigue
- – Drowsiness, confusion
- – Decreasing level of consciousness
- – Impending respiratory arrest

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2.5 Generalised convulsive seizures

Introduction

Generalised tonic-clonic seizures (GTCS) remain one of the most common medical emergencies in large-attendance spectator sports for a host of reasons, including stress, visual and auditory stimuli, medication compliance issues, alcohol ingestion and acute hypoglycaemia. If the GTCS is of short duration, less than five minutes of active, continuous convulsing, basic life support care and support is almost all that will be required and the patient may be escorted or transported to one of the football stadium medical posts for continued observation and care, which may include blood glucose evaluation.

However, if the GTCS continues for longer than five-ten minutes, clinical data indicate that spontaneous termination of the seizure, without emergency medication, is unlikely. In this high-risk situation, the patient may deteriorate into status epilepticus, with its known high morbidity and mortality complications, if not terminated rapidly.

It is therefore mandatory that first-line, status epilepticus-appropriate benzodiazepine medications and an easily administered glucose source be available, as part of the scope of medical services offered within the football stadium environment.

Diagnosis

Although patients within a football stadium environment may present with different types of seizures, it is the tonic-clonic convulsing seizure in a patient that is regarded as high risk and which, if not terminated rapidly, becomes life-threatening. Response to these incidents should therefore be immediate and they must be regarded as life-threatening until an on-scene evaluation can be made.

All patients having a seizure of any type must be regarded as being hypoglycaemic until the blood glucose level indicates otherwise. If it is not practically possible to measure the blood glucose in a patient that is having a seizure, then glucose must be administered via an appropriate route in case hypoglycaemia is present.

Obtain as comprehensive a medical history of the patient as possible and specifically a seizure history from accompanying family and/or friends, if possible.

Treatment

- Initial treatment of any convulsing patient is injury prevention and safety. Therefore, if the patient has not already been positioned in a safe horizontal position, gently place the patient onto a horizontal surface, in such a way that no harm will occur to the patient from any active movements of the head and body against any solid structure. Place something soft under the patient's head to cushion any convulsing movements.

It is best to attempt to place the patient into the lateral position in order to protect the airway, but this may not always be possible.

- Loosen any restrictive garments, if necessary.
- Do not attempt to restrain the patient in any way, unless absolutely necessary, so as not to increase the force of contractions by the patient.
- Do not attempt to force any object into the mouth or between the teeth, as this may result in severe bleeding and/or breakage of the teeth, all of which have the potential to be aspirated into the respiratory tract and cause airway obstruction and related pathology with critical consequences.
- All patients having a seizure of any type must be regarded as being hypoglycaemic until the blood glucose level indicates otherwise. If it is not practically possible to measure the blood glucose in a patient having a seizure, then glucose must be administered via an appropriate route in case hypoglycaemia is present.

If the seizure continues for longer than five minutes, which practically means that it lasts long enough for the football stadium medical team to arrive at the patient's side to find the patient still having a seizure, and if hypoglycaemia has been excluded or nominally treated, then administration of a benzodiazepine (BZP) is indicated as a first-line anti-convulsant medication.

Benzodiazepines

Although first-line BZPs include Midazolam, Lorazepam, Diazepam, Clonazepam and others, the BZP "drug of choice" in the football environment remains Midazolam because of its rapid onset, variable vial strength availability, multiple routes of administration, lack of "cold chain" storage and ability to administer repetitive doses, if and when required. All of these characteristics ensure safe, easy, effective and efficient use within the football stadium environment or during travel.

Midazolam may be administered via the following routes, using the following recommended doses:

Route of administration	Child dose	Adult dose
Intra-buccal: inside the cheek	0.3 mg/kg (max 10mg)	10mg
Intra-nasal: inside nose	0.3 mg/kg (max 10mg)	10mg
Intra-muscular	0.15 mg/kg (max 10mg)	10mg
Intra-venous	0.15 mg/kg (max 10mg)	10mg

Intravenous infusion for prolonged seizures, after an initial dose of 0.15mg/kg intravenously is 0.03-0.3 mg/kg/hour.

The risk of respiratory depression is a real issue but must not be over-estimated, as the seizure itself may cause respiratory depression; the recommended doses above are conservative for the average population and the alternative is severe complications from prolonged seizure activity. However, it is good clinical practice to ensure that a rescue manual, resuscitator bag and masks are immediately available whenever BZPs are administered. In clinical practice, a single correct dosage of BZP presents a very minimal risk of respiratory depression.

If a single dose does not terminate the convulsions five minutes after Midazolam administration, repeat the dose and initiate a slow, constant intravenous infusion, using the recommended dosages mentioned.

Any patient who is administered any anti-convulsant medication should be transferred, in the lateral position, to the nearest, most appropriate medical facility for further evaluation and management.

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2.6 Hypoglycaemia

Introduction

Regular exercise is highly recommended for all persons due to its beneficial effects in preventing and controlling disease. This recommendation is specifically prescribed for persons who are diagnosed with either type 1 or type 2 diabetes mellitus (DM). This is due to the fact that blood sugar in the diabetic can be controlled with combinations of insulin, oral medications, diet and exercise. This has resulted in many persons with uncomplicated diabetes engaging in almost any type of exercise, including football, with some of them reaching levels of the game that resulted in them being chosen to represent their national teams.

It is therefore not unexpected for football medical professionals to be presented with glucose-type emergencies in individuals who are non-diabetic as well as individuals who have documented and undocumented glucose-regulation disorders, such as DM. This is particularly relevant when it is estimated that 54% of individuals with DM remain undiagnosed. The most acute, life-threatening glucose-type medical emergency that might occur within the football stadium environment is hypoglycaemia, which can have devastating neurological results if not diagnosed and adequately treated as soon as possible. The brain relies on a constant provision of glucose from the blood to maintain normal function and any decrease in glucose levels will affect neurological function detrimentally.

Although hypoglycaemia may occur in non-diabetic persons due to dehydration, stress, intense exercise and heat-related disorders, it is more likely to occur in DM sufferers, particularly if adequate precautions are not taken before, during and after exercise. This is due to the effect exercise has on increasing insulin sensitivity, insulin-dependent glucose update and glucose usage on muscles, the effects of which entail a greater risk of hypoglycaemia.

Diagnosis

A normal blood glucose concentration level is above 45mg/dL (2.5mM) and any level below this is considered as hypoglycaemic. Common signs and symptoms of hypoglycaemia include any one or combination of the following:

Signs and symptoms of acute hypoglycaemia		
Anxiety	Blurred vision	Confusion
Drowsiness	Fatigue	Headache
Hunger	Incoordination	Loss of consciousness
Nausea	Odd behaviour	Cardiac palpitations
Seizures	Slow or slurred speech	Tachycardia
Tremors	Vertigo	Weakness

Severe hypoglycaemia, defined as a level of hypoglycaemia that requires the assistance of another person for treatment or that which is associated with loss of consciousness or seizures, is a life-threatening condition requiring immediate diagnosis and treatment. However, almost all known neurological signs and/or symptoms may be a clinical manifestation of acute hypoglycaemia and therefore the possibility of this condition should always be considered in any person who has a decreased level of neurological function, especially those that are unconscious.

Additionally the signs and symptoms of acute hypoglycaemia may also overlap with those caused by strenuous or prolonged exercise, dehydration and heat-related illnesses, thus requiring early consideration and measurement of blood glucose levels and/or administration of glucose substrates, if and when these signs and symptoms occur in football.

Cases of hypoglycaemia in spectators usually occur in diabetics, but may also occur in non-diabetics as a result of the consumption of alcohol.

Blood glucose measurement

The ability to measure blood glucose levels in a person within a football stadium is a mandatory requirement, in order to diagnose the presence of hypoglycaemia, monitor the effects of treatment and assist with a decision regarding the disposition of the affected person afterwards, regarding discharge home or transfer to hospital. Significant advances have been made in technology meaning that it is now possible to measure blood glucose levels in any environment. A single drop of capillary blood is obtained by lancing the skin at the tip of a finger, placed on a disposable plastic strip embedded with a chemical, placed into the glucometer, with the result obtained within just a few seconds, making it an ideal simple, safe method of measuring blood glucose levels before, during and after exercise. Any level below 70mg/dL or 4mmol/L is to be regarded as hypoglycaemic and requires supplemental glucose.

In any situation where it is not possible to measure the blood glucose in a person displaying signs and/or symptoms of hypoglycaemia, or any neurological signs or symptoms, supplemental glucose should be administered as a precaution.

Management

Victim conscious:

If a player self-recognises, or the coach or team medical professional recognises, that the player is showing signs and symptoms of hypoglycaemia, the player should immediately leave the field of play and measure his/her capillary blood glucose level. If hypoglycaemia is measured or no glucometer is immediately available, at least 20g of fast-acting glucose, in the form of a gel, powder or liquid, should be administered.

It must be noted that many isotonic beverages used to enhance exercise performance do not contain adequate amounts of readily available glucose to rapidly correct hypoglycaemia, particularly when compared with many fruit juices of the same volume.

Victim unconscious:

Any victim, who is unconscious, due to hypoglycaemia or an unknown cause, must have their airway opened and protected as a priority, by gently turning the victim onto their side and opening their mouth. Only after this has been successfully undertaken can supplemental glucose administration be undertaken. This applies equally if the victim is having a seizure.

Administration of supplemental glucose to an unconscious or uncooperative victim can be undertaken via a variety of routes, depending on what is immediately available:

- Rub small amounts of sugar granules, syrup or honey on the inner buccal surface of the victim's cheek until the victim resumes consciousness and can then follow instructions under medical orders.
- Inject 1mg glucagon, if available, intramuscularly.
- Administer 50ml of 50% dextrose intravenously through a free-flowing peripheral vein if logistically possible. This form of glucose can also be used to rub onto the buccal surface of the victim's cheek.

Whichever route of administration and substrate is used, additional amounts should be administered until the victim has returned to a state of alertness or the blood glucose measurement is higher than 70mg/dL or 4mmol/L minimum.

Once the victim is fully awake, able to swallow oral glucose, provide a medical history and has accompanying colleagues, family or friends to care for them, discharge home with medical instructions or to a family physician may be all that is required. If not, transfer to hospital for further evaluation may be the safest option.

Conclusion

Acute hypoglycaemia, a life-threatening medical emergency, may occur both in the non-diabetic, as well as the diabetic football player, official or spectator, on the field of play or anywhere inside the football stadium environment. Successful management is dependent on prompt recognition and management by initially measuring the blood glucose level and then administering glucose in whichever form and route appropriate.

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3 Environmental injuries in football

3.1 Altitude illness

Introduction

Football is the most popular sport played globally. As such it is played in most geographic locations not covered by water, ice or snow, including at different altitudes and under varying climatic conditions which include heat, cold, humidity, wind, jet lag and other weather conditions. As a result, in order to ensure the basic principles of fair play for both home and visiting teams wherever football competitions are played internationally, the FIFA Sports Medical Committee held a meeting of 12 international scientists and clinical experts in altitude medicine to develop a consensus statement on playing football at different altitudes. Although this consensus statement is meant primarily to guarantee fair play and secondarily to prevent any altitude-related illness or associated injury, altitude-related morbidity and/or mortality is still a risk factor for visiting teams playing football at altitude. This chapter is concerned exclusively with the medical illnesses that may arise in those visiting high altitudes in order to compete in football due to a combination of the location altitude, rate of ascent to the location altitude, factors of acclimatisation, exercise activity at altitude, co-morbid diseases, medications, weather factors and individual variability, all of which can trigger an acute medical event singularly or in combination.

Definition

For the purpose of this chapter, the following altitude definition will be used exclusively and all clinical signs and symptoms that will be related to different levels are based on average group effects and can never be directly predicted on any particular individual due to individual variability.

0 to 500 metres (m)	near sea level
Above 500m to 2,000m	low altitude
Above 2,000m to 3,000m	moderate altitude
Above 3,000m to 5,500m	high altitude
Above 5,500m	extreme altitude

Preparation for altitude

Research on preparation prior to ascent to altitude for competitive football is based primarily on performance issues, in order to ensure fair play and performance between competing teams. These preparations, although not essentially undertaken to prevent clinical illness at altitude, will, in and of themselves, have a positive effect in preventing acute illness from altitude. However, despite all of these preventive active preparations by the team (including team officials, coaches and other non-playing staff), altitude headache, acute mountain sickness (AMS) and, rarely, high-altitude cerebral oedema (HACE) or high-altitude pulmonary oedema (HAPE) may nevertheless occur.

Therefore, it is mandatory that medical plans be in place to prevent altitude illness or injury, to diagnose any occurrence in its early phase, to treat accordingly and, if necessary, to be able to descend rapidly if the clinical condition warrants such measures. No football team should ever ascend to altitude without these preparations in place.

In healthy players who live and play routinely near sea level (0 to 500m) or at low altitude (500m to 2,000m) and who ascend to moderate (2,000m to 3,000m) or high altitude (3,000m to 5,500m) to play, there is an individual risk of AMS. The altitude level accepted as being the threshold for the occurrence of AMS is 2,000m and above.

At moderate altitude levels, the risk of AMS in healthy players usually living and playing near sea level is low and, if it does occur, it is usually mild. However, in team members who have co-morbid disease, are obese or taking prescription medication, AMS may be more severe and HACE or HAPE, although unlikely, is still a possibility.

At high altitude, specifically at or above 4,000m, the risk of AMS in healthy players usually living and playing near sea level is considerable; AMS is more severe and if not diagnosed early and treated appropriately, can progress to life-threatening HACE and HAPE. Generally, both HACE and HAPE can be managed and effectively treated once diagnosed, as long as the necessary measures for treatment are in place. Therefore, a staged ascent should be undertaken by the team to prevent the onset of AMS in team members' form near sea level or low altitude level ascending to and playing competition at high altitude. In those non-playing individuals of the team known to be susceptible to AMS, prophylactic acetazolamide 125mg twice daily orally or dexamethasone 2mg six-hourly or 4mg 12-hourly orally can be taken, but not by any player as these medications are on the World Anti-Doping Agency (WADA) list of prohibited substances.

When staging an ascent to altitude, one day of acclimatisation should be spent for every 300m to 500m above 2,000m.

As mentioned earlier, the development of AMS in any team member depends mainly on individual factors, together with general external factors which include the degree of acclimatisation, rate of ascent to altitude and intensity of exercise undertaken.

Acute altitude headache

High-altitude headache (HAH) is a term that has been used for decades, and is the first unpleasant symptom to occur as a result of ascent to altitude. It may be the only presenting symptom, but if it occurs together with any one of four other symptoms, then it has progressed to acute mountain sickness (AMS). HAH occurs within a few hours of ascent to altitude, is worse after a night's sleep, more common in men, is of moderate intensity and responds well to mild analgesics such as acetaminophen/paracetamol. The literature suggests that HAH can be prevented and, if necessary, effectively managed with mild non-steroidal anti-inflammatory medications and acetaminophen, with ibuprofen and aspirin appearing superior to others.

Acute mountain sickness (AMS)

The basic cause of AMS is hypoxaemia. The diagnosis of AMS depends on the factors related to ascent, the symptoms, the result of medical examination and the exclusion of other disease entities, which in football and in this environment may include concussion, hypothermia, and hypoglycaemia or underlying infection. A throbbing headache, usually bitemporal, and worse at night or after sleeping, very much like a "hangover", together with any one of the other symptoms mentioned below, confirms the diagnosis of AMS.

AMS has been studied extensively in the literature and studies indicate that AMS has the same incidence in adults or children, between men and women, no relation to the menstrual cycle, physical fitness, smoking or oral contraceptive use. The only risk factor thus far identified is obesity. Therefore, the only variables that relate to the onset of AMS are genetic predisposition, normal altitude of residence prior to ascent and the altitude ascended, rate of ascent and prior recent altitude exposure.

- **Symptoms**

Headache + 1 of the following:

- Anorexia
- Nausea/vomiting
- Lassitude/fatigue
- Insomnia/disturbed sleep pattern
- Dizziness
- Dyspnoea on exertion

- **Treatment of AMS**

The earlier that AMS is diagnosed and treated, the easier and more successful is the outcome. Symptomatic headache treatment involves administration of mild analgesics, namely:

- Aspirin 500mg
- Acetaminophen 500mg to 1,000mg
- Ibuprofen 400mg to 800mg
- Codeine 30mg

whilst ondansetron 4mg via orally disintegrating tablets every four hours will resolve nausea and vomiting.

A person experiencing AMS should avoid alcohol and medication that has a respiratory depressant effect, so as to prevent any exacerbation of the existing hypoxaemia.

High-altitude cerebral oedema (HACE)

The same process that causes HAH and AMS can progress to cause high-altitude cerebral (o)edema (HACE) which is a life-threatening condition, requiring early recognition and immediate medical management. Progression from mild AMS to HACE unconsciousness can be as rapid as 12 hours but most commonly will progress over three days.

- **Symptoms and signs**
  - Headache
  - Nausea + vomiting
  - Ataxic gait
  - Severe lassitude
  - Confusion
  - Drowsiness
  - Decreased level of consciousness – stupor, coma
  - Retinal haemorrhages

HACE is mainly a clinical diagnosis and time must never be wasted attempting to arrange either lumbar puncture or radiological investigations, namely computerised tomographic (CAT) scanning or magnetic resonance imaging (MRI) unless other diagnoses are expected and need exclusion.

- **Treatment**

Treatment of this life-threatening condition should be immediate, which if instituted is most commonly successful with complete resolution. For this to occur, it is mandatory that all of the necessary treatment modalities are prearranged, immediately available and fully functional, if and when necessary.

As with all life-threatening medical emergencies, resuscitation and stabilisation begins with ensuring that the airway, breathing and circulation are all fully functional.

- Airway – protection of the airway in any patient with decreased levels of consciousness may either be undertaken by placing the patient into the lateral recovery position for treatment and transport by lacing a definitive airway, either Laryngeal Mask Airway (LMA) or Endotracheal Tube (ETT), whichever is safer, simpler and within the medical professional's competency and skill set. Inflation of any ETT or LMA cuff should be undertaken using liquid normal sterile solutions, e.g. saline, and not with air inflation via syringe (as is usually done) because of the problems that may occur from increased or decreased cuff pressures with changes in barometric pressure during transport.

- Breathing – supplemental oxygenation may be all that is required to ensure adequate blood saturation levels, unless severe High Altitude Pulmonary Oedema (HAPE) is also present, which may then require either non-invasive or invasive positive pressure ventilation in order to provide adequate oxygenation.

- Circulation – as many of these patients may be hypovolaemic from altitude-induced diuresis, which can be further compromised by use of loop diuretics in the treatment of HACE, it is important to monitor and, when necessary, replace intravascular volume so that adequate peripheral and cerebral perfusion pressures are maintained. Bladder drainage should be undertaken via urethral cauterisation as an indirect means of monitoring fluid output and/or if the patient has loss of consciousness.

- D.R.O.P. – the DROP method of treating HACE consists of:

Descent to an altitude at which the effects of hypoxaemia can be reversed should be undertaken, as evidenced by the increased blood oxygen saturation levels and decreased symptomatology. This movement, logistically, away from the location of symptoms to a lower level may either be undertaken by road ambulance or air transfer. Whichever is used, it is imperative that it be undertaken with full advanced life support medical care, arranged in advance of the team's arrival. If immediate patient descent cannot be undertaken, other forms of management may assist temporarily until descent can be undertaken safely. Aeromedical evacuation with these patients must be undertaken in a pressurised aircraft in order to prevent exacerbating the conditions as non-pressurised aircraft have to fly higher than the initial location on take-off.

Rest. The patient with HACE should be removed from all forms of exercise or activities in order to conserve energy and oxygen utilisation. In addition, adequate hydration and caloric nutrition should be ensured, including blood glucose determination and hypoglycaemia treatment if required.

Oxygenation is the mainstay of treatment for HACE, which is a hypoxaemic altitude-induced illness and is the first form of management applied when symptoms occur. It may be administered via nasal cannulae or face mask at 2-4 litres/minute or at whatever level of oxygen administration is required to raise the blood oxygen saturation above 90%, measured by means of peripheral oximetry.

Pharmacological measures include the administration of dexamethasone 4mg-8mg intravenously, intramuscularly or orally initially, followed up with a 4mg dose every six hours. Additionally, loop diuretics such as furosemide 40mg-80mg or bumetanide 1mg-2mg, via whichever appropriate route of administration is available, may successfully reduce brain oedema. However, adequate intravascular volume must be maintained in order to ensure adequate peripheral and cerebral perfusion pressures.

High-altitude pulmonary oedema (HAPE)

As the most common cause of mortality from altitude-related acute illness, HAPE is actually completely and easily treated if it is diagnosed early and appropriately and effectively treated. HAPE is a form of non-cardiogenic hypoxaemic-induced pulmonary oedema, usually developing after a rapid ascent to altitude without prior acclimatisation.

- **Symptoms and signs**
  - Symptoms of AMS
  - Persistent dry cough
  - Deceased exercise performance
  - Increased recovery times
  - Fatigue
  - Dyspnoea on exertion
  - Cyanosis around lips and in nail beds
  - Tachycardia + tachypnoea
  - Pink frothy sputum
  - Signs of HACE may predominate
  - Rales unilaterally or bilaterally
  - Abnormal pulse oximetry and chest radiography

- **Treatment**

Treatment of this life-threatening condition should be immediate, which, if instituted, is normally successful with complete resolution. For this to occur, it is mandatory that all of the necessary treatment modalities are prearranged, immediately available and fully functional, if and when necessary.

Football teams ascending to altitude for matches or competition should ensure that there is an adequate supply of pressurised oxygen available for the duration of the visit to altitude, both at the hotel and training/competition venues.

Patients with HAPE are usually fully conscious, unless they have concomitant HACE, and are therefore commonly, adequately treated with supplemental oxygenation and descent from altitude. Endotracheal intubation and positive pressure mechanical ventilation are rarely required.

The ABC of managing a HAPE patient is the same as that mentioned above regarding the treatment of the HACE patient with only minor adaptations. Similarly, the DROP method for management of HAPE is similar with a pharmacological adaptation.

DROP – the DROP method of treating HAPE consists of:

Descent to an altitude at which the effects of hypoxaemia are reversed should be undertaken, as evidenced by the increased blood oxygen saturation levels and decreased symptomatology. This may be all that is required for the effective treatment of a HAPE patient. However, if descent is required, descent from the location at which symptoms occur to a lower level may be undertaken by road ambulance. It is imperative that all ambulance transfers be undertaken with full advanced life support medical care, arranged in advance of the team's arrival. Aeromedical evacuation with these patients, if selected as the mode of transport, must be undertaken using a pressurised aircraft in order to prevent exacerbating the conditions when non-pressurised aircraft have to fly higher than the initial location on take-off.

Rest. The patient with HAPE should be removed from all forms of exercise or activities in order to conserve energy and oxygen utilisation. In addition, adequate hydration and caloric nutrition should be ensured, including blood glucose determination and hypoglycaemia treatment if required.

Oxygenation is the mainstay of treatment for HAPE which is a hypoxaemic altitude-induced illness and is the first form of management applied when symptoms occur. It may be administered via nasal cannulae or face mask at 2-4 litres/minute or at whatever level of oxygen administration is required to raise the blood oxygen saturation above 90%, measured by means of peripheral oximetry.

Pharmacological measures in HAPE are of limited value, with oxygen and descent from altitude being the mainstays of treatment. Medications are only really indicated when oxygenation or descent from height is not possible. This should never occur when a football team is travelling to altitude. Oxygen should always be available in the locations where the team is staying, training and competing. Emergency medications, however, include:

- Furosemide 80mg every 12 hours
- Morphine 15mg titrated via intravenous infusion
- Nifedipine 30mg via slow release every 12 hours

Conclusion

Acute medical emergencies at altitude in football are rare and should remain rare, not only due to the infrequency with which football teams ascend to high altitude to play, but also due to the adequate preparation and acclimatisation that should be undertaken in the event that competition at altitude occurs. In situations where, due to climatic conditions, logistical constraints or individual variability, altitude headache or acute mountain sickness occurs, every effort must be made to recognise and treat these early so that progression to HACE or HAPE is prevented. However, on the rare occasion that HACE or HAPE occurs, early recognition and treatment is usually successful.

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3.2 Cold injuries

Introduction

Football, being the most popular sport globally, is played in every country. For this to occur in all seasons, it is important that environmental factors and risks be evaluated so as to prevent when possible, recognise when present and treat when necessary heat, cold or altitude-related illnesses or injuries during training and competitions. Cold weather generally is not a barrier to outdoor football, as long as the environmental risks are evaluated, the necessary precautions taken and cold-related injuries constantly anticipated and identified and managed in time.

Prevention

The factors that are responsible for producing cold injuries in football are primarily low environmental temperatures, wind, low solar radiation and rain. Each of these factors can dramatically increase heat loss from the human body, more so if in combination. If other personal factors are taken into consideration, namely anthropometry, clothing, health status, comorbid diseases, age, sex and exercise intensity, cold injury in a particular player or players may be a high risk. In general, it is far better to prevent cold injury than have to treat it.

General principles to avoid cold injury: the **S.H.E.L.T.E.R.** mnemonic

- **S**helter team members from the cold, wind or wet weather as much as practically possible within the logistics of the surrounding environment. Plan ahead rather than having to be reactive.

- **H**ydrate players well when playing in cold weather. Intrinsic metabolic heat production (thermogenesis) and increased exercise activity all require water, as well as the need to counter the cold-induced diuresis that occurs from peripheral vasoconstriction and central redistribution of the blood volume.

- **E**liminate alcohol, nicotine and caffeine, if possible, as these may have detrimental effects on cold-induced vasoconstriction which forms part of the body's protective mechanism to counter heat loss. Alcohol may decrease the blood glucose level and thereby decrease the shivering thermogenic response.

- **L**ayered clothing that will adequately insulate the player by principally promoting sweat transfer from the skin to the outer layers, with the middle inner layers trapping heat and finally the outer layer composed of water- and wind-resistant material, are currently available for cold-injury prevention in football. Exchange wet clothing, including socks, gloves, head covering for warm, dry alternatives when it is logistically and/or clinically necessary.

- **T**hermogenesis should be promoted in order to balance body heat production against heat loss. This is promoted by frequent and intense exercises of the major muscle groups, adequate intake of carbohydrates, adequate hydration and elimination of various substances and supplements. On the field of play, this applies particularly to goalkeepers who are not as active as the rest of the team and to those sitting on the bench at the touchline.

- **E**xamine Exposed players and other members of the team, namely those who are playing on the field of play or located on the touchline team bench, for any symptoms and/or signs of cold injury, e.g. hypothermia, frostbite, chilblains, cold-induced urticaria, cold-induced bronchospasm, etc.

- **R**ecognise those individuals who are or may be at risk of cold injury, namely those with premorbid diseases, e.g. asthma, exercise-induced bronchospasm, cold-induced urticaria, previous cold-injury incidents, and ensure that they have been managed adequately and appropriately to prevent, and if necessary, treat the relevant potential cold injury at risk.

Clinical cold injuries

Commonly quoted cold-induced injuries in the published literature include the following, without there being any validated statistics on the actual global frequency of any particular cold injury in football. This section is therefore a review of what cold injuries could happen, their recognition and treatment, not necessarily what does happen.

- **Hypothermia**

Hypothermia is defined as a decrease in core body temperature by more than 2°C from its present normal level, although pragmatically it is currently defined as a core body temperature of 35°C or lower. It is conventionally divided into three stages of severity, namely mild (32°C to 35°C), moderate (28°C to 32°C) and severe (below 28°C) hypothermia.

– Mild Hypothermia (32°C to 35°C) is not always easy to identify, but is characterised by intense shivering, initially of the muscles of the trunk and then periphery. This sign is the most consistent and easy to observe on the field of play or bench. Other signs, particularly present when the temperature is 32°C to 33°C, include irritability, apathy, ataxia, dysarthria and confusion, signs that are similar to and which may be confused with acute concussion. Because peripheral vasoconstriction shunts blood away from the periphery to the body core, the skin appears pale and cool and the increased volume in the core causes a cold-induced diuresis, both of which should be looked for when attempting to diagnose hypothermia.

– Moderate hypothermia (32°C to 35°C) is more easily diagnosed because of the obvious neurological abnormalities evident in the patient. Signs include very cold skin upon palpation, slurred speech, gross motor incoordination, loss of consciousness, muscle rigidity and dilated pupils. Bradycardia, hypotension develops and there is a high risk of cardiac arrhythmia. Shivering ceases at this level of severity and is one of the distinguishing features between mild and moderate hypothermia. No member of any football team on the field of play or touchline should ever reach this level of hypothermia. Diagnosis is confirmed by a rectal temperature below 32°C.

– Severe hypothermia (below 28°C) is rare in football, if ever. These patients appear clinically dead with no reflexes, lack of corneal reflexes, profound bradycardia or asystole and can only be effectively diagnosed and managed in a fully equipped emergency department.

- **Treatment**

The treatment of hypothermia depends on its severity. The principles of hypothermia treatment include the following:

- The international standard for temperature determination in all environmental medical emergencies, both heat and cold, is a rectal temperature reading. Although this is the medical standard, its applicability in football, even in an enclosed Player's Medical Centre, may not always be practically or logistically practical. If, for whatever reason, a rectal temperature cannot be measured, then in hypothermia, if either the oral or axillary temperature is above 35°C, the person is not suffering from hypothermia because these devices "under read" the core temperature. It is also important to note that many thermometers may not be designed or calibrated to

read temperatures below 34°C which makes their use in hypothermia management of no value. This must be logistically corrected if present.

- Remove the player from the wet, windy, cold environment into a warm, sheltered area inside, preferably the Player's Medical Centre. This allows the player to be fully assessed and, if necessary, adequately treated.

- Remove all wet clothing and equipment and replace with dry, preferably warmed clothing.

- In any player who is conscious and shivering, mild hypothermia is present and can be managed by wrapping the player in blankets, partaking of non-alcoholic hot food and drinks containing around 7% carbohydrates which helps to maintain the shivering response and other thermogenic activities and/or exposure to warm radiant or convective heat, e.g. increase heat from the air conditioner or sitting near, but not next to, a radiant heater.

- Players with hypothermia may have comorbid medical diseases that may be the principal cause of the hypothermia. Patients with hypoglycaemia, myxoedema or hypoadrenalism may present with hypothermia primarily or due to an inability to mount an effective response to the cold stress.

- In any player who is not fully conscious, is not shivering and has a core temperature below 32°C is to be regarded as being at a moderate level of hypothermia. These patients require full advanced life support (ALS) and intensive medical care management in hospital as they are unable to produce adequate heat internally to overcome the hypothermia. Therefore, internal active warming is required and can only be undertaken safely and effectively in hospital. Additionally, transportation of these patients has to be undertaken with extreme care because any movement can precipitate ventricular fibrillation, meaning that such transportation should be undertaken by experienced, knowledgeable emergency medical service personnel, if available. Similarly, all invasive procedures, including intravenous access, endotracheal intubation, gastric tube intubation, long trauma board immobilisation, must all be done with increased care, efficiency and vigilance. A fully functional and prepared defibrillator must always be present before these medical procedures are undertaken.

  Because the patient suffering from severe hypothermia requires full ALS medical management, it is best and safest to ensure an open and protected airway by simply laterally positioning the patient, not manually rescue breathing the patient as the ventilatory requirements of these patients are minimal, to refrain from any vigorous attempts to obtain venous access and monitoring the cardiac function by use of a cardiac monitor, if this is available. If ventricular fibrillation (VF) is diagnosed on the cardiac monitor, attempt defibrillation and begin chest compression CPR. If the VF does not respond to defibrillation shocks after three attempts, do not persist because the cold myocardium is refractory to defibrillation shocks. In this situation, continue CPR and only resume attempts at defibrillation when the core temperature has risen to 32°C which will only be undertaken in a hospital emergency department.

- **Frostbite**

Frostbite is a clinical condition caused by the freezing of the tissue of exposed parts of the body, particularly the ears, nose, uncovered wrist and also hands and feet, when the environmental temperature is below 0°C. Due to protective peripheral vasoconstriction, warm blood is diverted away from the extremities and peripheral areas of the body, leaving these specific areas devoid of adequate blood flow. As the temperature of the tissue falls, destructive changes occur to the cells of the tissues, from superficial to deep, depending on the severity of the temperature drop. In mild frostbite, also known as frostnip, only the superficial skin is frozen with little, if any, permanent damage. If the temperature decrease is more substantial, deeper layers are affected and this may progress to damage of the muscle, tendons and bone.

Prevention

Prevention of frostbite involves insulation of the areas of the body that are normally exposed to a cold environment, namely ears, nose, hands and wrists. This is particularly important to those players who have had any previous cold-related injury and who are more susceptible to repeated injury with further morbidity or who are at risk of such injuries due to co-morbid disease or syndromes, e.g. Raynaud's disease.

Diagnosis

As the skin temperature decreases to below 10°C, symptoms begin. Symptoms and signs depend on the depth of damage. Superficial frostbite may begin with skin numbness, transient tingling, burning or pain, localised swelling and colour progression from an initial red-looking skin, to

waxy white to areas of white or blue-grey patches. When the fingers are involved, there may be loss of dexterity and fine coordinated movement. Deeper damage involving adjacent structures may present with a hard, waxy skin that may be white, grey, black or purple, have vesicles or haemorrhagic blisters, which may be painful or burning. As deeper tissues undergo necrosis, muscle, nerve and joint damage will occur.

In football, particularly if played in cold environments without adequate insulation, superficial frostbite is possible, but deeper frostbite should not occur unless there is insufficient preplanning, denial of signs or symptoms or related logistical inadequacies.

Frostbite occurring in exposed areas from decreased skin temperatures occurs in association with a general decreased core temperature, which could lead to hypothermia. Therefore, whenever frostbite is considered, it is mandatory to measure the core temperature to ascertain if concomitant hypothermia is present or not.

Treatment

The aim of treating frostbite is to warm the affected area so as to reverse the pathophysiological process. If the decision to warm the affected area is undertaken, this should only be attempted if it can be assured that re-freezing will not reoccur. Refreezing of a frostbitten area after initial warming may cause greater morbidity than if the frostbitten area is allowed to remain in its present frozen state until adequate warming can be assured.

Warming can be undertaken by removing the patient from the cold, wet, windy environment and allowing it to warm at room temperature. Alternatively, hands or feet may be warmed slowly in a bath at water temperatures of 40°C. The temperature of any water bath must be monitored so that it is neither too hot (above 40°C) nor too cold (below 35°C), thus avoiding further necrosis.

Thawing should be undertaken slowly, 15 to 30 minutes is acceptable. Resolution is complete when the skin colour, sensation and pliability have returned to normal or near normal.

NB: Thawing of a frostbitten area with return of circulation may elicit burning or moderate to severe pain. Analgesia may be required as part of the treatment process and must not be ignored due to what may appear as a very small affliction involving but a small toes. Ibuprofen and other non-steroidal anti-inflammatory medications may be considered for analgesia and to limit the inflammatory response to the tissue injury.

Avoid the application of any friction massage to the area, or the application of any creams or ointments and leave all vesicles and blisters intact. If necessary, clear blisters can be debrided but haemorrhagic blisters should be left intact as it indicates deep tissue injury and should only be debrided in hospital if they restrict movement. Do not apply any steam or radiant dry heat to the area affected.

If rewarming is not undertaken for various logistical and practical reasons, protect the frostbitten area from any external damage but do not wrap the area with any form of padding as this will cause it to thaw out.

Any debrided area should be managed with appropriate infection control methods.

- **Chilblains, or cold sores**

A chilblain is a superficial cold injury that occurs mainly in the digits after an exposure of approx. one hour to cold (below 16°C) and wet conditions, as may occur by wearing wet socks and boots in the rain. Other exposed areas of the body, similar to frostbite, can also be affected by chilblains. It develops as a cold injury-induced inflammatory response from local hypoxaemia and microcirculatory vessel wall inflammation.

Prevention

Replacing wet clothing, whenever possible, particularly socks, with dry clothing will prevent this type of injury.

Diagnosis

This superficial, non-freezing injury appears as red or cyanotic, swollen, itchy, painful papules, nodules, vesicles, bullae or ulcerations on the affected exposed skin. When the area is warmed, the return of circulation causes the area to become inflamed, red, swollen with itching, burning or pain.

Treatment

Remove the player from the wet, cold environment.
Replace any wet clothing with equivalent dry clothing.
The area can be gently washed with warm water to reverse the process, carefully dried and either left exposed to the warm environment or carefully padded for comfort. Elevation may prevent swelling.

As with frostbite, avoid the application of any friction massage to the area, or the application of any creams or ointments and leave all vesicles and blisters intact. If necessary, these can be debrided under optimal conditions in hospital. Do not apply any steam or radiant dry heat to the area affected. Do not bear any weight on the affected area until it is healed. If weight bearing is necessary, pad the area accordingly.

- **Cold-induced urticaria/Anaphylaxis**

Cold-induced urticaria is an allergic reaction induced by exposure to a cold environment. It may begin at any age, affects both sexes but is most prevalent in young adults between 18 and 25 years of age.
Mast cell degranulation and the activation of inflammatory mediators can result in the development of urticarial wheals, angioedema or, in rare cases, acute anaphylaxis. Some players may also experience respiratory, cardiovascular or gastrointestinal symptoms which may signal anaphylaxis. Urticarial wheals usually occur during warm-up exercises after exposure to cold.

Prevention

Avoidance of the cold is the only known prevention for this condition.

Treatment

Urticarial wheals/hives may be treated with oral antihistamines, which, if severe, may require oral corticosteroids as an emergency measure. If signs of angioedema or anaphylaxis develop, intramuscular epinephrine/adrenaline, e.g. EpiPen™, may be required. See Acute anaphylaxis for more details.

- **Cold-related exercise-induced bronchoconstriction (EIB)**

Exposure to cold is known as a trigger for bronchospasm and exercise undertaken in a cold environment is likewise a known trigger for exercise-induced bronchospasm. Please see Acute asthma for further details of the acute management of EIB.

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3.3 Acute heat illness

Introduction

Football is recognised as the most popular sport globally and as such will always be played in all seasons and in most climatic conditions. As a result, exposure to varying degrees of heat and humidity will be encountered, both by the players who are exercising on the field of play, and by those who are watching the competition from the sidelines and the stands. If the prevailing temperature, humidity, duration of exposure, intensity of exercise or other relevant risk factors are present singly or in combination, acute heat illness syndromes may develop, which, if not recognised, and managed early enough, can result in the death of the athlete. Although, tragically, this occurs annually, it should not because heat illness, including heat exhaustion and heat stroke are preventable, and if and when they do occur, adequate and appropriate treatment is guaranteed to lead to survival.

The key to successful heat-illness management, if prevention has failed for reasons which include failure to postpone, reschedule, adapt or cancel training or competition events when the prevailing environmental climatic conditions present a risk […]. Additionally, pressures from administrators, coaches and league or competition schedules may encourage participation, or continued participation, by players who are overly motivated, dehydrated, fatigued or experiencing some form of illness.

Heat stroke, heat exhaustion and heat cramps are the three traditional clinical syndromes that are classed as heat illnesses. Exertional heat cramps will not be considered in this section.

Heat stroke, characterised by a rectally taken, body-core temperature of above 40°C (104°F) in association with central nervous system signs and symptoms, is a life-threatening medical emergency. It occurs when the heat generated or accumulated within the body, exceeds the body's ability to effectively dissipate the heat. The elevated body temperature causes damage to bodily tissues and stimulates an inflammatory response which leads rapidly to multi-organ dysfunction and death. Exertional heatstroke (EHS) presents in individuals who are exercising in hot and/or humid conditions, often with associated risk factors, and generate large amounts of metabolic heat, whereas classical heatstroke (CHS) occurs without effort, usually in very hot environments amongst the elderly, ill and/or persons or those exposed to associated risk factors. Whatever the nature of the heatstroke, recognition and management must be undertaken early if the patient is to survive.

Heat exhaustion is the most common heat illness diagnosed in exercising populations. Evidence seems to suggest that heat exhaustion results from central initiation that causes decreased peripheral tone, resultant hypotension and collapse as a protective mechanism against rising core temperatures.

Risk factors for heat illness

- High environmental heat/humidity
- Fever from illness/immunisation
- Lack of heat acclimatisation
- Decreased fitness
- Intensity and duration of exercise
- Time of day of exercise activity
- Vapour-barrier exercise clothing
- Sleep deprivation
- Lack of fluid availability/decreased fluid intake
- Dehydration and/or fatigue
- Playing surface heat reflection and radiation
- Medication

Training and competition should be modified and adapted accordingly to the presence of the above risk factors by decreasing or eliminating risk factors, decreasing the duration and intensity of the exercise activity or by instituting additional measures such as intermittent forced "rest and water" breaks.

It is therefore advisable that team physicians prepare players involved in training or competitions in hot, humid climates in advance regarding the problems of heat illness, its expected symptoms, diagnosis and treatment, so as to preempt problems of taste and decency on the field of play when a rectal temperature measurement is required.

Prevention of heat-related illness – FIFA Cooling Breaks

Mandatory cooling breaks were established by FIFA under certain environmental conditions of heat and humidity in order to prevent the development of heat-related illness in players and/or referees on the field of play.

In any location or environmental condition known to be hot and/or humid, a Wet Bulb Globe Temperature (WBGT) is measured 90 minutes before the start of the match and repeated 60 minutes before the start of the match. Should

either of the WBGT readings be at 32°C/89.6°F or above, mandatory cooling breaks are undertaken or the match may be either postponed or cancelled, depending on the level of the WBGT and the decision of the match management team. In order to measure the WBGT, a fully calibrated, validated digital temperature device should be used.

It is important to coordinate the WBGT measurement with the watering of the pitch by the ground staff as this may artificially decrease the measured WBGT, with possible adverse effects. All WBGT measurements should be recorded on paper and, if possible, photographically.

In the event that the WBGT reading is near, at or above 32°C, communication should be made with the general coordinator/match commissioner, referees, FIFA Chief Medical Officer/venue medical officer and other persons managing the match, so as to reach consensus operationally as to what precautions need to be instituted in order to prevent any heat-related illness from occurring. At major FIFA tournaments, it may be necessary to also inform other related departments, e.g. media, marketing, logistics, etc.

Once official cooling breaks (CB) have been established, the following logistical and practical points should be considered:

- Ensure that the practical logistics of the CB are agreed with the referee/s.
- Ensure that the practical logistics of the CB are discussed with the team physicians or other medical professionals and show them the various items to be used, e.g. cooler box, towels etc. Some teams may wish to use their own cooling items which are allowed. Likewise discuss the planned heat stroke protocol, should the need arise. Advise the team physician or other relevant team medical professional to inform the players of the necessity of the CB, its purpose and logistics so that all the players congregate at the side of the field, obtain their cold, wet towels and cold bottled water to drink. Players must be informed that the CB is not for additional practice or match strategy but for body cooling to prevent heat related illness.

- Inform the team physician or other relevant team medical professionals that if doping control is to be undertaken during the match, then the usual 75 minute opening of the sealed envelopes will occur only after the CB has ended, which is around 78 minutes, depending on when the referee signals the CB.
- Obtain all of the necessary CB equipment and prepare well ahead of time, namely:
  – Adequate quantities of ice, at least ten standard packets. Additional ice may be obtained from the hospitality department or VIP lounges if needed.
  – Cooler boxes on wheels x 2
  – Two sets of ice-water-soaked towels for each player and referees: 11 x 2 = 22 for the players and four for the referees. One set is used during the first CB at 30

minutes of play and the second set is used during the second CB at 75 minutes of play.
– Two sets of cold bottled water for each player and referees: 11 x 2 = 22 for the players and four for the referees. One set is used during the first CB at 30 minutes of play and the second set is used during the second CB at 75 minutes of play. It is alwas wise to provide extra cold bottled water and towels, and these may also be handed to the match commissioner and his/her table if required.
– At least three (3) persons are required to distribute the cold bottled water and ice-cold, wet towels simultaneously to each team and referees during the CB. The cooler box containing iced water, towels and bottled water may be quite heavy and may require at least two (2) persons to access the field if there are steps leading from the tunnel to the field of play.
– Some players may not want anybody outside of the team to place the ice-water-soaked towels on the shoulders and their wishes should be respected.
– As the CB only lasts 2 minutes, be prepared to gather all of the towels and water bottles into the cooler box so as to leave via the touchline without any delay.
– In tournaments where extra time and/or penalty shoot-outs are possible, discuss the provision of ice-water-soaked towels and/or cold bottled water with the referee and teams, in case it is requested and/or expected, as this requires further logistical planning in advance. This is usually unlikely due to the natural rest period that occurs after full time and the rehydration that players may undertake spontaneously.
– Ensure that all heat-stroke diagnostic and treatment logistics are available, should the need arise, and that all appropriate medical staff on duty have been adequately briefed. These items include:

- Appropriate rectal temperature measuring devices

- Glucometer measuring device and intravenous dextrose
- Intravenous anti-convulsant medications

- Tub for player immersion with sufficient quantities of ice and water

- Sufficient towels for ice water soaking and body application and rotation

- Tepid (tap) water spray devise and fan, if relevant

Recognition of heat-illness syndromes

Exertional heat stroke

- Presence of a hot, humid environment
- Intense exercise or prolonged exercise duration
- **Rectal core temperature >40°C/104°F** – the mainstay of diagnosing EHS and initialising immediate treatment is a rectal temperature of >40°C/104°F.
  No other temperature-measuring devices, including ear (aural canal or tympanic membrane), oral, skin (temporal artery) or axillary thermometer is to be used to determine player core temperature, as these are notoriously inaccurate and lowered artificially by air flow and skin secretions.

It is medically mandatory that any player suspected of suffering from EHS be removed from the field of play to the Player Medical Centre, team changing room or equivalent private location in order to have their rectal temperature measured. It is fully understood and appreciated that a player may not wish to undergo rectal thermometer measurement and therefore protest. In this situation, it is important that a full explanation be given to the player regarding the life-threatening nature of EHS and the need to diagnose it definitively by rectal temperature measurement. It is likewise equally important to recognise that aggression, irritability and uncooperative behaviour may be part of the symptom complex of EHS.

In any player, suspected of heat illness, where a rectal temperature cannot be undertaken, for whatever reason, EHS should be the default diagnosis and treated as such immediately, until proved otherwise, because of the seriousness of EHS and the need for time-critical treatment.

- Sweaty, cool, skin
- Central nervous system – confusion, disorientation, irrational and unusual behaviour, aggression, inappropriate comments, headache, inability to walk, seizures, loss of consciousness or any neurological symptom or sign that is out of the ordinary for the player concerned.
- Circulatory – collapse, hypotension <100 mmHg, tachycardia
- Respiratory – hyperventilation
- Gastrointestinal – vomiting, diarrhoea
- Musculoskeletal – lack of muscle coordination, fatigue, loss of balance

In any circumstances where central nervous system signs or symptoms are present, whatever their nature or severity, the player's blood glucose level must be measured in order to exclude hypoglycaemia, which often coexists with EHS and which itself may be life threatening.

Exertional heat exhaustion (EHE)

The signs and symptoms of EHE are neither specific nor sensitive.

- History of exposure to heat, intense exercise, prolonged exercise duration
- Collapse with hypotension <100mmHg, tachycardia, tachypnoea
- Dehydration
- Sweaty, pale, ashen skin
- Headache, dizziness, weakness
- Nausea, vomiting, diarrhoea
- Deceased muscle coordination
- Rectal core temperature, if measured, <40°C/104°F

NB: If there are any central nervous system signs or symptoms, the diagnosis of hypoglycaemia and EHS must be excluded before any other diagnoses are considered, due to the life-threatening nature of these two medical conditions. This will involve a blood glucose measurement and rectal core temperature measurement. If, for whatever reason, neither measurement can be undertaken in a player who has central nervous system signs or symptoms, both conditions must be diagnosed empirically and immediate treatment initiated with glucose administration and effective cooling therapy.

Treatment of heat illness syndromes

Exertional heat stroke

Exertional heat stroke (EHS) is a time-critical, life-threatening medical emergency requiring immediate effective cooling on site.

Any person diagnosed with EHS should not be transported to hospital for cooling and treatment purposes, as delay in cooling has detrimental effects on prognosis. The morbidity and mortality rate of EHS is directly related to the time of onset of body cooling, with increased delay proportional to increased complications, organ failure and death.

- Remove the player from the field of play and transfer to the designated Player Medical Centre, team changing room or equivalent private location.

- Remove the player's clothing, as appropriate

- Evaluate the player's clinical vital signs, perform a focused medical examination and obtain a medical history, if relevant

- Assess the player for any medical complications regarding airway, breathing and circulation, blood glucose measurement, level of consciousness and epileptic seizures and resuscitate according to standard advanced life support practices. Monitor these parameters regularly, as deterioration may require immediate transfer to the nearest, most appropriate medical facility.

- Establish intravenous access and administer 0.9% normal saline to either keep the vein patent if hydration is clinically normal, or replace lost fluid if the player is dehydrated and/or hypovolaemic, so as to preserve adequate renal blood flow. This is vital to protect the kidney from precipitation of myoglobin due to acute rhabdomyolysis that may occur from intense exercise, heat stroke and tonic-clonic seizures. Do not provide oral fluids because of the possible development of nausea and vomiting.

- Provide immediate on-site cooling in order to decrease the core body temperature to <40°C/104°F, with an initial target of 38°C (100.4°F), at which temperature cooling should be terminated to prevent over-shoot hypothermia. Therefore, constant regular temperature monitoring must be provided during cooling and must be factored into the method of cooling used, e.g. water immersion in a plastic tub makes regular rectal temperature evaluation impractical.

- Effective on-site cooling can be achieved using any of the following accepted methods:
  – Evaporative techniques
    - Wetting the body surface with large amounts of water with continuous fanning to cause evaporation. Once the player's clothing has been removed, the body surface may either remain naked or covered with wet towels/sheets during the application of water to the body.

Tap water may be used for keeping the body surface continuously wet, although it has been recommended that lukewarm water, if possible, be used, as it has the advantage of aiding evaporation from the skin and maintaining peripheral blood flow, both of which aid heat distribution and evaporation.

- Conduction techniques

- Tap water body immersion – this is preferred to ice water because it is readily available and does not require special logistic arrangements. Optimal water

temperature for cooling EHS has not yet been conclusively determined; therefore, water temperatures ranging from 1°C (33.8°F) to 16°C (60.8°F) are acceptable.

- Non-invasive conduction coolant pads, e.g. EMCOOLS™. Use as per the manufacturer's instructions.
- Ice water body immersion, together with skin massage, is the fastest method of reducing core body temperature, but is not always immediately available on site.
- Application of ice-packs to vascular counter-current areas of the body, e.g. neck, axilla and groin, with/without rapidly rotating ice-water soaked towels to the head, chest, abdomen and extremities.
- Application of ice-packs over whole body
- Ice-water gastric and/or bladder lavage
- If early recognition of EHS is combined with immediate on-site cooling with/out other resuscitative measures, as indicated, there is an almost 100% chance of recovery on-site to the pre-morbid state, and may even preclude the necessity of the player requiring medical facility transfer and evaluation. However, if emergency transfer is required, due to the presence of life-threatening complications, e.g. cardiac tachyarrhythmia, refractory status epilepticus, intractable shock, then it is mandatory that adequate and appropriate cooling is continued en route to the medical facility, with other resuscitative procedures. This may necessitate opening as many windows and doors in the air/road ambulance used to facilitate air current movement during the in-transit cooling procedure, which must be continued in transit and not delayed until medical facility arrival.

Exertional heat exhaustion

- Remove the player from the field of play to a shaded, cool area or to the Player Medical Centre, team changing room or equivalent private location if clinically necessary.
- Remove any restrictive or excess clothing, as appropriate
- Place in a supine position with lower limbs elevated. Generally, this is all that is required and, together with a period of rest, will return the player back to the pre-morbid state.
- Evaluate the player's clinical vital signs, perform a focused medical examination and obtain a medical history, if relevant.
- Assess the player for any medical complications regarding airway, breathing and circulation, blood glucose measurement, neurological signs and/or symptoms. Monitor these parameters regularly, as deterioration may require urgent consideration of EHS management and/or immediate transfer to the nearest, most appropriate medical facility.
- If the player does not complain of nausea or signs of vomiting, administer oral fluids carefully. If this is not possible or the player does not recover with simple positional leg elevation and rest, it may be necessary to establish intravenous access and administer 0.9% normal saline to replace lost fluid, particularly if the player is dehydrated.

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3.4 Lightning

Introduction

In October of 1998 a bolt of lightning killed an entire 11-man football team from the Democratic Republic of Congo. Although the opposing team was completely unharmed, 30 spectators sustained burn injuries. Incidentally, a similar situation happened the following weekend in Johannesburg, South Africa. A Premier League soccer match was suddenly stopped when lightning struck the field. Half of the players from both teams, Jomo Cosmos and Moroka Swallows, fell to the ground, holding their ears and eyes in pain. Fortunately, no one was killed on that occasion.

Lightning flashes occur 50 times per second worldwide, with approximately 20% striking the ground. This results in 24,000 deaths per year and ten times as many injuries. Any outdoor activity entails a risk of lightning strikes, and football stadiums or any locations where football is played outdoors, no matter the size, share this risk. It is therefore mandatory for all football stadium managers and football event organisers to have a predetermined lightning plan in order to prevent, wherever possible, and appropriately treat, when rarely necessary, lightning strikes within a football environment.

Prevention

No outdoor environment is safe from a lightning strike. The only known safe environments against a lightning strike is a fully enclosed, metal vehicle e.g. cars or buses or a large enclosed solid structure e.g. concrete building. Football stadiums, unless they have been specifically designed or upgraded to protect players and spectators from lightning within the stadium environment, remain vulnerable, particularly when large, dense crowds are in attendance. It is therefore advisable that all football stadiums and locations consult local engineering experts, where possible, regarding lightning protection of the football stadium.

Besides structural and engineering upgrades, all football stadiums should additionally have a predetermined lightning plan in the event of a thunder storm with lightning occurring within the local vicinity around the time of the football match. This is important as the most dangerous time for lightning strikes are the beginning and end of a thunder storm. Because lightning has the ability to travel large distances, and due to lightning always being accompanied by thunder, these two factors have been incorpo-

rated in to the 30-30 lightning prevention rule which states that there is a danger of someone being struck by lightning when the interval between seeing a lightning flash and hearing the subsequent thunder is less than 30 seconds (see to sound time), placing the lightning within a ten-kilometre distance. The second 30 in the 30-30 lightning prevention rule states that resumption of outdoor activities should not resume until 30 minutes have elapsed after the last lightning flash or thunder. The 30-30 rule is currently accepted internationally as the simplest, safest, easiest implementable plan of action to activate in all locations under all lightning circumstances, particularly because it mandates that someone be designated, within the football stadium management, of being responsible for monitoring the weather, presence of lightning and the 30-30 lightning prevention rule when there is a forecast, visible threat or presence of a thunder storm within the vicinity of the football match. It must be noted, however, that the noise level of the spectator crowd, the structure of the football stadium and related lighting, may obscure the recommended audiovisual criteria that make up the 30-30 lightning prevention rule.

Once it has been determined that lightning is a threat to the occupants of a football stadium, the predetermined lightning plan (PLP) must be put into operation immediately by the stadium management or event organisers. The most important aspect of any PLP is communication, specifically via the stadium public-address system, informing the crowd of the risk of lightning, the postponement of the match (if relevant), advising that anybody leaving the stadium environment to seek appropriate shelter will be allowed back into the stadium using their same tickets, requesting the crowd to undertake any movements (or evacuation) with order and to follow the instructions of stadium stewards, wearing brightly coloured clothing, who will guide them to places of safety or open exits. All persons should be removed from the field of play until it is safe for their return.

Crowd density, rather than crowd capacity, is the main concern for PLPs, because stadiums that are relatively empty allow spectators to move quite easily to escape the storm, whereas a stadium that is filled to capacity inhibits crowd movement and may therefore increase the danger of panic and/or stampede. The National Fire Protection Association of the United States of America (NFPA) guidelines for lightning protection, list the "risk of panic" as the main concern for large stadium PLPs, and must always be taken into consideration when any PLP is activated, in order to ensure that the crowd flow dynamics do not pose a greater threat to spectator safety than the actual threat of lightning.

Lightning injury

Following a lightning strike with attendant injuries, safety is the main concern for all, and the following actions need to be undertaken:

- Cancellation/postponement of the football match
- Orderly movement/evacuation of spectators, as required
- Victim evacuation/on-site evaluation and treatment
- Transfer of all lightning-injured persons to hospital
  - Postponement/cancellation: If anybody is struck by lightning within a football stadium environment during the activities of a football match, the environment is to be regarded as inherently unsafe and high risk, as lightning does strike in the same place more than once, thus placing everybody who is not within an acceptable shelter at immediate risk. Postponement/cancellation must therefore be put into effect, whichever is deemed the safest and most appropriate decision by the football stadium management or event organisers.
  - Evacuation: if evacuation of the football stadium is to be undertaken, stewards must be placed in strategic locations within the stadium structure to guide spectators out of the stadium in an orderly manner through the exits or to locations within the stadium structure that are safe from further lightning strikes. Panic must be avoided at all costs and can be prevented by the presence of an up-to-date, rehearsed PLP that is known by the football stadium personnel.
  - Victim evacuation/on-site evaluation and treatment: Although it is always safe to touch any victim of a lightning strike without fear of injury, the environment of the injured victim may still be dangerous due to the continued presence of the thunder storm and lightning. It may therefore be necessary to speedily evacuate the injured victim/s to safety, out of harm's way, before any medical assessment and/or treatment is undertaken. If evacuation of any victim/s is undertaken, it should be performed using a spinal immobilisation board, as spinal fracture/s may have occurred from lightning induced muscle spasm.
    The victims that die from a lightning strike are those who go into cardiac arrest following the strike. Due to temporary injury to the cardiac and respiratory centres in the brain and electrical system of the heart, the victim goes into apnoea and cardiac arrest. After a short period, the heart regains electrical and contractile function, but the phase of apnoea is more prolonged – a few minutes – and if rescue ventilation is not undertaken to prevent hypoxia, the heart may go into hypoxic cardiac arrest a second time. If this is not treated with immediate basic (cardiopulmonary

resuscitation + Automated External Defibrillator – CPR +AED) and advanced life-support algorithms, when necessary, the patient will die. If the initial cardiac arrest does not occur after a lightning strike to a victim, it will not occur later, and these victims can then be transferred to hospital. There are numerous case reports of victim survival with normal neurological function following lightning strikes when immediate CPR was undertaken.

It is therefore vital that the following be understood and used when treating any victim in cardiac arrest after a lightning strike:

– Any victim of lightning who is unconscious and not breathing must not be regarded as dead, but is in cardiac arrest and requires immediate basic CPR and advanced life-support algorithms, including trauma where appropriate.
– All victims of lightning who are unconscious and not breathing must always be assessed and treated FIRST with immediate basic and advanced life-support algorithms and never triaged as dead or non-salvageable. This process is called 'reverse triage', where the most critical are treated first, never last.
– Prolonged CPR and advanced life support, at up to 30 minutes at least, may be necessary in lightning victims and should be continued until the victim is diagnosed in ventricular asystole with a cardiac monitor.
– All victims of lightning who are unconscious and not breathing but have a distinct pulse, will only need rescue ventilation until they start to breathe on their own.
– Pulse checks to ascertain the presence or absence of circulation must be done on central pulses, e.g. carotid, as vasospasm peripherally may mask circulation.
– When basic and advanced life support is undertaken on scene, continue with effective, adequate CPR, rather than transport the victim to hospital in a moving ambulance with ineffective, inadequate CPR on the way.
– If multiple victims need basic CPR, mouth-to-mouth rescue ventilation is very effective for the victim and just as safe for the rescuer. The fear of obtaining infectious diseases from mouth-to-mouth rescue ventilation should not prevent the only life-saving procedure, which works, from being done when necessary.
– All other victims, who are breathing and/or conscious, in whatever medical condition, must be transported to hospital for medical assessment and treatment, as required.

Conclusion

The incidence of lightning strikes within a football stadium is rare, yet it does occur. Prevention of lightning injuries is always the best option and requires a predetermined lightning plan to be available and known to all stadium personnel, so that it can be used effectively, efficiently and safely, if and when required. If, despite prevention strategies, lightning strikes a victim/s, safety issues become paramount and immediate victim assessment for cardiac arrest is mandatory, with initiation of basic and advanced life-support algorithms, if and where necessary.

When thunder roars, go indoors. Don't be lame, end the game.

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4 Gynaecological injuries

Introduction

With over 40 million female football players globally, acute gynaecological medical emergencies will occur regularly, although infrequently. Many of these emergencies will present with either pain and/or bleeding and may require referral to the nearest, most appropriate hospital for further evaluation and management, if the condition is either regarded as serious and/or cannot be managed within the team changing room environment, which is most commonly the most appropriate location to examine and manage gynaecological medical events.

Classification

Acute gynaecological emergencies in football can be divided into three categories:

– Lower abdominal pain
– Genital bleeding
– Genital injuries

Lower abdominal pain

Causes of acute lower abdominal pain in the female footballer may be due to:

- Dysmenorrhoea
- Ectopic pregnancy
- Torsion of an ovarian cyst
- Rupture of an ovarian cyst
- Acute pelvic inflammatory disease
- Ovarian haemorrhage
- Torsion of uterine leiomyoma

All of the above medical conditions, although they are due to different pathological processes, present primarily with acute lower abdominal pain, associated with nausea, vomiting, vagal-induced fainting, possible signs of peritoneal irritation and, in some cases, may present as hypovolaemic hypotensive shock.

Treatment

1. Ensure that the airway of the football player is open, maintained and protected, most commonly by positioning her in the left, lateral position horizontally, if required.
2. Ensure that the football player is breathing adequately and, if necessary and available, administer supplemental oxygen via face mask, keeping the blood oxygen saturation above 90%.
3. Obtain the pulse and blood pressure. If the football player is hypotensive, obtain intravenous access and administer a bolus of 250ml to 500ml normal saline, or equivalent crystalloid, in order to elevate the blood pressure to at least 90mmHg.
4. Administer appropriate analgesia, either orally or via a diluted, slowly titrated, intravenous infusion to effect.
5. If the football player cannot be adequately and speedily managed within the football stadium medical centre environment, then refer the player to the nearest, most appropriate hospital for further evaluation and management.

Genital bleeding

Genital bleeding may be functional due to menstruation and related events or pathological as may occur with a ruptured ectopic pregnancy or the various types of abortion (miscarriage).

Functional bleeding may present with or without associated lower abdominal pain. However, a ruptured ectopic pregnancy or abortion will present most commonly with acute lower abdominal pain, vaginal bleeding, nausea and/or vomiting, vagal-induced fainting, peritoneal irritation and in various stages of hypovolaemic hypotensive shock.

Treatment

1. Ensure that the airway of the football player is open, maintained and protected, most commonly by positioning her in the left, lateral position horizontally, if required.
2. Ensure that the football player is breathing adequately and, if necessary and available, administer supplemental oxygen via a face mask, keeping the blood oxygen saturation level above 90%.
3. Obtain the pulse and blood pressure. If the football player is hypotensive, obtain intravenous access and administer a bolus of 250ml-500ml normal saline, or equivalent crystalloid, in order to elevate the blood pressure to at least 90mmHg.
4. Administer appropriate analgesia only via a diluted, slowly titrated, intravenous infusion to effect.
5. Any player with symptomatic vaginal bleeding, particularly if in hypovolaemic hypotensive shock, should be urgently referred to the nearest, most appropriate hospital for further evaluation and management.

Sport-induced genital trauma

Although sport-induced (accidental) genital trauma can be caused by various straddling activities, in football it may be caused by sudden abduction of the legs that result in a "splits-type" genital injury, especially in pre-pubertal girls or by being kicked or kneed in the groin.

Signs and symptoms include pain and bleeding in the genital area. Bleeding may be mild to severe depending on the site, extent and nature of the injury and amount of traumatised tissue. A large haematoma may occur in the injured tissue, particularly around the vagina, because the external genitalia have a rich blood supply located in loose connective tissue.

Treatment

Treatment of sport-related genital trauma may either be managed within the football stadium environment if it is a minor injury or the player may need to be urgently referred to the nearest, most appropriate hospital for further gynaecological evaluation and management, if the injury and/or bleeding is severe.

Treatment of the specific injury may include:

- Ice pack application
- Vaginal gauze tamponade insertion
- Suturing of lacerations
- Direct, digital gauze tamponade of the bleeding site together with resuscitative measures including:
  - Ensure that the airway of the football player is open, maintained and protected, most commonly by positioning her in the left, lateral position horizontally, if required.
  - Ensure that the football player is breathing adequately and if necessary and available, administer supplemental oxygen via a face mask, keeping the blood oxygen saturation level above 90%.
  - Obtain the pulse and blood pressure. If the football player is hypotensive, obtain intravenous access and administer a bolus of 250ml-500ml normal saline, or equivalent crystalloid, in order to elevate the blood pressure to at least 90mmHg.
  - Administer appropriate analgesia only via a diluted, slowly titrated, intravenous infusion to effect.
  - Any player with symptomatic vaginal bleeding, particularly if in hypovolaemic hypotensive shock, should be urgently referred to the nearest, most appropriate hospital for further evaluation and management.

Reference

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5 Mass-gathering football medicine

5.1 Principles of football stadium major incident planning

Introduction

The gathering of large volumes of people within a football stadium environment, comprising different ages, nationalities and reasons for attendance – recreational, commercial, official, etc. – requires a safe, orderly, well-structured, timely entrance and exit of everyone into the football stadium before commencement of and after termination of the football match. The safe movement of attendees into and out of the football stadium, including their well-being during their entire stay inside the football stadium environment, is the primary function and responsibilities of the stadium management who oversee all mass-gathering systemic activities. One of the main, mandatory management responsibilities is the preparation, distribution and training of a specific football stadium major incident plan (SMIP), so that in the unlikely, rare event of a major incident within a football stadium, activation of the SMIP by well-trained and practiced stadium staff will result in the safe evacuation of people from the stadium, with a minimum level of injury and no loss of life.

Planning committee for a CAF football tournement involving all agencies.

A football stadium major incident can be defined as an incident within the environment of the football stadium that may potentially produce, or actually does produce, the simultaneous injury/illness of multiple individuals beyond the normal medical control, capability and capacity of the on-duty, on-site stadium medical services.

The aim of this section is to highlight the principles that should be considered in the development of a FIFA football stadium major incident plan (SMIP), for use by medical officers who may not be knowledgeable, experienced or skilled in this aspect of mass-gathering medicine. This chapter is not meant to provide an all-inclusive plan for any particular SMIP but contains information that all Venue Medical Officers (VMOs) should be aware of when assisting with, reviewing or developing their specific SMIP, which is to be regarded as a mandatory document. It must be clearly emphasised that, no matter how comprehensive and detailed any SMIP is, if the plan is not distributed to the football stadium staff who are to put into action its content, if and when required, nor practiced, either by way of desktop or actual stadium simulations, then the plan becomes a mere inert document without any contribution to ensuring the safety and well-being of those who frequent the football stadium environment.

Stadium location

The geographical location of the stadium, both in terms of physical address and Global Positioning System (GPS) coordinates, must be immediately available in the front section of any SMIP in order to facilitate distribution of this vital information to responding emergency agencies by road and/or air to the stadium.

- Physical address – the number and street of the stadium, including nearest physical corner must be available, to allow map cross referencing. In addition, all nearby highways, main roads and relevant side roads should be listed, specifically those that are likely to be of operational benefit during a capacity-crowded football match, when normal road access is restricted for safety, security, traffic and diplomatic purposes. The primary aim of this information is to allow responding emergency agencies traffic information that will allow their arrival on scene in the shortest practical time, with adequate and appropriate resources. Some of the emergency service vehicles that respond may have unusual/abnormal length, width, height or weight measurements, and their ability to move unimpeded to the stadium major-casualty incident (MCI) may be critical to minimising injury and preventing loss of life.

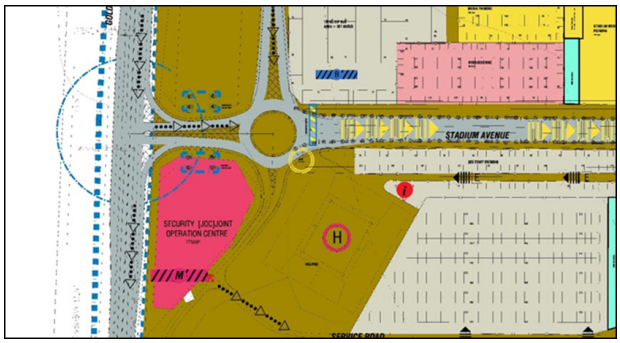
- Helicopter landing location – an emergency service helicopter response to the scene of an MCI is current normal operational practice because of the efficiency, effectiveness and expeditiousness with which rotary-wing aircraft can transport life-saving and related resources to the site of any MCI, as well as evacuate the critically injured en masse. This vital logistical air support is facilitated by the provision in the SMIP of the following:

  – emergency contact details of the helicopter emergency service to ensure efficient activation, if and when required. These details must be updated on a regular basis.

  – designated, preplanned and local civil aviation authority-approved helicopter landing pad/s (helipad)

or emergency helicopter stop/s (heli-stop), wherever possible. The ability to land a helicopter within a football stadium environment MCI, or as near as possible, entails a number of aviation, safety and federal regulatory factors that should be approved after consultation with the relevant agencies, so as to ensure its use, if and when needed. Ad hoc emergency use of this form of resource is fraught with many possible safety and regulatory issues that may make it unwise, unsafe and unacceptable for use.

– trained football stadium staff that are able to cordon off the designated helicopter landing site from all persons and animals, operate an appropriate fire extinguisher and undertake other safety landing procedures that are relevant to ensure overall safety.

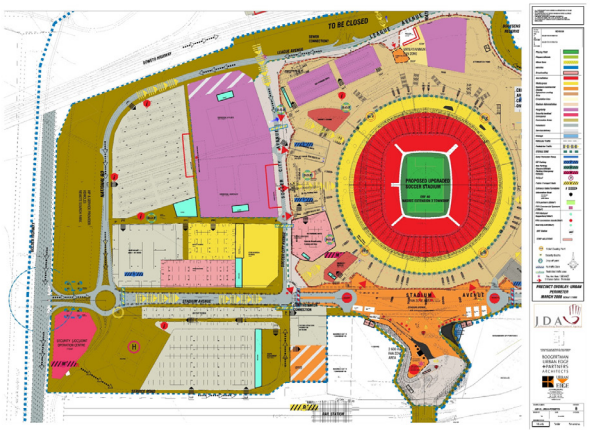


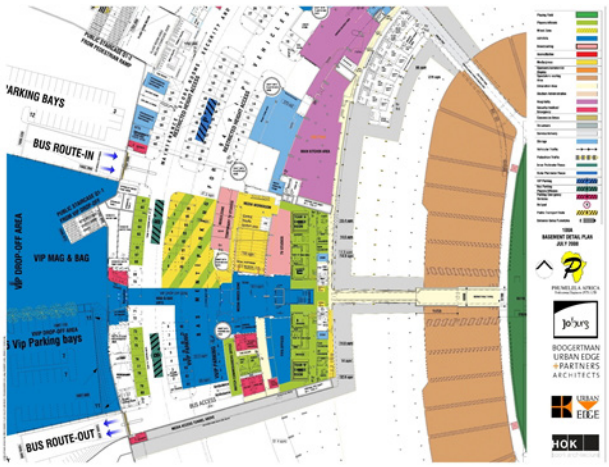
Civil Aviation Authority-registered helicopter landing port at Soccer City Stadium, Johannesburg during the 2010 FIFA Football World Cup, South Africa.

Structure

Updated, current plans of the football stadium and surrounding environment should form part of the overall SMIP, so that it is easy to identify the specific area of concern and its related physical characteristics, knowledge of which is required to limit damage, for spectators to be efficiently evacuated, for emergency agencies to gain access and relevant resource equipment to be strategically and operationally placed.

- The Venue Operations Centre (VOC) should have a full set of architectural plans of the stadium and immediate surrounding areas as standard procedure for any match. This allows immediate visualisation of the layout of any location within the football stadium environment, including electrical boxes, fire hydrants, lifts, ramps, service roads, etc.





- Gates – all gates should open outwards and need to be physically opened at any MCI to allow unimpeded egress of persons from within the football stadium structure. This major activity in the SMIP has to be written into the plan, must be communicated during all SMIP training, and must always have a member of VOC staff responsible for authorising the appropriate instruction at the relevant time, without delay. Failure to ensure that all gates are opened during mass exit is, historically, the primary cause of loss of life in football stadium stampedes.

Gates must be opened and manned once spectators are inside the stadium. Failure to open gates during mass evacuation leads to loss of life.

Gates that open easily from the inside, yet adequately prevent entrance from the outside are the safest form of exit.

It is preferable to unlock all exits and replace the lock with cable ties, as these can easily be overcome by a crowd wishing to exit in an emergency.

- Every stadium during any match must have a full list of the various steps to be taken, by which designated persons, under whose authority, under what (dire) circumstances, in order to ensure that all gates are unlocked and, if necessary, physically opened.

- Such physical actions require sufficient numbers of marshals to unlock and/or open the stadium gates, using designated keys and having effective communication to receive the necessary instructions. Exactly how this will be done is to be written into the SMIP.

- The greater the capacity of the spectator crowd attending a football match, the sooner the gates should be unlocked or manned by marshals, so that opening the gates in any emergency requires no delay.

- Any football stadium which still has fencing to prevent access of the spectator mass onto the field of play, must ensure that all gates leading onto the field of play are always manned and can be opened immediately, if and when required, to prevent life-threatening crushing.

Manned gate with steward in attendance throughout the match

- Although stadium gates are opened to allow persons to leave the confines of the football stadium, most modern football stadiums have separate service entrances and roads that are used by non-spectator officials, vendors or on-duty agencies to gain access for services and goods. It is via these routes that responding emergency services should proceed in order to gain access to the stadium, because it provides access to the field of play, service lifts, VIP and team entrances. If these separate service routes are not adequately and effectively managed and secured during an MCI, to separate those leaving the stadium en masse from those services entering the

stadium to enhance resource delivery, then emergency service response vehicles, manpower and equipment may be obstructed, leading to a delay in the provision of life-saving assistance to those in need. How these service roads, tunnels, gates and related routes will be secured in the event of an MCI is part of the SMIP.

Venue Operations Centre

The Venue Operations Centre (VOC) is the primary command and control centre of the football stadium, positioned in a location that allows its occupants to oversee the inner complex, the stadium structure and field of play, with accessory closed-circuit cameras strategically located so that the entire stadium environment is effectively monitored. The members of the VOC are normally senior members of the various agencies involved in providing strategic functions within the stadium, in order to provide immediate decision making in emergency or crisis situations, without the need to communicate externally, because of the ever-present problem of lack of communication during a major incident.

These agencies will usually include, but not necessarily be limited to:

- Football stadium management
- Local metropolitan police services and related agencies
- Local traffic enforcement agency and related agencies
- Local fire and rescue services and related agencies
- Local emergency medical services and related agencies
- Local disaster/public disorder agencies
- Local metropolitan transport agency

Bangkok Glass FC Venue Operating Centre.

Medical services should have a mandatory two seats inside the VOC: one for the senior medical decision maker and the other for a communication medical/ambulance dispatcher who can receive information and commands from within the VOC and dispatch this to the necessary mobile medical teams on duty within the football stadium environment or visa versa.

Field of Play

- The field of play (FoP) in a football stadium remains practically, logistically and operationally the ideal place to establish a mass casualty medical management area. Due to the fact that the FoP provides a large open area, a uniform surface and inclination, is generally well lit during an MCI and has efficient access from one or more service tunnels, it is usually the first choice practically for SMIP patient triage, treatment and transport. However, no matter how ideal the FoP may be, it cannot be relied on, because of its tenuous position inside the stadium's physical structure, which itself may be damaged or destroyed. It is therefore mandatory that the SMIP designate a fixed MCI medical management area outside of the stadium's physical structure, should the need arise. This location is to be part of the SMIP document.

Fixed MCI location outside of the main Soccer City stadium in Johannesburg

Police, stewards and supporters tend to wounded football supporters on the field at Hillsborough Stadium, in Sheffield on 15 April 1989 (Associated Press)

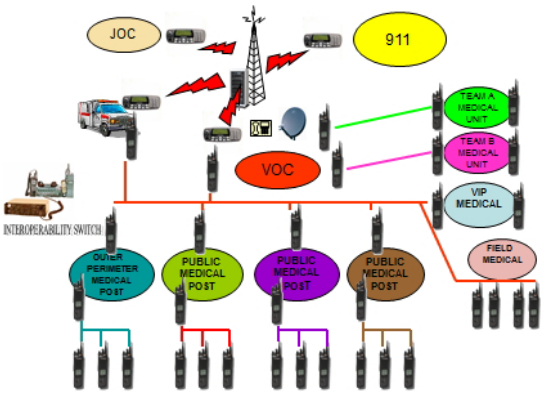
Fixed MCI location, Maracanã Stadium, Rio de Janeiro during the 2013 FIFA Football Confederations Cup

- If the FoP is used as a primary MCI medical management area, a number of considerations apply:
  - it must be safe to do so
  - there must be adequate lighting, which is usually the case
  - ambulances and rescue vehicles should have access to the field via the service tunnels
  - use should be made of any electrical power supply available, if safe and appropriate
  - Do not bring in any helicopters onto the FoP unless it has been declared safe to do so by those who know about these requirements. Overhanging electrical and TV cables can bring a helicopter down very easily and quickly.
  - ensure that the service tunnel is not obstructed by ambulances, fire and other vehicles, particularly large vehicles that may become jammed in the tunnel because they are too large to drive through and then block the tunnel for everybody else.
  - there must be constant communication between the VOC and FoP at all times.

Communication

Communication is the key to successful MCI medical management. The football stadium VOC should have various forms of communication with officials and staff inside the stadium and various participating agencies outside of the stadium. A valid SMIP must always ensure that there is a written plan that lays out the forms of communication that will exist in the event of an MCI, as one form of communication may not function adequately for various reasons. The various forms of communication that are available inside a football stadium may consist of the following:

- Two-way portable radios - simplex or duplex
- Cellular mobile phones
- Portable pager message devices
- Landline telephones
- Social media and email formats
- Human message runner



VOC = Venue Operations Centre
JOC = External Joint Operations Centre

Although it is normal for all officials and pivotal staff members within the football stadium to be equipped with mobile radio communications so that each person can talk to their respective functional group, e.g. medical, security etc., or communicate with each other individually or when necessary communicate with the VOC, the surrounding noise level of a full-capacity football stadium during a match is of such a high volume that unless adequate earphones and ear protection are effectively distributed to those mobile radio users within the stadium environment, it may become practically impossible for those attempting to communicate to relay their message effectively.


This inadequate communication from ambient noise may occur either because the receiver may not be able to hear what is being communicated, the dispatcher may not hear any reply from the initial message or both, thus leading to ineffective, possibly incorrect and distorted information transfer: a very dangerous situation.

It is often normal operational communication practice to have a dedicated MCI channel that is available only for this specific use, and that will be utilised in an MCI, thus allowing other communication matters to continue, as required. The VMO should be fully aware of these various forms of communications and be able to adequately and effectively function in an MCI.

Public address system

One of the prominent causes of unease and anxiety among spectators at any mass gathering event is lack of adequate information at a time of crisis. Previous football stadium disasters have been caused because of the inability to provide the spectators with appropriate information concerning the nature of any particular incident, hazard or risk, the designated evacuation routes, the need for medical assistance from among the mass of spectators and other vital items of information that serve to enlighten the spectators and thereby promote calm.

In the unlikely event of an impending MCI, it is standard procedure to first notify all football stadium officials on duty, e.g. medical, security, stewards, etc., as to the existence and nature of an incident, instructions regarding opening the exits/gates for evacuation purposes, before the crowd is notified, thus allowing time for MCI preparation and plan activation. This notification may occur using formal radio communication channels and may be enhanced by use of a coded message using the public address system. This form of notifying officials on duty of any impending or actual incident is only reliable if all those officially on duty are notified of the coded message well in advance, preferably during the initial brief at the beginning of their respective shifts.


Public address system at the Bauchi Football Stadium, Nigeria.

Signage

The display of appropriate signage within the football stadium environment, regarding exits, medical posts, fire extinguishers, automated external defibrillators etc., is often a mandatory requirement for licensing and accreditation in many stadiums internationally, because of the vital information that it provides in normal circumstances and particularly in crisis situations. Adequate preparation of any SMIP includes inspection and, if necessary, installation of adequate emergency and evacuation signage throughout the football stadium environment.

Medical management plan

In the unlikely event of a major incident involving mass casualties, a preplanned, adequately practiced, orderly medical management plan should be put into action, so as to minimise further injury and prevent loss of life. There are many varieties and forms of major incident systems internationally, with all of them having their own strengths and weaknesses. None are adequate and appropriate to every location in every situation and it is up to the local emergency services to select a major incident system that is well suited to the specific football stadium. Generally, the basic elements of a Stadium Major Incident Plan (SMIP) involve the following:

- Command and control
- Safety
- Triage
- Treatment
- Transport
- Debrief

Command and control

Although command and control within the football stadium environment is undertaken by the VOC, once a major incident has been declared, various agencies may take over specific command and control as per national or federal regulations. This eventuality must be known by all senior medical staff, including the VMO, so that there is a smooth transition of command and control to the appropriate agency, with medical services falling into whichever control and command structure the current regulations dictate.

'Command and control' briefing prior to an event to ensure everybody knows their respective roles.

However, until the command and control structure is established, medical provision for those who are injured must be undertaken urgently, with all of the elements as described below put into operation as safely, effectively and efficiently as is practical under the prevailing circumstances.

Safe and effective major casualty incident management is best undertaken under the direction of an experienced trauma surgeon, emergency physician or senior paramedic who understands the principles of triage, treatment and rapid transport. If such an experienced person is present, they will delegate various functions to various medical and paramedic professionals, so as to ensure that all necessary functions have a responsible person making appropriate decisions regarding triage, treatment, transport, communication, etc. Who ends up doing what will once again depend on the available resources in manpower and experience.

Safety issues

Once a major incident has occurred with multiple casualties, the primary goal of all agencies is the safety all of persons within the stadium environment, with the goal of preventing any further injury, including responding medical and rescue service staff. This means any specific area of damage should be isolated and cordoned off as soon as possible, in order to facilitate the entry into the incident area only of persons who are adequately protected, equipped and with the required training, skills and experience to function safely and effectively within the incident area. It is common practice, in a number of major incident management systems, to designate areas within the incident into "danger zones", such that there may be a "red zone" which is out of bounds to all persons except those with specific clothing, equipment and expertise, whilst a less dangerous area may be designated an "orange zone", with a "green zone" being safe for all persons to enter. Because different major incident systems have different characteristics, it is important that the VMO understand what is commonly used by the fire and rescue services under whose jurisdiction the football stadium falls.

The injury of a rescuer, for whatever reason, puts a further burden on fellow colleagues, in both resource utilisation and emotional control and may compromise the rescue effort or elements of it.

Football stadiums may succumb to two types of major incidents. The first type is a "non-spectator type MCI" which is due to a physical cause such as fire, structural collapse, explosion, etc, management of which follows standard methods of MCI management, with safety being the primary element. The second type of football stadium major incident is a "spectator type MCI" characterised by stampeding or rampaging masses of spectators within the stadium structure, with minimal structural damage. This type of MCI commonly does not present significant safety issues once the initial incident has occurred, with urgent medical management being the primary priority in this situation.

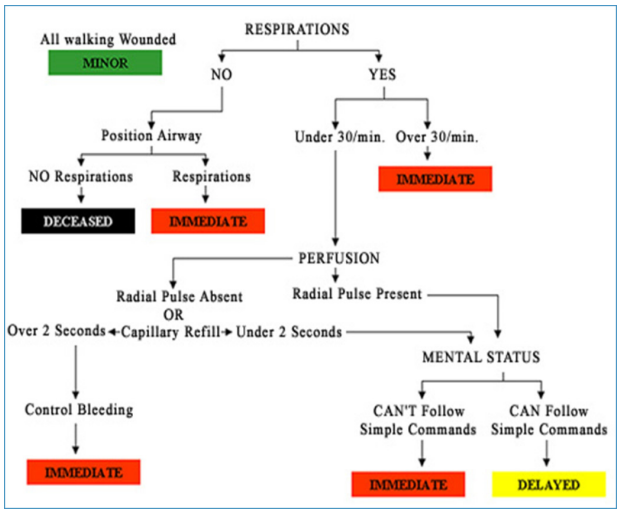
Triage

The number, injury severity and degree of entrapment of casualties in any MCI may dictate that not all patients can be treated at the same time, especially if available resources are limited. However, if available medical resources, in the form of qualified medical or paramedical professionals, rescue and medical equipment and patient transport are adequate to initially treat all patients simultaneously, then triage (patient selection) may not be necessary.

Limited stadium resources

In the event that the quantity of casualties outnumber the capacity of available medical and paramedical staff, it may be necessary to have to select which patients are treated in what order, as not all patients will be able to receive medical care simultaneously. In this unfortunate, but predictable situation, it is standard practice to categorise patients by

their level of injury severity, and to treat the most critically injured first and the least injured last. A common triage system used internationally is the S.T.A.R.T. (Simple Triage and Rapid Treatment) system developed in the United States. S.T.A.R.T. divides patients into four categories of treatment scheduling which is determined by injury severity:



1. Immediate (RED) – patients receive immediate treatment
2. Delayed (YELLOW) – patients will receive treatment after "immediate" patients have been treated.
3. Minor (GREEN) – these are patients without any severe or life-threatening injuries who do not require treatment on scene or who may be treated when all other categories of patients of higher injury severity have been treated and stabilised
4. Deceased (BLACK) – these are patients who are declared dead on scene, or who, in very rare circumstances, may be categorised "not for treatment", either because their injuries are not life sustaining or they require vast resources to treat them adequately, resources which are either not available or in short supply, at the MCI.

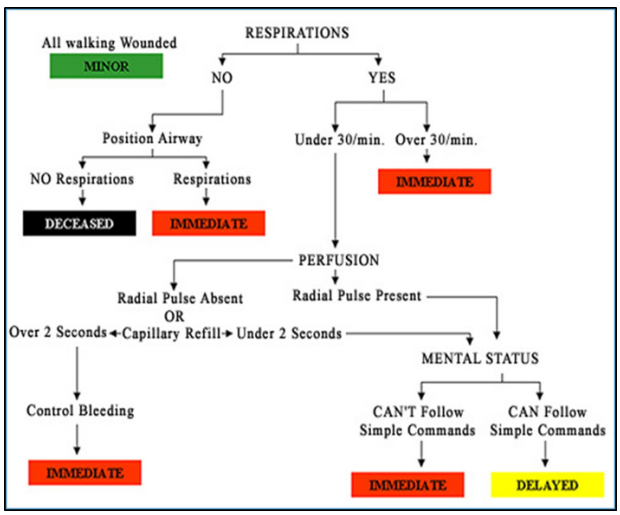
The clinical elements used to categorise the level of injury severity are the mental status of the casualty, adequacy of breathing, presence of a radial pulse and capillary refill time, each of which can be judged without the need for any equipment. This system of patient selection can be used to determine who receives treatment and/or transport with what priority.

Adequate stadium resources

If the available on-site medical or paramedical human resources, rescue and medical equipment and modes of transport are sufficient to treat and/or transport all casualties simultaneously, then use of a triage system becomes unnecessary. It is important to classify what type of MCI is present within the football stadium when determining resource availability. Within the football stadium crowd, there are many medically and paramedically trained and qualified fans who would be willing to assist with casualty management, if asked to do so by use of the public address system.

Therefore, in any football stadium MCI, a public address system becomes vital for publicly requesting medical assistance from others in the stadium who may be prepared to assist. The response to this "call for help" may be the determining factor between resource limitation and resource adequacy. Failure to take this into consideration and thereby increase capacity may have been the failing in many football major casualty incidents.

More importantly, in "spectator type MCIs", stampede-related crush injuries result in cardiac arrest from asphyxia, the only treatment of which is standard compression-ventilation cardiopulmonary resuscitation (CPR). In these cardiac arrest casualties, the S.T.A.R.T. system of triage **must not** be used, because these casualties are not deceased, but require CPR to reactivate their hearts. It is in this type of MCI that "reverse triage" is indicated, namely, those patients who have been crushed and as a result are not responding and are not breathing, should be treated first, specifically with standard CPR. It is also in this category of casualty that a public address request should be undertaken for medical and paramedical spectator assistance to perform CPR, in which case there will be adequate resources available to initiate life-saving CPR on all cardiac arrest crushed casualties simultaneously.



Spectator type MCI reverse triage algorhythm.

CPR at Hillsborough football major casualty incident in Sheffield on 15 April 1989 (Associated Press)

Treatment

The treatment of casualties during an MCI should follow basic trauma treatment principles, with only the necessary being undertaken medically, and rapid transport to the nearest awaiting hospital emergency department. If, and when, advanced trauma life support type management is required because of the severity of injury, this should be preferably be taken by skilled and experienced medical and/or paramedical professionals using adequate and appropriate medical equipment, if available. Generally, the most appropriate and adequate trauma management is undertaken using whatever resources are immediately available, with the intention of transporting the casualty to hospital as soon as practically possible. It must be stated that it is important to inform all receiving hospitals that form part of a football SMIP well in advance of the intended football match, so that they can prepare their own major incident plan, including the necessity of ensuring extra manpower on duty if it is deemed necessary to do so. It is part of the responsibility of the medical persons in the VOC to obtain updated SMIP receiving hospital "readiness status" so that it is known how many patients each hospital emergency department can accept of the differing injury severity categories.

One recommended simplistic protocol for football stadium casualty treatment involves the following, (although there are many others):

Airway

Open patient's mouth
Gently turn patient onto their side if they are unconscious and not able to control the airway
Insert oropharyngeal tube, if available

Breathing

Instruct volunteers in mouth-to-mouth breathing if they do not know to do CPR
Do mouth-to-mouth or mouth-to-mask, whichever is available
If you can intubate, do so and initiate mouth-to-tube on as many as possible
Close any open sucking chest wound, digitally if needed

Circulation

If chest compressions are indicated, do it effectively and instruct others as required
Stop external bleeding with digital counter pressure
Do not stop chest compressions until electrocardiograph tracing is available

Treatment strategies will always depend on what type of major casualty incident has occurred, how many casualties are present requiring treatment, how much medical equipment is available and what the response time is of the responding emergency service agencies that would have been summoned to the scene to assist. As casualties are evacuated and resources arrive on scene, it may become possible and practical to undertake more advanced trauma care for those that still remain on the scene. No treatment plan is fixed; it all depends on the casualty, timing and resources.

Transport

Multiple casualty management principles involve transportation of the patient from the scene to the nearest, most appropriate hospital emergency department, as rapidly and effectively as possible. Remaining unduly on scene when the casualty should be in an operating theatre is detrimental to trauma patients, who have a time-critical problem that often requires immediate treatment, part of which may be undertaken initially on scene, the remainder of which has to be undertaken under surgery.

It is therefore mandatory that casualty transport from the football MCI be adequately controlled by a knowledgeable and preferably experienced out-of-hospital medical person, who has experience in ambulance transport, and thereby be able to prioritise patient transport, ambulance and vehicle utilisation, so as to clear the scene of all patients as rapidly as possible.

One of the factors that determine rapid and efficient casualty transport is the availability of hospitals in accepting the casualty flow. For this to occur efficiently, it is important that hospitals are informed before every match about relevant information about a football match, e.g. expected crowd capacity, anticipated risks, unfavourable weather forecast, so that each emergency department can plan accordingly regarding staff and stock. It is likewise important for the senior medical person in the VOC to know the bed status of each receiving hospital in the football stadium area, so that each hospital receives the appropriate number and category of casualties.

Debriefing

A debriefing session, although it occurs after the major incident has been completed, is part of the SMIP in order to ensure that all those involved with the major incident have not been adversely affected psychologically and are therefore able to continue their respective duties and functions in good mind and body.

Debrief session after the 2013 FIFA Football Condfederations Cup

Conclusion

This guide for football stadium MCIs regarding the basic principles of a football stadium major incident plan and various aspects of major casualty incident activities is not in any manner all inclusive, as such a document is usually complex, voluminous and detailed. Needless to say, this is not easy reading. This brief example is meant to provide basic information, stimulate ideas about one's own stadium and generate discussion with those who should be writing the football stadium major incident plan.

5.2 Principles and provision of massgathering medical services

Introduction

Mass-gathering medicine involves the provision of medical services to large volumes of people, usually in excess of 1,000, gathered together for a particular event in a specific location for a defined period of time and who would generally elect to remain at the event should clinical indications of illness or injury develop. As a result of personal, family and peer pressures and the purchase of entrance tickets, most persons elect not to leave the environs of a football stadium once they have gained access despite illness or injury. This is the unusual nature of mass-gathering medicine.

Football mass gathering medicine specifically involves the provision of medical services to all persons present, in and around a football stadium, for the time period before, during and after a football match. As described, all persons located in and around the football stadium are present for varied reasons and, if acutely ill or injured, often elect to be medically managed on site in order not to have to leave the football environment, if medically possible. Supporters who have purchased tickets, who have travelled long distances, those accompanying fellow supporters and vendors who are present for commercial and financial gain, all wish to remain at the football stadium despite clinical indications of illness/injury and may neglect their disease process with detrimental consequences, if immediate medical services are not available on site to accommodate their particular circumstances.

This section is compiled from contributions from authors who have planned, prepared and performed medical services prior to, during and post international FIFA football tournaments. Due to the scarcity of football-specific mass-gathering scientific peer-reviewed publications, a large part of the information contained in this section is not evidence based, but provides general information from those who have undertaken supervisory medical duties, during which they may have unintentionally erred, learnt invaluable lessons, and are therefore in a position to share these with those who can look forward to the pleasure, privilege and professionalism of providing medical care as elected FIFA-specific medical officers at football tournaments in the future. This is a living document, whose pages will continually be revisited, reviewed and revised as new recommendations and considerations become evident and old ideas less relevant.

Preparation and planning for any FIFA football tournament, particularly the FIFA Confederations Cup (FCC) and FIFA World Cup (FWC) must include the provision of effective and efficient medical services in order to ensure the health and well-being of all FIFA participants, players, staff, delegates and dignitaries on the one hand and the supporting spectator crowds on the other. Medical service provision is therefore integral to the successful planning and provision of any FIFA football tournament.

For successful medical service delivery, it is acknowledged that appropriate personnel appointments, comprehensive planning, focus-directed training and football match exercises be undertaken as early as practically possible, thus ensuring timely knowledge and experience before the tournament itself.

Staff

Chief Medical Officer (CMO)

The FCC CMO is the individual who has the overall responsibility of providing effective and efficient, adequate and appropriate medical services during the FWC and FCC to all persons within the football stadium environments, designated participating FCC hotels, team training camps, team training sites, FIFA headquarters, FIFA Conference and related activities, on site or on the move, besides supplementary medical activities including out-of-competition and in-competition doping control operations.

Each of the activities and responsibilities mentioned above require designated and appropriately designed locations (stadium doping control room, player medical centre, VIP

medical centre, general spectator medical centres + posts), knowledgeable and experienced emergency medicine/critical care/doping control medical professional staff, adequate and appropriate medical equipment able to support provision of current, evidence based, internationally accepted, anticipated and approved levels of emergency football medicine, intensive care medicine and a full spectrum of primary healthcare, family medicine, travel medicine, infectious medicine and disaster medicine, if and when required, in each and every FCC football match, team draw or conference venues.

It must furthermore be appreciated that medical services also encompass the specific medical requirements of all FIFA staff and delegates who travel internationally to the host country in order to assist in the provision of the FCC, whether it is a participating team that requires specialised radiological investigations or a FIFA official requiring a dentist for severe pain.

For all of the above to be effectively planned, prepared and provided, the CMO needs to be appointed as soon as possible after the host country has been awarded the privilege of hosting the converted FCC, but at the latest two (2) years before hosting of the relevant FCC. This fixed, full-time contracted position, demands the characteristics of effective leadership and total commitment, passion and perseverance, fluency in professional English, computer literacy and able to achieve the necessary goal of maximising health and safety and minimising morbidity and mortality.

The main duties of the CMO include, but may not necessarily locally be limited to:

- Acquiring knowledge and understanding of the medical service requirements for hosting the FCC and associated activities.

- Appointing an effective FCC Local Organising Committee (LOC) medical team, fluent in English, to assist with all designated and required medical service activities.

- Appointing the Venue Medical Officers, fluent in professional English, for each host stadium, together with provision of effective briefing, training and support, where necessary.

- Appointing the Venue Doping Control Officers for each host stadium, together with provision of effective briefing, training and support, where necessary.

- Assisting in the designing, construction, building alteration and regular site inspections of football stadiums to ensure that medical service requirements are adequately provided, including the Doping Control Room, Player Medical Centre, VIP/VVIP Medical Centres, Spectator Medical Centres and medical posts, appropriate ambulance bays with easy immediate access to the field of play, players medical centre and VIP medical centres and other issues as relevant.

- Assisting in planning and provision of the FIFA medical conference.

- Assisting in the acquisition of essential medical, physiotherapy, doping and associated equipment that will be required for the provision of comprehensive medical services, as per the approved financial model.

- Communicating with national, regional, local authorities and their respective emergency medical, fire and rescue, hospital and health agencies in order to develop a nationally coordinated, regionally approved, locally integrated medical service to each host stadium and team training centre, host city and team base town/city, relevant airports and highways based on cooperation, coordination and communication.

- Communicating with relevant agencies regarding the provision of emergency medical and primary healthcare medical services to the crowd inside host stadiums and open day training venues.

- Communicating with the relevant agency responsible for mass casualty incident management at each host venue, in accord with national/regional/local regulations.

- Communicating with the national health authorities regarding regulations of any national act that may influence the provision of medical care by team physicians to team members, the importation of medical equipment, medications and related substances for medical purposes, registration of FIFA and/or team physicians nationally, the issuing of prescriptions for scheduled drugs and related medical requirements.

- Communication with national health authorities regarding regulatory vaccination, immunisation and disease prophylaxis requirements that may be relevant to FIFA staff, delegates, participating member associations and others.

- Ensure the establishment of a network of host city FIFA-approved, LOC VMO designated hospitals and specialist physician network and allied healthcare providers that will provide 24 hour continuous medical, dental, sport radiological and allied healthcare provision, if and when required.

The activities as outlined above, for which the CMO becomes fully responsible, cannot be undertaken by a single person, and therefore require a team to undertake the above in order to ensure that goals are achieved timeously. During the FCC, the LOC CMO will have medical office space in the FIFA headquarters, so that he/she will be in close administrative and strategic proximity with his/her FIFA CMO/MO counterpart and thus be able to plan and resolve any problems speedily and efficiently. This medical office space is traditionally located very near to the FIFA headquarters PHC for practical reasons.

Venue Medical Officer

The Venue Medical Officer (VMO) is the local host city equivalent of the CMO and is appointed to ensure that all locally required activities are undertaken effectively and efficiently. The VMO, a registered physician fluent in professional English, is the local liaison between FIFA and all local medical service providers, and therefore responsible for establishing a comprehensive network of colleagues that he/she can rely on to provide a FIFA-approved level of comprehensive medical services, 24 hours a day. Although the establishment of this network is the primary responsibility of the local VMO, he/she also has other duties and responsibilities that locally mirror the national responsibilities of the CMO, namely to:

– Acquire knowledge and understanding of the medical service requirements for hosting the FCC and associated activities locally.

– Appoint the Venue Doping Control Officers and doping chaperones at each host stadium, if designated to do so, together with provision of effective briefing, training and support, where necessary.

– Appoint the various physicians, nursing and allied healthcare professionals who will provide current, evidence based, internationally accepted medical services to the Competitions Area of the host stadium during the FCC. Only if necessary will the VMO also be involved in the appointment of physicians, nursing and allied healthcare professionals for stadium spectator medical service provision, as this is traditionally undertaken by the local authority emergency services.

– Appoint the physicians, nursing and allied healthcare professionals who will provide primary healthcare medical services at the official FIFA hotel/s, FIFA headquarter (if different), FIFA referees hotel (if different) during the FCC.

– Inspect the host stadium doping control room, player medical centre, VIP/VVIP medical centre, spectator medical centres and medical posts and appropriate ambulance bays, so as to familiarise himself/herself with the layout of the stadium that he/she is medically responsible for. The VMO must also inform the CMO of any inadequacies, delays or associated problems that may affect the host stadium medical service provision, so that solutions and resolutions can be undertaken in a timely manner.

– Be prepared to assist in the planning and provision of the FIFA medical conference.

– Be prepared to assist with the acquisition of essential medical, physiotherapy, doping and supplying medical equipment required for provision of comprehensive medical services in their host stadium

– Be requested to communicate with local authorities and their respective emergency medical, fire and rescue, hospital and health services in order to develop a locally integrated medical service plan for their host stadium, team training centre, and team base camp locally, local airports, based on good local cooperation, coordination and communication.

– Communicate with relevant agencies regarding the provision of emergency medical and primary health-

care medical services to the crowds inside their host stadiums and open day training venues.

– Communicate with the relevant agency responsible for mass casualty incident management at each host venue.

– Ensure the establishment of a network of host city FIFA-approved, LOC VMO designated hospitals and specialist physician network and allied healthcare providers that will provide 24-hour continuous medical, dental, sport radiological and allied healthcare services, if and when required

The above designated schedule of responsibilities can only be successfully accomplished if the VMO is appointed early in the FCC organisational process and is comprehensively briefed and empowered. The longer it takes to appoint the various medical officers responsible nationally and/or locally, the greater the problems that may manifest and the more difficult it becomes to find resolution, to the potential detriment medically of the players, officials and spectators alike.

Preparation for a FIFA Football Tournament FIFA Confederations Cup (FCC) / FIFA World Cup (FWC)

The FCC as a tournament is intended to be a practice event for the host country in its preparation for the FWC, which is held a year later. It is therefore vital that all medical services be put into action for the few selected participating stadiums during the FCC, at the same level as it would be during the FWC, and thereby scrutinise the medical service provision to uncover any deficiencies, inadequacies, deficits or the like that may require replacement, rehabilitation, removal or rethinking.

As only a limited number of host city stadiums will be used during an FCC, and in order to ensure that the medical services are successful, the following activities should be considered, and where relevant and appropriate, put into operation.

These preparations are generically similar to preparation for any FIFA tournament anywhere.

General medical service information

The host city VMO is responsible, not only for the provision of medical and doping control services within the environment of the host stadium, but is essentially also responsible for all FCC medical requirements by the extended FIFA delegation, which includes all FIFA staff, referees and delegates and PMA teams that are resident in the city and its related environment. This means that the host city VMO must ensure that adequate medical service coverage and provision, if and when required, is available on match days to the host stadium environment and on non-match days to the FIFA hotels, FIFA headquarters, PMA training camps and training stadiums and for all PMA football medicine-related issues, e.g. MRI organisation for players if requested by a team physician at any time.

For this comprehensive medical service to be made available, the VMO needs to establish:

- A local network of specialist colleagues who can be relied upon for expeditious consultation and medical management for members of the extended FIFA delegation if and when necessary.

- Establishment of a FIFA headquarters primary healthcare consultation clinic (PHC), managed by an appropriate physician and nurse, for daily consultation of medical problems that may arise in the FIFA delegation, many of whom are international visitors to the host country, as stated above.

- Appointment of medical, nursing and allied healthcare professionals to the various sites of medical service provision, each of whom requires the following considerations:

  – Security clearance by the national security organisation before appointments can be officially made. This process may take extended periods of time and therefore the sooner this information is obtained, data captured and dispatched for processing, the earlier the appointments can be made and delegation of duties commenced.

  – FCC accreditation which involves the issuing of an official FCC photo identification access card that indicates which areas the holder may access during the competition and without which the individual cannot gain access to any FCC location or event.

  – National medical, nursing or allied healthcare-related proof of current national registration, without which no national or international healthcare provider may practice clinically.

– Approve FCC clothing and/or uniforms to be worn by healthcare providers when on duty at FCC locations, as no non-officially branded clothing may be worn inside these locations without special permission from the FIFA marketing department.

– Provision of food packages for all healthcare providers on duty in official FIFA locations, as the presence of off-site prepared food may be prohibited from entering the FCC location due to strictly enforced local health regulations, officially monitored to prevent any food-related disease outbreak that could have major detrimental effects on the FCC tournament. This may practically mean that on-duty personnel may be restricted from bringing their own food from home into the FCC location, thereby placing a mandatory responsibility on the host VMO to ensure that adequate food and drinks are supplied regularly to all on-duty staff, wherever they may be distributed within the event. This should be arranged early on in the planning stage with LOC catering or whoever else is officially responsible in providing catering services inside the FCC location. Exceptions may occur where special diets, e.g. kosher, halal, vegetarian, diabetic diets, etc., are involved and which may not be accommodated by the catering service provider.

– Transport matters regarding all on-duty healthcare providers, to and from the FCC locations, must be planned well in advance with the relevant LOC transport department. The practice of allowing individual staff members the use of their own forms of transport to reach the FCC location, e.g. host stadium on match day, is fraught with problems, with many healthcare providers arriving late for duty because of unexpected traffic delays, congestion, road closures and so forth. It is far more preferable to organise formal transport from a pre-selected location, where all providers can easily congregate and park their vehicles safely, and then transport them all with an official FCC accredited vehicle to the host stadium in a timely manner, thus ensuring that all staff arrive together and on time. Such a gathering, prior to transfer, allows for provision of information, distribution of equipment and other related matters and activities.

– Any funding that will be provided to any healthcare provider will have to involve the transfer of funds to an approved-provider personal bank account, the logistics of which should be established early in the planning process so as to avoid any financial complications and/or dissatisfaction during the event, by one or many providers.

FIFA hotel medical services

The FIFA delegation, including FIFA referees, present for the FCC will be resident in a number of designated hotels, each of which requires as minimum level of medical care, namely basic life support (BLS), plus AED emergency medical response within five minutes of activation. This immediate level of emergency medical care can only be achieved if BLS teams are physically located on the premises or in a designated location nearby. This specific response period is to ensure immediate response to any person with a sudden cardiac arrest where time any person in sudden cardiac arrest where time to initiate treatment is critical to successful resuscitation. If such an incident occurs and BLS is initiated, guaranteed backup of advanced life support (ALS) medical response must be in attendance at the patient's side within 15 minutes of activation. The FCC is an ideal tournament that affords the opportunity of testing the planned medical services involving the various local hospitals, emergency medical ambulance services and allied healthcare service providers, whether public or private. It is the local VMO's responsibility to safeguard that all of the links in the emergency medical service provider chain are present, functional, competent and fully briefed.

In addition, a primary healthcare service (PHC) is also required at the FIFA hotels during delegates' working hours, preferably manned by a local family physician. It is recommended that the FIFA hotel PHC medical centre stock a reasonable quantity and range of generic, commonly prescribed medications for FIFA patients making use of the PHC medical facilities and/or a pre-organised prescription

delivery service with a designated pharmacy, according to regulatory requirements, so that intended medications can be obtained easily and expeditiously, if and when required.

All of these primary healthcare and emergency medical services need to be adequately planned and prepared well in advance, taking into consideration staffing requirements, medical equipment availability and emergency response times to and from the various hotels to the nearest, most appropriate receiving hospitals, with traffic considerations paramount.

Stadium medical services

- Doping control services
- Player medical services
- VIP medical services
- Spectator medical services
- Multiple-casualty incident medical services

Doping control services

During the preparation for the FCC, doping control activities will be undertaken with the participating teams, usually in the participating team's hotel early in the morning for any out-of-competition testing and routinely after each match on selected players for in-competition testing.

For out-of-competition testing, the entire team may be selected to undergo venous blood sampling, and this will require the assistance and active involvement of the host city LOC Doping Control Officer (DCO) working in conjunction with the designated host city FIFA Medical Officer. This cooperation and coordination of the FIFA Medical Officer and LOC DCO in providing doping control services can only be accomplished:

- If the DCO has been officially appointed to the DCO position in good time
- If the DCO has been adequately trained, informed and empowered to assist
- If there is effective communication and correspondence between the FIFA MO and LOC DCO
- If adequate preparations have been undertaken

Before the day of the first host stadium match, and for every match thereafter, the LOC DCO should ensure that the following items are present in the doping control room within the host stadium:

– Key for locking the Doping Control Room
– Functional TV for viewing by the selected PMA team players
– A functioning fridge with 24 bottles of water (still) and 12 isotonic drinks
– A minimum of eight comfortable chairs in the waiting room
– A second doping testing room with opaque door
– Two tables and four comfortable chairs
– A lockable cupboard with keys
– Doping testing room adjoining toilet with wall mirror
– Doping testing room adjoining functional shower with hot+cold water
– Selection of hand soap, shampoo, towels and toilet paper
– FIFA doping control official bibs obtainable from the FIFA General Coordinator (GC)

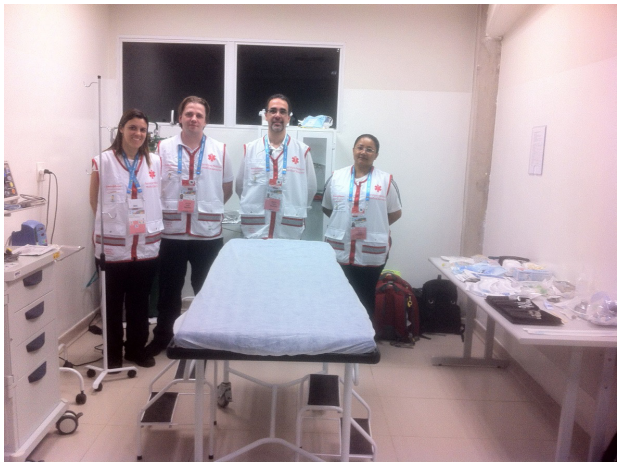
These doping control activities are an ideal time for the LOC DCO to become acquainted with the designated FIFA Medical Officer and to be trained and mentored on a one-to-one basis in both venous blood and urine sampling procedures. Every effort should be made to ensure that this opportunity is successfully seized.

The designated doping control chaperones should be appointed in a timely manner before commencement of the first host stadium match and should be instructed to be present in the stadium on match day four hours before kick-off at the latest. This may require specific transport arrangements on match day for the chaperone team to use official shuttle transport from a designated location. If necessary, they may be advised to meet with the doping control chaperones on Match Day -1 in order to introduce the LOC VMO to the chaperone team and exchange any logistical information necessary.

Arrangements must be made for the doping control designated courier service to be issued with a FCC tournament vehicle access permit (VAP) that allows official entry of the courier vehicle into the stadium environment and for provision of FCC match specific supplementary access devices (SAD), that allow the doping control courier access to the competition area (red SAD) and the doping control room (white SAD) in particular. Communication should therefore be established well in advance with the courier to discuss all arrangements and resolve any problems that may exist.

Player medical services

Each FCC host city VMO has the responsibility, under the jurisdiction of the LOC CMO, to ensure that the health and medical welfare of all participating member association team players that are in action within his/her designated stadium, are properly, professionally and personally cared for, and that all acute injuries and/or illnesses that may occur within the stadium and host city are adequately and appropriately managed according to current, evidence-based, internationally accepted standards of medical care.



Similar to the LOC DCO, the LOC VMO can only perform his/her delegated medical responsibilities if the VMO has been officially appointed to the position in a timely manner, if he/she has been adequately trained, informed and empowered to undertake the duties and responsibilities as mentioned above on page 4 and if there is effective, timely communication and cooperation between the VMO, all participating emergency medical services, physicians, nurses and allied healthcare professionals who need to be delegated, selected and officially appointed, so that adequate numbers of healthcare providers, equipment and medications are available within the host stadium to provide efficient and effective medical services, if, when and wherever in the host stadium such services are required.

Once the LOC VMO has been appointed, it becomes his/her responsibility and duty to attend to all host stadium medical logistical issues in order to ensure that all required medical activities are considered and, if present, problems are identified and resolved, if necessary, with the assistance of the LOC CMO and/or LOC host stadium manager and associated team. For this to happen, the VMO should attend all LOC host stadium meetings, in order to become acquainted with the LOC host stadium team, become well informed of the issues and requirements of hosting all scheduled matches and educate the host stadium team as to the required level, scope and range of anticipated medical services and logistical requirements, so that a cohesive team with constructive assistance develops. Once all general medical considerations and plans have initially been put into operation, successful acquisition and implementation thereof must be constantly monitored and persevered, right until match day minus one (-1), even on match day, in certain circumstances.

The following procedures should be in place, by the latest, by match day -1, or on match day where specifically relevant.

- Player and VIP/VVIP medical centres are fully constructed and functional with required electrical power, lighting, water source, liquid waste drainage and air conditioning
- Keys for the various medical centres are available
- Acquisition and host stadium delivery of all required emergency medical and/or primary healthcare equipment and pharmaceuticals

- All participating healthcare providers have been issued with the mandatory FCC accreditation identification card

- All arrangements have been undertaken with participating medical, nursing and allied healthcare providers regarding the time and place of assembly and means of transport to the host stadium. This assembly, on match day, allows inspection of each individual's FCC accreditation, allows general communication regarding standard operating procedures, allocation of stadium duties and responsibilities and all other duties and information that participating healthcare providers should be informed about. Although all of these activities can be done inside the stadium, it is logistically more appropriate to undertake this at a site away from the host stadium, prior to transfer of staff to the stadium environment.

- Pre-planned request for SADs, where applicable, particularly for those healthcare staff located within the competition area medical centres and field of play. The normal SAD is usually the following:
  – All Access (blue) – for FIFA MO, LOC VMO + LOC DCO x 3+
  – Doping Room (white) – for doping chaperones x 4
  – Field-of-Play Access (green) – doping chaperones + FoP medical team x 12
  – Competition Area (red) – Player + VIP/VVIP medical centres x 9+
  – VIP/VVIP medical centre wrist bands: 4+

- Acquisition of a requested supply of two-way radios for use by the medical services within the stadium and their distribution on match day to the responsible healthcare providers.

- Pre-planned request, before match day, of food packs and drinks for all on-duty healthcare providers, physical acquisition on match day from the designated catering source and individual provider distribution accordingly.

- All designated ICU Player + VIP/VVIP ambulances, including staff and equipment, are available for match day duties and will be in position, adequately prepared and professionally operative, one hour before the main stadium gates are open to the public. Likewise, the availability and positioning of all ambulances available for duties within all non-competition areas of the stadium should be confirmed with the relevant emergency medical service agency.

Please review Appendix A – FIFA Competitions Area for detailed requirements concerning acute medical care of PMA players.

VIP/VVIP medical services

Medical service provision to all delegates present in either the VIP or VVIP lounges, which often include international and national dignitaries, chief amongst them the FIFA President, host country president and various other heads of state, must be planned, prepared and undertaken at the highest current, evidence-based, state-of-the-art, internationally accepted levels of medical care, as nothing less than this high standard of medical care is acceptable.

In order for this level of medical care to be provided, if and when required, a number of factors must be taken into consideration and then enacted accordingly. As per Appendix A, it will be acknowledged that two categories of medical care must be provided for, namely (1) primary healthcare and (2) emergency medical care. For this to be successfully accomplished, the CMO must ensure that all venues have VIP + VVIP medical centre designated locations as part of the designs of all host stadiums for the FCC, while the VMO should do so locally for his/her designated stadium, wherever practically and logistically possible.

Adequate features that the CMO/VMO should consider regarding a VIP/VVIP medical centre (VMC) include the following:

- The VMC must be a solid, soundproof structure that provides safety, solitude, privacy, confidentiality with a minimum of noise and/or light when medically required.
- The VMC must have a solid lockable door, sufficiently wide to allow movement of an ambulance stretcher with patient.

- The VMC must be located within the VIP or VVIP lounge complex such that an immediate call for medical assistance and resultant response to the patient's side can be undertaken swiftly without the need for stairs, lifts, security checks or other impediments to emergency care.

- The VMC must be adequately sized, preferably 10 metres x 5 metres, to accommodate a reception table and two chairs on either side of a medical examination couch, an ambulance resuscitation stretcher, table for resuscitation equipment, mobile screens for maintaining privacy, lockable cupboard, with an adequate electrical supply able to charge a number of medical items simultaneously.

- The VMC should be equipped with immediately adjacent toilet facilities and a source of water with sink outlet.

- The VMC should have FIFA-approved signage that designates the area as a VIP medical centre.

- The VMC must be located within the VIP/VVIP lounge environment so that there is easy access to a delegated VMC ICU ambulance that will be positioned nearby. Preferably, access to the delegated VMC ICU ambulance should not involve any lifts or steps, but should require simple single level transit to the awaiting ambulance. If single level transit is not architecturally possible, a dedicated, adequately sized lift, capable of accommodating an ambulance stretcher with horizontal patient, may suffice, although its availability will need to be guaranteed, if and when required, during match events.

- Communications from within the VMO needs to be checked, with mobile telephone and two-way radio communication. If there is any doubt regarding these two modes of communication, it would be advisable to install landline telephone communications inside the VMC, thus ensuring communication with medical colleagues whenever required.

It is therefore mandatory that the CMO, or VMO if so delegated, becomes involved in the host stadium's design and construction as soon as is practically possible in order to ensure that the various medical centres, namely VIP/VVIP Medical Centres, Player Medical Centre, Doping Medical Rooms are all adequately represented on the stadium architectural plans Competition Area and built accordingly with no unexpected alterations. More often than not, however, the CMO may not become involved nor invited to participate in mapping the medical requirements of a new stadium, and the structure may take shape before his/her involvement commences. In this situation, it may become difficult to ensure that all of the requirements of the various medical centres are successfully provided, and done so in time before commencement of the FCC. This is one of the main reasons why selection and appointment of the host stadium VMO should be undertaken as soon as practically possible, and briefed accordingly, so that his/her active involvement begins as soon as possible.

Once the VMC design and construction has been resolved or is in the process of resolution, attention must be paid to the appointment of appropriate staff, medical equipment and furniture.

The staff appointed to the VMC should be highly professional individuals who have a good command of English and possibly other languages, with maturity and wisdom to be able to communicate and medically manage politicians, statesmen, foreign royalty and international celebrities without intimidation, bother or anxiety but with strict professionalism, confidentiality and competence. This is best achieved by appointing a team comprising medical, nursing and paramedical colleagues of both sexes that is led by a qualified and experienced clinician, adequately able to provide current, evidence-based, internationally accepted levels of both primary healthcare and acute medical care in this out-of-the-ordinary, out-of-hospital environment.

These members of staff of the VMC should be colleagues that the VMO knows personally, is able to rely on and will be able to command and control if and when necessary. If this is not at all possible or practical, and the selection has occurred within the involvement of the VMO, a meeting with the relevant members of staff should be called as soon as possible for general introductory, medical briefing and related issues, in order to promote the formation of a coherent group of professionals can be created.

A minimum of one month prior to the FCC, the LOC VMO should visit the host stadium on a regular basis and visit each of the intended medical centres to gauge progress towards finality of construction, adequate attention to water source, electrical supply and sewage/waste water drainage provision, furniture and medical equipment procurement so that adequate progress is ensured towards fully functional medical centres within the competition area on time, before kick-off of the FCC. Although it is not unknown or unusual for some host stadium medical centres to be in the final aspects of completion on match day, this situation should be avoided wherever possible because of the unnecessary stress that becomes evident in all.

Spectator medical services

The provision of medical care to the spectator mass inside the host stadium security environment, including commercial vendors and on-duty stadium contracted staff, is tradi-

tionally provided by public emergency medical service agencies under the jurisdiction of the local metropolitan, regional state/province or national health departments, singly or in combination. Under unique circumstances, this function may be undertaken by a private contractor/s after a successful bid to a national tender. Whoever provides such services must be fully briefed and empowered to provide the required medical services comprehensively and competently, within the host stadium security perimeter, for single and multiple-patient events, catering for a wide range of primary healthcare and emergency medical conditions.

It is the VMO's responsibility to assist with identifying the key roles of the players and liaison parties that he/she will have to negotiate, cooperate, communicate and coordinate with throughout the planning, preparation and operational phase of the FCC tournament, so that the appropriate healthcare providers are employed and/or enlisted, in sufficient quantities and with an adequate supply and range of medical equipment and provisions to be able to fulfil the required level of medical care in all areas of the stadium, outside of the competition area, which is the usual area of jurisdiction of the public healthcare services.

Once the VMO has identified who is responsible for spectator medical services and has communicated with the necessary role players regarding the services to be provided, his role henceforth is to monitor progress of the planning and preparation of the intended medical services but not necessarily to be actively involved in recruitment, training, equipment acquisition, communications, transportation and other issues, all of which become the responsibility of the relevant designated service provider and its management structure. Any failure of progress in any aspect of spectator service provision should be communicated and escalated to the LOC CMO and/or host stadium LOC management as is relevant.

Similarly to what has been stated regarding the general medical service information, the spectator medical service agency must fulfil all of the necessary requirements regarding their employed and/or enlisted staff, namely funding, licensing, accreditation, clothing, food, transport and other related issues, all of which should be considered early on in the FCC planning and preparation phase. The VMO should monitor all of these activities, provide whatever LOC assistance, advice or information necessary, so that last-minute difficulties and problems are prevented at best or minimised at worst.

The range of spectator medical services required in order to medical respond to, evaluate, resuscitate, stabilise and, when necessary, transfer all patients within the multi-level stadium and security zone, requires a variety of medical structures or systems. The features of each host stadium medical system, relating to the size, location, quantity, staffing and equipping characteristics should follow the FIFA Football Emergency Medicine medical mass gathering principles as outlined. To this end, the VMO should note the number and location of recommended medical points for his/her specific stadium and compare this to the architectural and construction plans to ensure accord.

The various medical system elements requiring consideration include:

- The Main Spectator Medical Centre, of which there is usually only one and which contains between five-ten beds, a resuscitation area, storage facilities and is the main advanced life-support/critical-care area of the stadium.

- Medical posts, which may contain only one or two beds/couches/stretchers with a minimum of medical and/or nursing staff, one or more of which are located on every level of the stadium.

- Mobile medical teams, comprising two-five healthcare providers, usually at a BLS level of care, which patrol all areas and levels of the stadium within the security zone. These mobile medical teams may be on foot, bicycle, motorbike, and quad-bike or electric golf-cart with stretcher adaptation.

All of the above, in different forms and quantities should be in operation within the host stadium spectator and commercial areas to ensure that any collapsed person can be identified, responded to and treated within a 3-5 minute period, which is the internationally accepted time period for management of sudden cardiac arrest. It is the VMO's responsibility to monitor that these standards of medical care, provided by the delegated emergency medical service agency, will be available during the FCC tournament.

Medical staff: The ratio of the recommended number of healthcare providers to the volume of football supporters at any match is not absolute internationally and is based mainly on historical and, often, human resource factors. The Guide to Safety at Sport Grounds (Guide), published by the British Football Licensing Authority (2008), mandates that a "crowd doctor, qualified and experienced in pre-hospital immediate care" should be available for all crowd volumes in excess of 2,000. Similarly, the Guide recommends the presence of suitably trained first aiders, such that there are no fewer than two (2) on site, a ratio of one first aider per 1,000 supporters (1:1000), up to 10,000 and thereafter one first aider per 2,000 supporters (1:2000) in addition, in an all-seater football stadium. If however, there is a mix of seating and standing room, the ratio of first aiders must increase.

More recently, the use of a 'crowd nurse' working alongside the crowd doctor and providing additional support and skills to the mobile teams and medical room has been recommended.

Although the Guide's recommendations have not been validated, it brings to the fore a number of generic factors that require consideration. The minimum level of a qualification of on-duty personnel at football stadium matches is basic life support (including AED use) providers who are capable of providing effective and efficient basic life support emergency care to the acutely ill or injured. However, it is obvious that these basic life support providers need the support of a higher level of healthcare provider, if and when, an emergency incident presents itself. This support should ideally be in the form of an emergency experienced medical doctor, registered professional emergency nurse or advanced life support ambulance paramedic inside the stadium, who can either respond to the incident when necessary or provide advice by mobile radio/mobile phone communication, if appropriate. Whether the ratio is based on the number of expected supporters, the physical design of the stadium, additional known risk factors, and the main deciding factor is the ability of any mobile basic life support medical team to respond to any patient's side and initiate any life-saving care within a four (4)-minute time period. In addition, the time it would take to medically back-up any responding basic life support medical team with advanced life support capability will determine how many of these members are required. This time period should not exceed four (4) minutes from activation.

In view of the above and the paucity in the literature of recommending appropriate numbers and related medical-type qualifications for mass-gathering events in general and football stadium matches in particular, the logistical recommendations below are provided:

- Stadium gates usually open two hours before kick-off and most stadiums empty within ten minutes after the final whistle. The average duration for provision of medical services inside the stadium environment is approximately four hours
- The majority of football matches are low-risk events
- The majority of patients seeking medical assistance have minor ailments
- Minor ailments will be treated on site, whereas anything serious will be transported by ambulance to hospital

- The need for medical resilience of ambulances and staff throughout the whole event

Please note, as discussed elsewhere in this manual, these on-site football stadium medical service recommendations do not take into account either confederation or FIFA tournaments, as these have specific international requirements that are above normal football match recommendations due to the nature of the event and the international players, officials and dignitaries who will be present. Likewise, these recommendations do not take into account the dedicated field-of-play medical teams that are required to be positioned on the side line, comprising 2 x 4 person teams.

	Low Risk	Moderate Risk	High Risk
ambulance + 2 staff minimum	2 on site	2 on site	3 on site
Up to 15,000	2 on site	2 on site + 2 off site*	3 on site + 2 off site*
25,000	3 on site + 1 off site*	3 on site + 2 off site*	4 on site + 2 off site*
50,000	3 on site + 2 off site*	4 on site + 2 off site*	6 on site + 2 off site*
75,000	4 on site + 2 off site*	6 on site + 2 off site*	8 on site + 4 off site*
Stadium medical posts + centres with 2 BLS staff per post minimum	Number of posts	Number of posts	Number of posts
Up to 15,000	2	2	3
25,000	3	3	4
50,000	4	6	8
75,000	6	8	10
Mobile medical teams** with 2 x BLS staff each minimum			
Up to 15,000	4	4	6
25,000	8	8	8
50,000	16	16	16
75,000	20	20	20
Advanced Life Support: EM doctor, EM nurse, paramedic			
Up to 15,000	1	1	2
25,000	2	2	3
50,000	3	3	4
75,000	4	4	6

Table 2.2.1 Minimum suggested medical service provision at football events
EM = Emergency-medicine trained.

* Off site - ambulances must be designated before the event and should be in close proximity to the event. They should respond to a pre-arranged rendezvous point and the crews be fully briefed as to their role at the event, should they be called to assist.

** Mobile medical teams - the number and designation of these teams will depend on the structure of the stadium (number of levels, crowd movement limitation measures) and the accreditation limitations of the event.

Multiple-casualty incident medical services

All stadiums, by international standards and national regulations, require the existence of a host stadium disaster and/or evacuation and/or multiple-casualty management document that all local emergency and rescue services are aware of, have studied in depth and are fully competent to put into operation should the need ever arise. Failure to produce such a document and/or failure to know of its contents by the local emergency and rescue services, including the LOC host stadium management, who take control of stadium during the "exclusive period" of any FIFA tournament, puts at risk the health and welfare of all persons present within the stadium and its security environment, both within the competition and non-competition zones.

Although it is not the VMO's responsibility to draw up such a document, it is nevertheless his/her responsibility to monitor its development and to communicate with the relevant local authorities regularly so that it is successfully finalised and approved well ahead of time. In many jurisdictions, licence to host the FCC may be delayed until such a document has been produced to the satisfaction of the relevant regulatory authority.

APPENDIX A
FIFA Competition Area

Player Medical Centre / Field of Play / VIP Medical Centres

The Competition Area (CA) in a FIFA tournament is that exclusive area of the football stadium frequented by FIFA staff, FIFA member association players and officials and FIFA (and national and international) dignitaries. As such, and particularly because many of the FIFA staff will be international visitors, the medical service provision within the CA needs to be at the highest international level of medical care. It is with this in mind that all medical service provision must be planned, prepared and enacted, if and when, necessary.

The specific areas of the CA that require specific planning and preparation include:

- The Player Medical Centre (PMC)
- The Field-of-Play (FoP) area
- The VIP/VVIP Medical Centres

Player medical services

Medical services for FIFA football players during tournaments are a mandatory requirement and must be planned for and prepared to ensure that any and all injuries and/or illnesses that may occur before, during or after training or competition, within the stadium environment, are adequately and appropriately managed at a level of medical care equal to the best international out-of-hospital medical care available currently, that many of these sportsmen may be used to receiving at their football clubs of origin.

With the presence of a team physician, who is responsible for the general and sporting health of every team player, most primary healthcare and sporting issues will be effectively managed by this healthcare provider who is in regular contact with the players and is fully aware of each one's individual health status, including what medications may and may not be used so as not to contravene the FIFA doping regulations.

What the team physician cannot undertake on his/her own, however, is the management of an acute life-threatening illness or injury to the player, on or off the FoP, and it is for this uncommon medical event that the stadium medical services must plan and prepare. This is undertaken by:

- Player Medical Centre
- Field-of-Play (FoP) Medical Team

The Player Medical Centre

The Player Medical Centre (PMC) must be staffed, equipped and practically arranged in order to provide immediate, comprehensive resuscitation and stabilisation (treatment) of any acute life-threatening injury or illness that may afflict any player or referee, on or off the FoP, within the stadium environment, prior to expeditious and safe transfer of the player or referee, by road or air ambulance, to the nearest, most appropriate medical facility that can effectively and definitively care for the player. The designation of these hospitals is the responsibility of the VMO during the initial planning and preparation process.

Location: The PMC must be located within the complex that houses the two team changing rooms, referees' changing rooms and the doping control room, all of which are within a very short distance from the main access tunnel to the field. This primary location ensures immediate access to any injured or ill player and/or referee within the CA if and when required. Additionally, a PMC designated ICU ambulance must be located at as short a distance as possible from the PMC in order to facilitate expeditious transfer from the PMC to the ambulance.

In the event that a player is transferred from the PMC to the awaiting ICU ambulance, strict privacy and confidentiality during the transfer must be maintained at all times.

A second PMC-designated ICU ambulance must be located in a tunnel allowing immediate access to the FoP, so that any critical player can be immediately transferred from the FoP to the PMC, or to an awaiting aeromedical helicopter or by police escort to the nearest most appropriate medical facility by road. It is mandatory that all of these logistical requirements be pre-planned before the FIFA tournament and that all parties, e.g. ambulance, security, traffic police, etc., are all aware of the required emergency activities, if and when they occur.

It is also mandatory to ensure that an injured/ill player transferred from the FoP can be easily transferred by the FoP medical team without any physical obstructions or impediments.

Staff: The medical, nursing and paramedical staff that man the PMC and designated ICU ambulances must comprise a team that is led by a qualified and experienced emergency-medicine/critical-care clinician, adequately able to provide current, evidence-based, internationally accepted levels of acute medical care in this out-of-hospital environment.

Additionally, at least one member of the team must be fluent in professional English, be so as to be able to communicate professionally with the team physician, FIFA medical officer and other relevant persons.

Practically, this means that advanced airway management, manual and mechanical ventilation, peripheral and central venous access, defibrillation/synchronised cardioversion/transcutaneous electrical pacing, life-saving emergency surgical procedures and other relevant management activities at critical-care level be available, if and when required, inside the PMC.

The PMC should have a minimum of four healthcare professional staff at all times, with at least one experienced clinician, as already stated, with the rest of the team comprising a combination of professional nurses and/or advanced life support technicians/paramedics.

The PMC-dedicated ambulance staff should also be stationed in the PMC, as they will be involved in the management of the ill or injured player and his/her eventual transport to the nearest, most appropriate medical facility after initial PMC resuscitation and stabilisation. Thus team work and staff delegation and coordination within the PMC are essential with there always being one team leader that everybody takes instruction from.

NB: Although it is advisable that PMC staff have attended various international advanced life support courses in the emergency management of life-threatening events, such as acute trauma (ATLS™), cardiac (ACLS™) and equivalent, it must be acknowledged that these are courses of attendance and do not in any way certify the participant as competent in the management taught. Such competency is obtained by working in the various clinical disciplines on a regular basis at an acceptable level of medical care promoted by these courses.

Equipment: The range of medical life-saving equipment present in the PMC must be fully comprehensive to ensure that all life-saving medical and/or surgical procedures can be undertaken with immediate effect if indicated during the resuscitation of the player.

NB:

- It is therefore mandatory that all life-saving medical equipment present in the PMC be personally checked by the on-duty medical staff for availability, functionality, cleanliness and expiration date prior to each and every match.
- All items of medical equipment must be able to accommodate the full range of adult and/or teenage player physique sizes expected during each FIFA tournament, e.g. manual resuscitator face mask, airway tubes, laryngoscope blades, so that effective management is never hindered by inappropriately sized items.
- All medical equipment and medical activities must be appropriate and applicable to the out-of-hospital environment such that full resuscitative procedures can be effectively and efficiently performed on the ground (FoP), on an ambulance stretcher, inside a moving ambulance, wherever required. This requirement is mandatory for the effect provision of cardiopulmonary resuscitation (CPR) if and when required.

To this end, the minimum equipment that should be available, functional and clean should include:

- Comprehensive personal protective equipment (PPE) against body secretion/fluids including latex + non latex gloves, face masks and plastic goggles. Hazardous disposal containers for body fluids and sharp items must be readily available.
- At least two emergency ambulance-type resuscitation stretchers with head-elevation and trendelenburg-positioning capability.
- At least one medical examination couch with head-elevation section.
- A set of metal steps to perform effective chest compression.
- A fully comprehensive advanced airway-management tray containing equipment necessary to manage a normal, difficult or failed airway in patients of different morphologies according to internationally accepted standards.
- This should include non-latex safety gloves, safety goggles, full set of advanced airway equipment for normal, difficult and failed airway including laryngoscope handle, set of curved and straight laryngoscope blades, set of endotracheal tubes of various sizes, 20ml syringes, water-based lubricant, McGill's forceps, endotracheal tube fixation device, flexible bougie, endotracheal tube stylet, range of supraglottic devices, oropharyngeal and nasopharyngeal airways, cricothyroidotomy set, mechanical and manual suction devices with hard and soft suction catheters.

- A manual biphasic defibrillator with synchronised cardioversion, external transcutaneous pacing, three-lead (minimum) patient cardiac rhythm monitoring with paper printout and all ancillary equipment including relevant defibrillation pads/gels, patient chest electrodes, all of which must be checked for expiration dates, selection of peripheral and central venous access consumables with administration sets, intravenous crystalloid and colloid fluids, intravenous cannulae fixation consumables, variety of bandages, trauma dressings and gauze swabs, syringes and needles, antiseptic swabs and/or solution.

- 12-lead electrocardiogram (ECG /EKG) machine.

- A non-invasive blood pressure, pulse rate, respiration rate, oxygen saturation monitor with end-tidal carbon dioxide measuring capability, when required.

- Comprehensive peripheral and central intravenous access and administration consumables, including the capability to administer warmed fluids via a volumetric or pressure infusion, electronic device with related ancillary equipment.

- Fully comprehensive array of emergency medications necessary to treat all serious life-threatening emergency medical incidents and which, at minimum, is available to stabilise the patient with regard to airway, e.g. rapid sequence intubation, breathing and circulation before transfer to the designated hospital.

- A fully functional manual resuscitator kit with reservoir bag, positive end-expiratory pressure valve (PEEP) and oxygen source that will last for at least 60 minutes at 15 litres/minute minimum. This will include a manual resuscitator with a variety of masks, reservoir bag, PEEP valve, 5 metres of oxygen tubing, 400 litre pressurised oxygen source minimum, 2 x mouth to mask ventilators with oxygen inlet.

- Mechanical suction devices, electrical and battery-operated, with a minimum negative pressure of 500mmHg with a minimum container capacity of 1000mls.

- Therapeutic sterile surgical sets for the acute management and drainage of a tension pneumothorax, haemothorax, pericardial tamponade and performance of a cricothyroidotomy.

- Spinal column immobilisation equipment including cervical collars, long spinal board, basket stretcher/scoop stretcher, vacuum mattress and accompanying straps.

- Full set of upper and lower limb fracture, traction and immobilisation splints.

- Full set of linen and blankets for each stretcher and examination couch.

- Diagnostic equipment: double-headed cardiac stethoscope, end-tidal carbon dioxide monitor, blood glucose testing equipment, plastic reflex hammer, pulse oximeter, pupil torch with spare batteries, sphygmomanometer with full set of adult and paediatric arm cuffs.

- Miscellaneous: Burn dressings, appropriate surgical and suture equipment, assortment of splints, black pen, permanent marker, note pad, rescue-type scissors.

Communication: Adequate communication between the PMC and the Venue Operations Centre (VOC), PMC-designated ambulance and the receiving nearest most appropriate medical facility, so that all medical information can be relayed to the various centres when required. All official persons and their respective contact numbers should be available to all parties before each match to ensure efficient and effective communications when it is required, particularly in the event of a medical emergency.

Time: All of the above-mentioned activities and preparations should be completed and fully ready for operation a minimum of one hour before the FIFA participating member teams are expected to arrive in the stadium, which is usually 90 minutes before the official kick-off time. This ensures that immediate medical care is available to all players from the moment they enter the stadium environment.

APPENDIX B
Field-of-play Medical Team (FoPMT)

The FoPMT is designated to provide immediate treatment and/or transfer for the ill and/or injured player on the field of play. Originally these teams were called "stretcher teams", as their primary role was to evacuate the player from the FoP, with very little consideration being given to immediate treatment. With the increasing awareness of the dangers of spinal injury and life-threatening cardiac conditions, it has become mandatory that field-of-play medical teams be established, comprising medical, nursing and paramedical professionals who are trained in basic life support measures as a minimum level of care, and that at least one member of the FoPMT be qualified and experienced in out-of-hospital advanced life support. This new level of immediate medical care instituted by F-MARC has become the new standard of medical care for ALL FIFA tournaments internationally, and it is anticipated that all member associations will follow this lead in ensuring that all football players receive adequate and appropriate medical care during training or competition, on or off the FoP.

Therefore, it is mandatory that the FoPMT be formally trained and skilled, adequately staffed and comprehensively equipped to fulfil the responsible task that is expected of them.

Staff: It is traditional during a FIFA tournament that two teams consisting of four members each are located on the lateral side of each team bench. All of the members of the FoPMT should be formally trained and experienced in basic life support, able to effectively perform at least:

- Basic cardiopulmonary resuscitation
- Automated External Defibrillator (AED) use
- Rescue manual resuscitator breathing use
- Spinal injury alignment and immobilisation
- Fracture and/or dislocation splintage
- External bleeding management
- Management of a player having a seizure
- Management of a unconscious player

In addition, at least one member of the FoPMT should be adequately qualified and experienced in out-of-hospital advanced life support in order to lead and guide other members of the FoPMT in the event of a life-threatening injury or illness in a player located on the FoP. It is highly recommended that at least one member of the FoPMT should have been trained in the FIFA Football Emergency Medicine course, which details the responsibilities of the FoPMT and the current medical management of common life threatening football injuries and illnesses on the FoP.

Each of the FoPMTs is responsible for their half of the football field and it is the responsibility of the FoPMT to be continuously aware of all activities in its designated half of the field of play. If one of the FoPMTs is actively involved in treating and/or transferring a player, then the remaining FoPMT becomes responsible for the entire FoP until the other team has completed its task and returned to their seats.

Each member of the FoPMT should have been trained regarding the current Rules of the Game as they relate to the injured player, the rules regarding entrance to and exit from the field of play, exceptions to the rules where relevant and so forth.

It is also mandatory that the members of the FoPMT be aware of various activities that require there attention and behaviour, namely:

- To be uniformly dressed
- To behave in a professional manner as national ambassadors
- To be in position 15 minutes prior to the team warm-up practice session
- To enter and leave the field of play with a sense of urgency
- To stand during broadcast of national anthems
- To remain always available for radio communication
- To always remain in position during play
- Not to wear accreditation bands once in position the FoP
- Never to leave the FoP as long as players are present on the FoP or the match is in progress. However, members of the FoPMT may leave their positions at half time, if necessary, in order to obtain nutrition, drinks or use toilet facilities. However, this should be undertaken in a pre-planned coordinated fashion so that there is always

at least one member of the FoPMT if there are any players on the field. Common sense should prevail in all circumstances.
- Not to display open enthusiasm for any particular team during the match
- To ensure adequate nutrition and hydration whilst on the FoP
- It is always advisable for the FoPMT physicians to introduce themselves to the respective PMA team physicians during the pre-match warm-up session as a gesture of courtesy.

Although the overwhelming majority of field activities involve transportation of the minor injured player from the field, the FoPMT must at all times be prepared in recognising and hence management and transfer of the acutely injured or ill player on and from the FoP. This is the primary role of the Field-of-play Medical Team.

Equipment: The standard items that a FoPMT is equipped with during a FIFA tournament includes, as a minimum:
- An Automated External Defibrillator (AED)
- A rigid spinal immobilisation board with straps
- FIFA Medical Emergency Bag or equivalent
- A Stokes basket stretcher/Scoop stretcher

Please note that the traditional NATO-type stretcher is inappropriate for sports use as it does not provide adequate support or immobilisation for the spinal column.

Professional responsibilities
- **Player transfer only** – when a player is injured or ill, such that the player cannot leave the FoP unaided, the referee may request the FoPMT to access the FoP in order to either assist with treatment and/or transfer. Therefore, when any player collapses after contact with another player and/or the ball in play, the FoPMT must be alert and ready to respond immediately if required. Once the referee has requested the team physician or appropriate deputy to enter the FoP because of the nature of the player's injury/illness, the FoPMT should stand up as a team, ensure that all the medical equipment is ready for use and be prepared to enter the field on the instruction of the referee. Once the referee clearly indicates that he/she wishes to the FoPMT to enter the field, and only then, does the FoPMT immediately access the field of play and run to the player's fallen position to provide whatever assistance is required.

  If the player requires transfer via stretcher off the field of play, as is the norm, gently assist the player onto the basket stretcher/scoop stretcher/spinal board, ensure the player is well positioned and balanced, lift the carrying device horizontally at all times and then speedily and safely transfer the player from the field of play by walking towards the nearest touchline.

  Once the player has been safely and successfully transferred off the field of play, you may be requested to gently lower the player to the ground at the touchline for him/her to receive further attention form the team medical staff, leaving the FoPMT to return urgently to its original location to once again be responsible for its side of the FoP.

  Alternatively, the FoPMT may be required to transfer the player to the team bench area or even to the team change rooms, depending on the nature of the injury or illness. Whichever scope of duty is required, it must be done horizontal attitude.

- **Player treatment** – depending on the nature of the injury/illness, the referee may request the assistance of the FoPMT at the same time as the team medical staff because of the seriousness of the medical condition. Under these circumstances, the FoPMT may be required to assist with medical treatment of the player, besides player transfer as stated above. In these circumstances, all treatment is undertaken in association with and under the supervision of the team physician, except if the team physician requests otherwise and leaves all acute treatment to the FoPMT because of the nature of the medical emergency and expertise of the members of the FoPMT. Whatever the nature of the medical emergency, a decision must be made whether it is more beneficial for the player to be treated on the field of play or in another location, remembering that the wel-

fare and safety of the player is primary and paramount and takes precedence over the match if the medical emergency is serious in nature.

- Do not rush the unstable patient from the field to be treated in another location if this is not in the patient's best medical interest. International standards dictate that resuscitation is often better brought to the patient than the patient brought to the resuscitation. Whichever is more beneficial applies. Once the player is adequately resuscitated and/or stabilised, safe transfer to either the FoP ICU ambulance or via stretcher to the PMC can be undertaken.

- **Non-contact collapse** – in all circumstances where a player collapses without contact with another player or the ball in play, Sudden Cardiac Arrest (SCA) is diagnosed as the primary medical emergency. In these rare circumstances, once this has been recognised, the leader of the FoPMT must run to the fourth (4th) referee and shout clearly "CPR" whilst pointing to the collapsed player and then enter the FoP and run towards the player, with the rest of the FoPMT ensuring that the AED is brought immediately to the player's side.

  SCA is diagnosed under the following four circumstances:
- Non-contact sudden collapse of a player
- Unresponsiveness/unconsciousness in a player
- Abnormal or absent breathing
- Slow, myoclonic seizure-like movements

Please read the reviews "Practical management of Sudden Cardiac Arrest on the Football Field" by Kramer, Botha, Drezner, Abdelrahman and Dvorak as published in the British Journal of Sports Medicine, 2012;46:1094-1096 for management of this medical emergency.

APPENDIX C
Player ICU dedicated ambulances

Both the PMC and the FoPMT have dedicated ICU ambulances which are appropriately staffed with qualified and experienced out-of-hospital advanced life support/intensive medical care staff and comprehensively equipped so as to provide full resuscitative measures to a critically injured or ill player by assisting on site or inside the ambulance whilst stationary or mobile.

- PMC ICU ambulance is to be position close to the PMC so that any player can be expeditiously transferred from the PMC to the ambulance for transfer to either an awaiting aeromedical helicopter or by road to the nearest, most appropriate medical facility. It is therefore mandatory that both the staff and available equipment in the PMC dedicated ambulance should be adequate and appropriate for patient resuscitation and stabilisation, if and when required, including full cardiopulmonary resuscitation whilst en route to a cardiac catheterisation laboratory nearby.

- FoPMT ICU ambulance is to be positioned in a tunnel that allows unrestricted immediate access onto the FoP to the player's side, if and when necessary. Similar to the PMC ICU dedicated ambulance, it is mandatory that both the staff and available equipment in this FoPMT ICU dedicated ambulance should be qualified and experienced in providing comprehensive, current ICU levels of patient resuscitation and stabilisation in this restricted, confined out-of-hospital environment, if and when required, including full cardiopulmonary resuscitation on the FoP and whilst en route to whichever destination it is bound, either to the PMC, awaiting aeromedical helicopter or to a cardiac catheterisation laboratory nearby.

  This must be stated categorically, contrary to current internationally recommended CPR protocols which recommend that a patient without a return of spontaneous pulse not be transferred by ambulance to the nearest, most appropriate emergency department, because of issues of futility and cost, this DOES NOT APPLY to resuscitation or CPR of the football player. This means that once CPR and defibrillation has been commenced on the FoP or other location inside the stadium, such resuscitative measures are to be continued, if medically indicated, en route to the nearest most appropriate emergency department or cardiac catheterisation laboratory by aeromedical or road ambulance with staff that have been adequately trained in performing adequate CPR (manual chest compressions/positive pressure ventilation/defibrillation/drug administration) inside a moving ambulance.

- With the above clinical critical responsibilities of the PMC and FoPMT dedicated ambulances, it is evident that all items of medical equipment be thoroughly checked every

match for availability, functionality and cleanliness, so that comprehensive critical care can be performed at the highest acceptable level of care. The practice of relying on pre-sealed containers and medical bags having all items available and functional is not acceptable in this out-of-hospital environment where absence of a single item could have devastating consequences.

- Although medical and related staff may be designated to specific areas of responsibility, during active player resuscitation, this responsibility may have to be changed to ensure that the appropriate professional is always in attendance clinically and/or control. Under no circumstances should personal issues play any role nor should pre-designated responsibilities be dogmatically maintained, if these would compromise effective and efficient player resuscitation. If this means that designated ambulance crews may have to step aside so that other medical professionals can continue effective treatment or medical professionals need to take the advice of pre-hospital emergency medical service colleagues, then all professionals should be humble and professional enough to allow this to occur, for the benefit of the critical player.

- The issue of whether the FoPMT ICU ambulance should have the front or rear of the ambulance facing the field of play is of no major concern, as long as the ambulance can enter the FoP unrestricted, if and when required.

- Prior to use, each of the dedicated PMC and FoPMT ambulances must be fully checked for:
  - Full tank of gasoline/fuel
  - Tyre pressure, including spare type
  - Water and oil levels
  - Windscreen wiper operation and spray
  - Radio communications
  - Internal air conditioning
  - Emergency warning lights and sirens
  - Electrical equipment charging lights

- Prepared plans must be instituted with the traffic police or relevant agency to ensure that, if required, a police escort will be immediately available and the specific road/s unobstructed, should a critically ill or injured player be required to be transferred by road to the appropriate medical facility.

- Standing down: Please note that comprehensive care for players must be available until all players have left the stadium environment. Therefore, as long as any of the players are still undergoing doping control measures, the PMC and designated ambulance must remain fully operational, but the FoPMT and related ambulance may stand down, if appropriate.

Confidentiality

At no time should any medical staff involved in an event under the auspices of FIFA divulge any information concerning illness or injury of players, officials, VIPs or spectators to members of the public or media.

Information essential to the care of the patient may be communicated to medical colleagues only.

VIP/VVIP Medical Centres

The VIP and VVIP Medical Centres inside the Competition Area is frequented by members and staff of the FIFA delegations, FIFA member association delegates, FIFA invitees, Local Organising Committee (LOC) delegates and invitees, government ministers and officials and a variety of foreign and local dignitaries, all of whom need to be cared for medically. The need for medical care of this important group of participants at the football stadium is based firstly on the principles of mass-gathering medicine which dictate that medical services should always be provided in an attempt to prevent where possible, treat where applicable and transfer where appropriate all persons manifesting acute illnesses and injuries within the perimeter of the football stadium from a defined period before, during and after the scheduled matches. Secondly, because many of the delegates in the VIP and VVIP lounges may have travelled internationally in order to support and/or staff the FIFA tournament, their only form of medical services, during illness or injury, is that provided by the LOC medical department, whether these clinical conditions be due to travel medicine, infectious medicine, family medicine or other related and associated medical conditions. Therefore, any delegate frequenting the VIP or VVIP lounges will be provided adequate and appropriate medical care, if and when required, on site, without having to be transferred to the non-competition medical centres.

The nature of the on-site medical care provided to VIP/VVIP delegates is divided into two forms:

- Primary healthcare medical issues
- Emergency medical issues

Primary healthcare medical services

Due to the fact that many of the FIFA delegates and staff will be travelling between the various venues throughout the FIFA tournament, with possible disturbances in sleep patterns, nutrition, hydration and other travel-related medical problems, primary healthcare medical problems are often the most common complaints causing a delegate to visit the VIP/VVIP medical centre for advice and assistance.

Therefore, in order to facilitate these primary healthcare medical issues, the VIP/VVIP medical centre should designed and set up logistically and pharmacologically in order to provide:

- A reception area with table and chairs for comfortable medical history and current medical problem questioning, note-taking and patient rapport building.
- A medical examination couch, with patient steps, for general patient examination and/or if the patient requires lying down for a variable period of time for therapeutic reasons, e.g. dizziness, headache, etc.
- A comprehensive supply of common primary healthcare medications for immediate use and for a short-term discharge supply, if and when required.
- Bottled mineral water and glasses for immediate oral intake of medications, if and when required.
- Privacy and confidentiality of patients resting on the medical couch from those who may be sitting at the reception desk.

It will therefore be fully acknowledged and appreciated that in order to provide a professional, compassionate and caring medical environment in both VIP and VVIP medical centres, the attending medical, nursing and allied healthcare staff need to be appropriately selected, professionally dressed and always medically competent.

Emergency medical services

Besides the predominant primary healthcare issues, the provision of emergency medical care for any medical emergency in the VIP lounge environment must be immediately available, such that initial CPR and AED management is competently provided on site by the attending medical staff, while further backup medical resources are summoned. It is therefore important to have a mobile emergency kit consisting of, as a minimum, an AED, manual resuscitator and laryngeal mask airways, aside from a fixed resuscitation area inside the VIP/VVIP medical centre. In the event of a medical emergency in the VIP/VVIP area, backup medical resources should be summoned and when appropriate, the patient transferred to the VIP/VVIP medical centre or designated ICU ambulance in attendance.

The VIP/VVIP Medical Centre must be staffed, equipped and practically arranged, besides the primary healthcare setup as described above, but also for the provision of immediate comprehensive resuscitation and stabilisation of any acute life-threatening injury or illness that may afflict the VIP/VVIP delegate, prior to expeditious and safe transfer of the delegate, by road or air ambulance, to the nearest, most appropriate medical facility that can effectively and definitively care.

Location: The VIP/VVIP medical centre should be located within the VIP/VVIP lounge environs, and be a very short distance from the two dedicated ICU ambulances in attendance. This primary location ensures immediate access to any ill delegate.

In the event that a delegate is transferred from the VIP/VVIP medical centre or lounge area to the awaiting ICU ambulance, strict confidentiality during the transfer must be able to be maintained.

Staff: The medical, nursing and paramedical staff that operate the VIP/VVIP medical centres and designated ICU ambulances must comprise a team that is led by a qualified and experienced clinician, adequately able to provide current, evidence-based, internationally accepted levels of both primary healthcare and acute medical care in this out-of-hospital environment.

Additionally, all members of the VIP/VVIP medical team must be fluent in professional English.

Practically, this means that advanced airway management, manual and mechanical ventilation, peripheral and central venous access, defibrillation/synchronised cardioversion/transcutaneous electrical pacing, life-saving emergency surgical procedures and other relevant management activities at critical care level be available, if and when required, either within the VIP/VVIP medical centre or from backup medical resources within a very short period of time, not exceeding five minutes after activation.

The VIP/VVIP should have a minimum of two healthcare professional staff at all times, with at least one experienced clinician.

The VIP/VVIP dedicated ambulance staff may be present in the VIP/VVIP medical centre, as they will be involved in management of the ill delegate and his/her eventual transport to the nearest, most appropriate medical facility after initial resuscitation and stabilisation.

NB: Although it is advisable that staff have attended various international advanced life support courses in the emergency management of life-threatening events such as acute trauma (ATLS™), cardiac (ACLS™) and equivalent, it must be acknowledged that these are courses of attendance and do not in any way certify the participant as competent in the management taught. Such competency is obtained by working in the various clinical disciplines on a regular basis at an acceptable level of medical care promoted by these courses.

Equipment: The range of medical life-saving equipment present in the VIP/VVIP medical centre should ideally be fully comprehensive to ensure that all life-saving medical and/or surgical procedures can be undertaken with immediate effect if indicated during the resuscitation, but it is acceptable for such emergency equipment to be brought to the site of resuscitation by backup medical resources within a very short period of time, not exceeding five minutes after activation.

NB:
It is therefore mandatory that all life-saving medical equipment present in the PMC be personally checked by the on-duty medical staff for availability, functionality, cleanliness and expiration date prior to each and every match.

All items of medical equipment must be able to accommodate the full range of adult physique sizes expected in the normal population during a FIFA tournament, e.g. manual resuscitator face mask, airway tubes, laryngoscope blades, so that effective management is never hindered by inappropriately sized items.

All medical equipment and medical activities must be appropriate and applicable to the out-of-hospital environment such that full resuscitative procedures can be effectively and efficiently performed on the ground, on an ambulance stretcher, inside a moving ambulance, wherever required. This requirement is mandatory for the effective provision of cardiopulmonary resuscitation (CPR) if and when required.

To this end, the minimum equipment that should be available, functional and clean either inside the VIP/VVIP medical centre or be available as backup within a very short period, not exceeding five minutes after activation, should include:

- Comprehensive personal protective equipment (PPE) against body secretion/fluids including latex + non latex gloves, face masks and plastic goggles. Hazardous disposal containers for body fluids and sharp items must be readily available.
- One emergency ambulance-type resuscitation stretcher with head-elevation and trendelenburg-positioning capability.
- One medical examination couch with head-elevation section.
- A set of metal steps to perform effective chest compression.
- A fully comprehensive advanced airway-management tray containing equipment necessary to manage a normal, difficult or failed airway in patients of different morphologies according to internationally accepted standards.

This should include non-latex safety gloves, safety goggles, full set of advanced airway equipment for normal, difficult and failed airway including laryngoscope handle, set of curved and straight laryngoscope blades, set of endotracheal tubes of various sizes, 20ml syringes, water-based lubricant, McGill's forceps, endotracheal tube fixation device,

flexible bougie, endotracheal tube stylet, range of supraglottic devices, oropharyngeal and nasopharyngeal airways, cricothyroidotomy set, mechanical and manual suction devices with hard and soft suction catheters.

- A fully functional Automated External Defibrillator (AED) with backup access to a manual biphasic defibrillator with synchronised cardioversion, external transcutaneous pacing, three-lead (minimum) patient cardiac rhythm monitoring with paper printout and all ancillary equipment including relevant defibrillation pads/gels, patient chest electrodes, all of which must be checked for expiration dates, selection of peripheral and central venous access consumables with administration sets, intravenous crystalloid and colloid fluids, intravenous cannulae fixation consumables, variety of bandages, trauma dressings and gauze swabs, syringes and needles, antiseptic swabs and/or solution.

- 12-lead electrocardiogram (ECG /EKG) machine.

- A non-invasive blood pressure, pulse rate, respiration rate, oxygen saturation monitor with end-tidal carbon dioxide measuring capability, when required.

- Comprehensive peripheral and central intravenous access and administration consumables, including the capability to administer warmed fluids via a volumetric or pressure infusion, electronic device with related ancillary equipment.

- Fully comprehensive array of emergency medications necessary to treat all serious life-threatening emergency medical incidents and which, at minimum, is available to stabilise the patient with regard to airway, e.g. rapid sequence intubation, breathing and circulation before transfer to the designated hospital.

- A fully functional manual resuscitator kit with reservoir bag, positive end-expiratory pressure valve (PEEP) and oxygen source that will last for at least 60 minutes at 15 litres/minute minimum. This will include a manual resuscitator with variety of masks, reservoir bag, PEEP valve, 5 metres of oxygen tubing, 400 litres pressurised oxygen source minimum, 2 x mouth to mask ventilators with oxygen inlet.

- Mechanical suction devices, electrical and battery-operated, with a minimum negative pressure of 500 mmHg with a minimum container capacity of 1000ml.

- Therapeutic sterile surgical sets for the acute management and drainage of a tension pneumothorax, haemothorax, pericardial tamponade and performance of a cricothyroidotomy.

- Spinal column immobilisation equipment including cervical collars, long spinal board, basket stretcher/scoop stretcher, vacuum mattress and accompanying straps.
- Upper and lower limb fracture traction and immobilisation devices.

- Full set of linen and blankets for each stretcher and examination couch.

- Diagnostic equipment: double-headed cardiac stethoscope, end-tidal carbon dioxide monitor, blood glucose testing equipment, plastic reflex hammer, pulse oximeter, pupil torch with spare batteries, and sphygmomanometer with full set of adult and paediatric arm cuffs.

- Miscellaneous: burn dressings, appropriate surgical and suture equipment, assortment of splints, black pen, permanent marker, note pad, rescue-type scissors, sharp-items disposable bin.

Communication: Adequate communication between the VIP/VVIP medical centres and the Venue Operations Centre (VOC), designated ICU ambulances and the receiving nearest most appropriate medical facility, so that all medical information can be relayed to the various centre when required.

Time: All of the above-mentioned activities and preparations should be completed and be fully ready for operation a minimum of one hour before the official opening of the stadium gates to the public, as a guide.

VIP/VVIP ICU dedicated ambulances

As with the PMC and FoPMT ICU ambulances, the VIP/VVIP dedicated ICU ambulances must be appropriately staffed with qualified and experienced out-of-hospital advanced life support/intensive medical care staff and comprehensively equipped so as to provide full resuscitative measures to a critically injured or ill delegate by assisting on site or inside the ambulance while stationary or mobile.

The 2 x dedicated VIP/VVIP ICU ambulances are to be positioned close to the VIP/VVIP lounges so that any delegate can be expeditiously transferred from the VIP/VVIP medical centre to the ambulance for transfer to either an await-

ing aeromedical helicopter or by road to the nearest most appropriate medical facility. It is therefore mandatory that both the staff competency and available emergency equipment in the VIP/VVIP dedicated ambulance be adequate and appropriate for patient resuscitation and stabilisation, if and when required, including full cardiopulmonary resuscitation while en route to a nearby cardiac catheterisation laboratory.

Once again, it must be stated categorically that, contrary to current internationally recommended CPR protocols which recommend that a patient without a return of spontaneous pulse not be transferred by ambulance to the nearest most appropriate emergency department, because of issues of futility and cost, this DOES NOT APPLY to resuscitation or CPR of the FIFA VIP/VVIP delegate or staff. This means that once CPR and defibrillation have been commenced on site or in other location inside the stadium, such resuscitative measures are to be continued, if medically indicated, en route to the nearest, most appropriate emergency department or cardiac catheterisation laboratory by aeromedical or road ambulance with staff that have been adequately trained in performing adequate CPR (manual chest compressions/positive pressure ventilation/defibrillation/drug administration) inside a moving ambulance.

Once again, it must be stated that all items of medical equipment be thoroughly checked every match for availability, functionality and cleanliness, so that comprehensive critical care can be performed at the highest possible level of care. The practice of relying on pre-sealed containers and medical bags having all items available and functional is not acceptable in this out-of-hospital environment where absence of a single item could have devastating consequences.

Although medical and related staff may be designated to specific areas of responsibility, during active VIP/VVIP resuscitation, this responsibility may have to be changed to ensure that the appropriate professional is always in attendance clinically and/or control. Under no circumstances should personal issues play any role nor should pre-designated responsibilities be dogmatically maintained, if these would compromise effective and efficient player resuscitation. If this means that designated ambulance crews may have to step aside so that other medical professionals can continue effective treatment or medical professionals need to take the advice of pre-hospital emergency medical service colleagues, then all professionals should be humble and professional enough to allow this to occur, for the benefit of the critical player.

Prior to use, each of the VIP/VVIP dedicated ICU ambulances must be fully checked regarding:

- Full tank of gasoline/fuel
- Tyre pressure including spare type
- Water and oil levels
- Windscreen wiper operation and spray
- Radio communications
- Internal air conditioning
- Emergency warning lights and sirens
- Electrical equipment charging lights

Prepared plans must be instituted with the traffic police or relevant agency to ensure that, if required, a police escort will be immediately available and the specific road/s unobstructed, should a critically ill or injured player be required to be transferred by road to the appropriate medical facility.

Standing down: Please note that comprehensive care for all VIP/VVIP delegates must be continued until all delegates have left the VIP/VVIP lounge area.

APPENDIX D
Emergency medical equipment

All medical centres and ICU ambulances at the stadium have a minimum recommended list of emergency equipment which is required to be present, functional and clean and overall this responsibility falls on the stadium VMO or his/her delegated person. It is also recommended that the team physicians visit the Player Medical Centre in order to familiarise themselves with the staff and equipment that are present, enquire regarding any special individual requirements and agree on procedures in case of a need for emergency assistance.

Minimum list of emergency medical equipment:

- At least one medical examination couch with head-elevation section
- At least two emergency ambulance-type stretchers with head-elevation and trendelenburg-positioning.
- A fully comprehensive advanced airway management tray containing equipment necessary to manage a normal, difficult or failed airway in patients of different morphologies according to internationally accepted standards.
- Non-latex safety gloves, safety goggles, full set of advanced airway equipment for normal, difficult and failed airway including laryngoscope handle, set of curved and straight laryngoscope blades, set of endotracheal tubes of various sizes, 20ml syringes, water based lubricant, McGill's forceps, endotracheal tube fixation device, flexible Bougie, stylet, supraglottic devices, oropharyngeal and nasopharyngeal airways, cricothyroidotomy set, mechanical and manual suction devices with hard and soft suction catheters.
- At least one fully functional biphasic manual defibrillator with synchronised cardioversion, external transcutaneous pacing, 12-lead electrocardiographic function and 3-lead patient cardiac rhythm monitoring, with paper printout and all ancillary equipment including relevant external defibrillation pads/gels, patient chest electrodes, all of which must be checked for expiration dates. It is highly recommended that all VMOs and team physicians be competent in the operation of the available defibrillator, as it is possible during training sessions, that he/she may be the only physician in the vicinity.
- A non-invasive vital signs monitor which include blood pressure, pulse rate, respiration rate, oxygen saturation monitor with end-tidal carbon dioxide measuring capability.
- Peripheral and central intravenous access and administration consumables, including the capability to administer warmed fluids via a volumetric or pressure infusion, electronic device with related ancillary equipment.
- Fully comprehensive array of emergency medications necessary to treat all serious life-threatening emergency medical incidents and which, at minimum, is available to stabilise the patient with regard to airway, breathing and circulation before transfer to the designated hospital.
- A fully functional manual resuscitator kit with a variety of face mask sizes, reservoir bag, positive end-expiratory pressure valve (PEEP), 5 metres of oxygen tubing, and oxygen source that will last for at least 60 minutes at 15 litres/minute minimum.
- Mechanical suction devices, electrical and battery operated, with a minimum negative pressure of 500mmHg with a minimum container capacity of 1000ml.
- Therapeutic sterile surgical sets for the acute management and drainage of a tension pneumothorax, haemothorax, pericardial tamponade and performance of a cricothyroidotomy. Medical personnel experienced in the use of the equipment must also be available on site during the football match.
- Spinal column immobilisation equipment including hard cervical collars, long spinal board, basket stretcher/scoop stretcher, vacuum mattress and accompanying straps.
- Upper and lower limb fractures splints and appropriate traction and immobilisation devices.
- Full set of linen and blankets for each stretcher and examination couch.

The Field-of-play Medical Team should be equipped with at least the FIFA Medical Emergency Bag (FMEB), basket stretcher with/without accompanying long spinal board and related straps.

The standard minimum FMEB contains the following items:

PERSONAL PROTECTION		
Pair of latex/nitrile gloves	small/medium/large	2
Plastic goggles	one size	1
Antiseptic hand disinfectant	100 mls	1
Rescue scissors shears	stainless steel	1
AIRWAY MANAGEMENT		
Guedel oropharyngeal tube	Size 3,4	1 each
Nasopharyngeal airway	6mm, 7mm	2 each
Laryngeal Mask Airway (LMA)	Size 3, 4	1 each
Water-based lubricating jelly	50ml tube	1
Magill's forceps	Size -adult	1
Spencer Wells artery forceps	straight / stainless steel	1
Scalpel handle and blade	Size 15, disposable	2
BREATHING + VENTILATION		
Bag valve manual resuscitator (self-inflating)	without adult - pop off valve	1
BVM face mask	Size 3 ,4, 5	1 each
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	500ml container	1
Antiseptic-type appropriate swab e.g. chlorhexidine	sachets	25
IV cannula	14G, 16G, 18G, 20G	3 each
Sterile IV retaining dressing	7.5 x 8.5 cm packet	4
IV fluid administration set	15 drop/ml	2
Sterile disposable syringe	Size 2ml, 5ml, 10ml, 20ml	4 each
Hypodermic needle	Size 21g x 40mm	6
Hypodermic needle	Size 18g x 40mm	6
Lactated Ringer's solution	500ml	2
Sterile saline	20ml	5
Clinical waste bag	20 x 25cm with seal	3
DRESSINGS		
Gauze swabs 10cm x 10cm	packet of 5	10
Crepe bandage	100mm, 75mm, 50mm	2 each
Trauma wound dressing	100mm, 75mm, 50mm	4 each
Transpore hypo-allergenic tape	25cm	2
Sterile burn dressing	100mm x 100mm	5
Plasters	assortment of sizes	1 box
Non-suture skin closures	singles	5
Adhesive bandage	25mm	2
EVACUATION		
Long trauma board	plasticized	1
Board immobilisation straps	6 x straps / spider type	1 x set
Calico triangular bandage	single wrapped	6
Rescue type blankets to prevent or treat hypothermia post injury	aluminium or equivalent	4

FRACTURES		
SAM splint orange/blue	91.5cm x 11.5cm	2
Ambu head wedge cervical	single	2
GENERAL		
Sealable plastic bag	small, medium, 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 & contacts		1
Inventory & checklist		1
MEDICATIONS (equivalents can be substituted for local reasons)		
Adrenaline/epinephrine 1 in 1000 injection	1mg per ml	10
Aspirin tablets	300mg dissolvable	10
Atropine	0.5mg in 1ml	5
Chlorpheniramine injection	10mg in 1ml	5
Glucose gel	25g sachet	3
Glyceryl trinitrate tablets/spray	300mcg sublingual	I unit
Midazolam	15mg in 3ml	3
Salbutamol pMDI inhaler	200 mcg / dose	1
Tramadol injection (or equivalent analgesic)	50mg in 2ml	4
Oral rehydration solution sachets		10

APPENDIX E
Recommended FCC preparation timelines

NB: All of the times mentioned are related to the date of the approaching FIFA World Cup™, which includes consideration of the FIFA Confederations Cup which is always held one year before the associated FWC.

Once various Local Organising Committee (LOC) staff members have been appointed, their duties and responsibilities should be undertaken as per the above mentioned, namely:

- Chief Medical Officer (CMO) – page 2
- Venue Medical Officer (VMO) – page 5
- Doping Control Officer (DCO) – page 10

Three years prior to FCC
Selection of the FCC LOC CMO with commencement of official duties and responsibilities encompassing all host cities, stadiums and hotels.

Two years prior to the FCC
Selection of the FCC LOC VMOs for all the delegated host stadiums. This selection must be accompanied by the relevant training required by the VMOs in order for them to fulfil their delegated duties competently in managing all medical activities in their host stadium.

Inspection of the host stadiums medical facilities in order to ensure that all FIFA medical requirements are being met during construction/renovation of the host stadiums and modification where necessary.

This inspection is particularly important regarding the building of the Doping Control Room, Player Medical Centre and Spectator Main Medical Centre, which are permanent medical centres that form part of the legacy of the newly built/renovated stadium. Likewise, FIFA "overlay" architectural plans should be scrutinised for construction of the VIP and VVIP Medical Centres.

18 months prior to the FCC
Selection of the FCC LOC DCO for all the delegated host stadiums.

Inspection and selection of the FIFA-designated private hospital/s that will be used for all acute injuries and/or illnesses requiring hospital presentation/admission.

Selection and appointment of host stadium doctors, nurses, emergency medical ambulance services and their personnel for the FCC and forthcoming FCC.

Security screening of all selected medical and healthcare service providers is mandatory prior to official appointment, necessitating early personal data collection as required.

15 months prior to the FCC
Selection of the LOC doping control chaperones who will be in action during the FCC at the delegated host stadiums. This selection must be accompanied by the relevant training required by the chaperones in order for them to fulfil their duties competently.

Commencement of active service of the FCC host city VMOs in preparing their host city, with its official stadium, hotels and training camps, with all necessary medical services including briefing and training of appointed doctors, nurses, emergency medical ambulance services and their personnel.

One year prior to the FCC
Begin full active duties during the duration of the FCC. The VMOs of the designated FCC host cities should be shadowed by those VMOs from FCC host cities who are not involved in the FCC, so that they can gain necessary operational experience.

Nine months prior to the FCC
Presentation of a FCC debriefing session by all LOC medical appointees, in order to learn the lessons, both positive and negative, from the FCC just passed.

Six months prior to the FCC
Begin organisation of medical service provision for the Participating Member Associations' (PMAs) training camps, training sites and hotels.

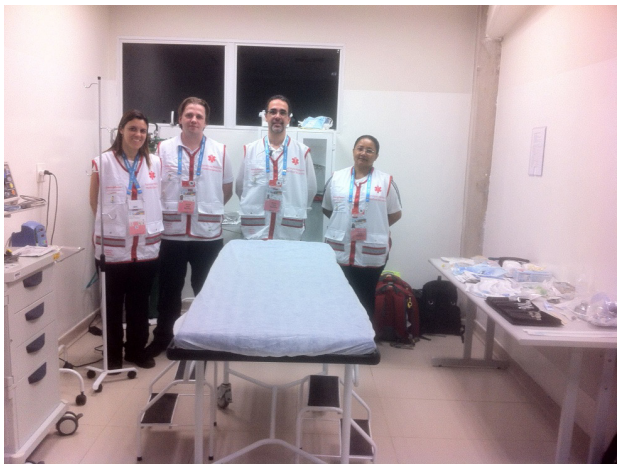
Three months prior to the FCC
Confirmation of the FIFA-designated private hospital/s that will be used for all acute injuries and/or illnesses requiring hospital presentation/admission.

Two weeks prior to the FCC
Commence of active "full-time" service of the FCC host city VMOs regarding all designated duties and responsibilities.

One week prior to the FCC
Final medical meeting of all medical and healthcare service providers to finalise all operational logistics, resolve any outstanding issues,

1 day prior to the FCC – pre-match day
Attendance at the pre-match coordination meeting in the stadium

Collection of match-day Supplementary Access Devices (SADs)



Match day

Congregation of all medical service providers in a designated location, at a designated time for transport to the host stadium.

Inspection of personal accreditation cards and distribution of SADs to the appropriate medical service providers.

Inspection and distribution of all medical equipment to the relevant medical teams and centres.
Inspection and distribution of all ambulances within the stadium environment.

Testing and distribution of communication devices.

Inspection of all stadium medical centres – Doping Control Room, Player Medical Centre, VIP/VVIP Medical Centre, Main Spectator Medical Centres and medical posts.

Distribution of food packages or information regarding its timely distribution.

6 The FIFA Medical Emergency Bag (FMEB)

Introduction

Medical emergencies on the football pitch are not common but, if and when they occur, it is imperative that immediate recognition, on-field response and acute medical management is available to the injured player by on-duty medical staff using adequate and appropriate equipment, until such time as emergency medical services arrive on scene to assist with additional treatment and/or transfer the player to the nearest, most appropriate medical facility, if required.

In order to support and promote a standardised and consistent level of advanced life-support emergency medical care on the football field, F-MARC developed a FIFA Medical Emergency Bag (FMEB) for distribution to all member association medical departments, following the decision of the 2012 FIFA Congress (Budapest) to provide each of the 209 member associations with an AED as a sign of the importance of the prevention of Sudden Cardiac Death (SCD) on the football field. F MARC further endorsed the Congress decision by creating a comprehensive FMEB including educational manual and instructional video which is available at www.F-MARC.com.

The FMEB is intended for use by all FIFA member associations internationally, for training and competition, as 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 fully appreciated that certain FIFA member associations, football teams and healthcare professionals may elect to provide a level of football emergency medical care above that provided by the contents of the FMEB, which is naturally to be welcomed and encouraged, the contents of the FMEB have taken into consideration the global nature of football internationally, while at the same time recognising the need for an optimum level of football emergency care for all, a level that all member associations should strive for during training and competition, irrespective of the location.

Therefore, although individual or team medical staff may use their own discretion to add any items to the FMEB due to local circumstances, it is recommended that the basic itinerary of the FMEB not be altered and always be available when used by on-duty medical staff, in accordance with the recommendations of the FIFA international expert panel. This will ensure basic consistency of contents across matches and enable professional healthcare from different teams to be able to work in unison, on the same field, on single or multiple players, using a number of FMEBs, all with the same basic contents.

FMEB content considerations

The decision regarding the appropriate contents of a "universal" football emergency medical bag has taken into consideration the multitude of locations globally where football is played, at amateur and professional level, as weekly a multitude of registered matches are played worldwide. Additionally, consideration was given to the emergency medical knowledge, training and experience of the varied composition of healthcare professionals who may be on-duty at the football field of play during training or competition matches. In the absence of adequate skills in the recommended life-saving medical skills related to the con-

tents of the FMEB, or knowledge of the current standards of care of the anticipated football field emergency medical conditions, these inadequacies should be resolved by implementation of the FIFA football emergency medicine training courses, undertaken locally by the confederations and/or member associations for team physicians, venue medical officers and field-of-play medical team members. Additional qualifications such as basic and advanced life support qualifications are beneficial.

A multitude of stadiums internationally have made the inclusion of pressurised oxygen as an optional rather than a mandatory item, due to the logistical difficulties of having oxygen routinely on scene during training or competition matches globally. This necessitated the inclusion of FMEB items that were not oxygen-driven or -dependent. Hence the inclusion of a pressurised metered dose inhaler and volumetric spacer for exercise-induced bronchospasm rather than a nebuliser mask.

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 at a level which would practically be equivalent to an advanced life support level of emergency care. After setting the intended level of emergency care, consideration was centered on which medical emergencies would be likely to be encountered on the football field and which relevant basic medical items, encompassing at least "airway, breathing and circulation" considerations, an on-duty healthcare professional could be expected to be competent, and if not, easily trained, if and when confronted with an on-field medical emergency.

It was also agreed that the contents of the FMEB would primarily, but not exclusively, be designed for a player older than 14 years of age, with a weight of 50 kilograms for a duration of 60 minutes, without immediate availability of supplemental oxygen, until arrival of the emergency medical ambulance services on the field. The inclusion of a rigid, durable immobilisation device was considered mandatory. Although the item recommended was a toughened plastic long spinal board, or equivalent, because of universal availability, it is further recommended that, wherever logistically and financially possible, the acquisition of a Stokes-type basket stretcher or scoop stretcher would be preferable.

The contents of the FMEB have been selected mainly in generic format such that all of the items can be replaced once used in an emergency or expired in the local country. Although the local replacement may not necessarily be the exact brand of item that was originally packed, it is the functionality of the item and its appropriate and effective use in a medical emergency that is paramount. It was with this in mind that the manufacturer of the selected FMEB was requested to colour-code the different FMEB content pouches so that there was consistency in packaging according to function, namely airway, breathing, circulation and so forth. Additionally, the outer compartment of the FMEB is made of transparent plastic and houses the Automated External Defibrillator (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.

The contents of the FMEB were selected to manage the following life-threatening football medical emergencies:

- Anaphylaxis
- Chest pain
- Concussion
- Dehydration
- Exercise-induced bronchospasm
- Fractures
- Grand mal seizures
- Head Injury
- Heat stroke/head exhaustion
- Hypoglycaemia
- Lightning injury
- Spinal column injury
- Sudden Cardiac Arrest

PERSONAL PROTECTION		
Pair of latex/nitrile gloves	small/medium/large – as appropriate	2
Plastic goggles	one size	1
Antiseptic hand disinfectant	100 mls	1
Rescue scissors shears	stainless steel	1
AIRWAY MANAGEMENT		
Guedel oropharyngeal tube	Size 3,4	1 each
Nasopharyngeal airway	6mm, 7mm	2 each
Laryngeal mask airway LMA	Size 3, 4	1 each
Water-based lubricating jelly	50ml 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	1
Scalpel handle and blade	Size 15, disposable	2
BREATHING		
Bag valve manual resuscitator (self-inflating)	without adult - pop off valve	1
BVM face mask	Size 3 ,4, 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	500ml container	1
Antiseptic-type appropriate swab e.g. chlorhexidine	sachets	25
IV cannula	14G, 16G, 18G, 20G	3 each
Sterile IV retaining dressing	7.5 x 8.5 cm packet	4
IV fluid administration set	15 drop/ml	2
Sterile disposable syringe	Size 2ml, 5ml, 10ml, 20ml	4 each
Hypodermic needle	Size 21g x 40mm	6
Hypodermic needle	Size 18g x 40mm	6
Lactated Ringer's solution	500ml	2
Sterile saline	20ml	5
Arterial tourniquet	size - adult	1
Clinical waste bag	20 x 25cm with seal	3
DRESSINGS		
Gauze swabs 10cm x 10cm	packet of 5	10
Crepe bandage	100mm, 75mm, 50mm	2 each
Trauma wound dressing	100mm, 75mm, 50mm	4 each
Transpore hypo-allergenic tape	25cm	2
Sterile burn dressing	100mm x 100mm	5
Plasters	assortment of sizes	1 box
Non-suture skin closures	singles	5
Adhesive bandage	25mm	2
Celox gauze dressing		1
Protective eye shield		1

EVACUATION		
Long trauma board	plasticized	1
Board immobilisation straps	6 x straps / spider type	1 x set
Calico triangular bandage	single wrapped	6
Lower limb metal traction splint	Kendrick traction splint or equivalent	1
Rescue type blankets to prevent or treat hypothermia post injury	aluminium or equivalent	4
FRACTURES		
SAM splint orange/blue	91.5cm x 11.5cm	2
Ambu head wedge cervical	single	2
GENERAL		
Sealable plastic bag	small, medium, 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 & contacts		1
Inventory & checklist		1
MEDICATIONS		
Adrenaline/epinephrine 1 in 1000 injection	1mg per ml	10
Aspirin tablets	300mg dissolvable	10
Atropine	0.5mg in 1ml	5
Chlorpheniramine injection	10mg in 1ml	5
Cyclizine injection	50mg in 1ml	5
Glucose gel	25g sachet	3
Glyceryl trinitrate tablets/ spray	300mcg sublingual	I unit
Midazolam	15mg in 3ml	3
Salbutamol pMDI inhaler	200 mcg / dose	1
Tramadol injection (or equivalent analgesic)	50mg in 2ml	4
Oral rehydration solution sachets		10

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7 Appendices

Checklist: football stadium medical centres Player/VIP/spectator centres

The Player Medical Centre (PMC) must be staffed, equipped and practically arranged in order to provide immediate, comprehensive resuscitation and stabilisation (treatment) of any acute life threatening injury or illness that may afflict any player or referee on or off the FoP, within the stadium environment, prior to expeditious and safe transfer of the player or referee, by road or air ambulance, to the nearest, most appropriate medical facility that can effectively and definitively care for the player.

Location:

- Located near to the team changing rooms, a short distance from the main access tunnel to the field.
- 2 x ICU ambulances located near to the PMC
- PMC entrance/exit doors wide enough to accommodate ambulance stretcher
- Adequate electric lightning
- Adequate electrical points for charging 10 x items of medical electrical equipment which may include:
- Cardiac defibrillator/monitor/external pacer
- Mechanical suction device
- Intravenous infusion pumps
- Mechanical ventilator
- Video laryngoscope
- Vital signs monitor
- Portable radios
- Patient heating/cooling devices
- Refrigerator
- Electric medical diagnostic set
- Waste ablution + drainage facilities
- Toilet facilities for patient and staff needs
- Control air conditioning according to environmental needs
- 2 x resuscitation couches/stretchers that would allow effective external chest compressions/trendelenburg positioning/anti-trendelenburg positioning
- All stretchers able to reach ambulances without any obstructions, steps, tight corners, or any other obstacle from PMC to ambulance.
- 2 x metal mobile sets of steps located next to each stretcher/couch.
- Intravenous solution hanging device
- Portable patient privacy screen/s
- Waste containers – general waste
- Waste containers – medical waste
- Resuscitation cart or equivalent surfaces to display medical equipment
- Table for administrative purposes
- 6 x chairs minimum that can be cleaned
- Lockable medicine container for storage/display

Staff:

- At least 1 x specialist, registered emergency physician or appropriate equivalent
- At least 1 x specialist emergency/intensive care nurse
- At least 1 x advanced life support qualified paramedic
- At least 1 x fluent English speaking medical staff member available at al times.
- Minimum of 4 healthcare staff at all times present in the PMC.
- PMC dedicated ambulance crew stationed in the PMC.
- All PMC staff currently certified in advanced trauma life support (ATLS™) and advanced cardiac life support (ACLS™) or equivalent as minimum.

- **Equipment:** The range of medical life-saving equipment present in the PMC must be fully comprehensive to ensure that all life-saving medical and/or surgical procedures can be undertaken with immediate effect if indicated during the resuscitation of the player.

NB:

- It is mandatory that all medical equipment in the PMC is personally checked by the on-duty medical staff for availability, functionality, cleanliness and expiration date prior to each and every match.
- All items of medical equipment must be able to accommodate the full range of adult and/or teenage player physique sizes expected during each FIFA tournament, e.g. manual resuscitator face mask, airway tubes, laryngoscope blades, so that effective management is never hindered by inappropriately sized items.
- All medical equipment and medical activities must be appropriate and applicable to the out-of-hospital environment such that full resuscitative procedures can be effectively and efficiently performed on the ground (FoP), on an ambulance stretcher, inside a moving ambulance, wherever required. This requirement is mandatory for the effect provision of cardiopulmonary resuscitation (CPR) if and when required.

- Presence of personal protective equipment (PPE) against body secretion/fluids:
  – Latex + non-latex gloves – all sizes
  – Surgical face masks
  – Plastic safety goggles
  – Hazardous material disposal containers
  – Surgical gown kit

- Advanced airway management equipment to adequately manage a normal, difficult or failed airway in patients of different morphologies according to internationally accepted standards. Minimum airway equipment includes:
- Personal protection equipment
- Inline air filter and humidifier device
- Bag valve manual resuscitator - adult
- Bag valve manual resuscitator masks – minimum size 3,4,5.
- Bougie – adult
- Cricothyroidotomy set - needle
- Cricothyroidotomy set - surgical
- End tidal CO2 monitor
- Endotracheal fixation tape/device
- Endotracheal tubes – minimum range of sizes 5mm to 9mm.
- Endotracheal tube stylet/introducer
- Endotracheal tube flexible extension tubing
- Gauze swabs x packet
- Laryngoscope handle – standard
- Laryngeal Mask Airway (LMA) – sizes 3, 4, 5 or other appropriate supraglottic devices.
- Lignocaine Spray
- McGill's forceps – adult
- Mechanical suction unit, tubing and suction catheters.
- Miller + Macintosh type laryngoscope blades, sizes 3, 4 5.
- Nasopharyngeal airway – minimum range of sizes 6, 7, 8.
- Oropharyngeal airways – full adult and child set
- Oxygen – portable pressurised cylinder/s to be able to administer 15l/min for 60 minutes.
- Oxygen cylinder spanner
- Oxygen cylinder peak flow metre
- Oxygen face mask – non-rebreather type with reservoir bag.
- Nebulizer administration system
- PEEP valve
- Rescue scissor
- Syringe 20ml + 50ml
- Water-based lubricant
- Wooden spatula/s
- Orogastric tubes

- A manual, biphasic defibrillator with:
- synchronised cardioversion
- external transcutaneous pacing
- 3-lead (minimum) patient cardiac rhythm monitoring
- Paper for printout
- Defibrillation pads/gels
- Patient chest electrodes
- Razors – for shaving hair on chest
- Cloth – for wiping sweat from chest
- Hand steriliser

- 12-lead, multi-channel electrocardiogram (ECG /EKG) machine
- Selection of peripheral + central venous access catheters
- Intravenous administration consumables with:
- Administration sets of varying flow rates
- Intravenous crystalloid and colloid fluids
- Intravenous cannulae fixation consumables
- Linen savers
- Strapping – variety of sizes/types
- Bandages
- Trauma dressings and bandages
- Gauze swabs
- Syringes
- Needles
- Antiseptic swabs and/or solution.

- A non-invasive vital signs monitor capable of measuring blood pressure, pulse rate, respiration rate, oxygen saturation monitor, end-tidal carbon dioxide, as a minimum.
- Volumetric or pressure intravenous infusion, electronic device with related ancillary equipment.

- A fully functional manual, self-inflatable, resuscitator kit with:
- Reservoir bag
- Patient fitted, face masks of varying sizes, minimum size 3, 4, 5.
- Positive end-expiratory pressure valve (PEEP)
- Oxygen source that will last for at least 60 minutes at 15 litres/minute minimum.
- Oxygen tubing x 5 metres of oxygen tubing
- Mechanical suction device, electrical and battery operated, with a minimum negative pressure of 500mmHg and a minimum container capacity of 1000ml.
- Therapeutic sterile surgical and suture sets for management of:
- Tension pneumothorax
- Haemothorax
- Pericardial tamponade
- Failed airway
- Lacerations/incisions
- Spinal column immobilization equipment which may include:
- Cervical collars
- Foam based head blocks

- Long spinal/trauma immobilisation board
- Stokes-type basket stretcher
- Scoop stretcher
- Vacuum mattress
- Straps as required
- Triangular bandages x 12

- Variety of flexible upper and lower limb orthopaedic immobilisation and traction splints.
- Linen + blankets for each stretcher/couch.
- Diagnostic equipment:
- Double-headed cardiac stethoscope
- Glucometer + testing ancillary items
- Plastic reflex hammer
- Mobile, oxygen saturation monitor
- Pupil torch with spare batteries
- Manual sphygmomanometer with full set of adult cuffs.
- Thermometer, preferably digital

- Burn dressings
- Bed pan/urine bags/urinary catheters
- Stationary:
- Black pen
- Permanent marker – black, red
- Note pad/paper
- Physician prescription pad
- Hospital referral letter
- Patient report form
- Patient observation/procedure form

Communication: Adequate radio, telephonic or other appropriate forms of communication between the PMC and the Venue Operations Centre (VOC), designated ambulance/s and receiving medical facility, including:

- Radio charger/s
- Electric cables
- Electric multiplugs
- Ear pieces/headphones

Time: All of the above-mentioned activities and preparations should be completed and fully ready for operation a minimum of one hour before the FIFA participating member teams are expected to arrive in the stadium, which is usually 90 minutes before the official kick-off time. This ensures that immediate medical care is available to all players from the moment they enter the stadium environment.

Checklist: Ambulance

Prior to use, each of the dedicated intensive care ambulances must be fully checked regarding:

- Full tank of gasoline/fuel
- Tyre pressure including spare tyre
- Water and oil levels
- Windscreen wiper operation and spray
- Radio communications
- Air conditioning
- Emergency warning lights and sirens
- Electrical equipment charging points and plugs

1. At least one collapsible, rugged, ambulance stretcher with head-elevation and trendelenburg-positioning, intravenous hanging pole and adequate straps. Adequate and appropriate line, clean blankets and a soft pillow should be available, if and when required.
2. A long trauma board set of straps to immobilise the shoulder, pelvis, supra-patellar and ankle regions, and set of foam-based head immobilisation blocks with set of straps.
3. Oxygen cylinders of sufficient size and quantity to be able to fully mechanically ventilate a patient for a 60-minute period.
4. Mechanical suction device, electrical + battery-operated, with a minimum negative pressure of 500mmHg with a minimum container capacity of 1000ml with hard and soft suction catheters.

5. One fully functional biphasic manual defibrillator with synchronised cardioversion, external transcutaneous pacing, 12-lead electrocardiographic function and 3-lead patient cardiac rhythm monitoring, with paper printout and all ancillary equipment including a mandatory set of external defibrillation pads, tube of defibrillation gel, patient chest electrodes, all of which must be checked for expiration dates. In addition, the ambulance crew must be fully conversant with the defibrillator regarding its use and must be able to demonstrate and prove that the defibrillator has been checked before its match.

6. A fully functional manual resuscitator kit with at least three different sized masks, reservoir bag, positive end-expiratory pressure valve (PEEP), 5 meters of oxygen tubing, and oxygen source that will last for at least 60 minutes at 15 litres/minute minimum.
7. A fully comprehensive advanced airway management kit containing equipment necessary to manage a normal, difficult or failed airway in patients of different morphologies according to internationally accepted standards, namely:

- Non-latex safety gloves
- Safety goggles
- Sharp scissors
- Laryngoscope handle with spare batteries
- Set of curved and straight laryngoscope blades – size 2,3,4
- Set of endotracheal tubes of various sizes from 2.5 to 9
- Two 20ml syringes
- Water-based lubricant
- McGill's forceps – adult and paediatric
- Endotracheal tube fixation device
- Flexible bougie
- Endotracheal stylet – adult + paediatric
- Laryngeal airway device, sizes 2,3,4,5
- Set of oropharyngeal airways
- Set of nasopharyngeal airways
- Emergency cricothyroidotomy set

8. A non-invasive, vital signs monitor which include blood pressure, pulse rate, respiration rate, oxygen saturation monitor with end-tidal carbon dioxide measuring capability and accompanying cuffs of different sizes and related accessories.

9. Peripheral and intraosseous venous access devices together with administration consumables, including the capability to administer warmed fluids via a volumetric or pressure infusion, electronic device with all related ancillary equipment. Administration sets must include high capacity trauma sets, blood administration sets and paediatric administration sets. There must also be available intravenous crystalloid and colloid fluids, intravenous cannulae fixation consumables, variety of bandages, trauma dressings and gauze swabs, syringes and needles, antiseptic swabs and/or solution.
10. Fully comprehensive array of emergency medications necessary to treat all serious life-threatening emergency medical incidents and which, at minimum, is available to stabilise the patient with regard to airway, breathing and circulation before transfer to the designated hospital.
11. Therapeutic sterile surgical sets for the acute management and drainage of a tension pneumothorax, haemothorax, pericardial tamponade and performance of a cricothyroidotomy. Medical staff experienced in the use of the equipment must also be available on site during the football match.

12. Upper and lower limb fractures splints and appropriate traction and immobilisation devices.
13. Fire extinguisher of regulatory size.
14. Bed pan and urinal with accessories.

Checklist: Pre-match medical services

Before the beginning of a football match, various medical service activities should be discussed between the two team physicians, VMO, members of the field-of-play (FoP) medical teams and medical staff of the Player Medical Centre.

Field-of-play Medical Team (FoPMT)

- Have all the FoPMT members arrived on site?
- Have all the FoPMT members been issued with the necessary FoP SAD access accreditation passes?
- Have the FoPMT been issued with their medical equipment for the match, specifically a FIFA Medical Emergency Bag (FMEB) including an Automated External Defibrillator (AED), long spinal immobilisation board with straps and sponge-type head immobiliser as minimum?
- Have the FoPMT had sufficient time to practice, as a unified team:
  - turning the potentially spinal injured patient from various positions
  - use of the long spinal immobilisation board with a simulated patient
  - review of the SCA Emergency Medical Plan protocol including recognition of collapse, the response onto the field protocol, player assessment and initiation of external chest compressions, how to use the designated match AED and other important CPR protocol issues
- Have the FoPMT been informed regarding:
  - what signal the referee will use to summon the FoPMT onto the field, when required
  - the regulated route of field exit when transporting an injured player
  - the half time protocols regarding FoPMT members leaving the field
  - proper use of radio communications and specifically use of the hand-held radios provided
  - o at what time the FoPMT must be in position at the sidelines
- Have the members of the FoPMT been supplied with bottled water and food in case some/all are unable to leave the FoP during half time because of the presence of football team members who may be exercising.
- Have the FoPMT members been introduced to the team physicians.

Team physicians

- Have the team physicians been invited to a meeting in the Player Medical Centre in order to:
  - introduce the team physicians to the members of the FoPMTs and Player Medical Centre staff
  - highlight the resuscitation equipment available for emergency resuscitation, if and when necessary
  - to revise the current Emergency Medical Plan (EMP) and decide who will activate the EMP, under what circumstances and appropriate role delegation
  - to demonstrate use of the AED that is present for the match and which will be located at the sideline with the FoP medical teams

Ambulances

- Have the VMO and team physicians checked the presence, number, location and backup reserves of the ambulances and staff delegated for duty for the match?
- Has it been ascertained whether it is practically possible for the FoP delegated ambulance to enter the field in an emergency or whether the player will be required to be transported to the ambulance instead?
- Have the FoP ambulance crew been briefed concerning the EMP and their role in treatment and transport?
- Have the VMO and/or team physician/s ensured that all life-saving medical equipment has been adequately checked and that all mandatory items are present, functional and clean?

Referee/s

- Have the VMO, team physicians and FoPMT members been introduced to the match referee?
- Has the match referee been asked how he/she will indicate when he/she wants the FoPMT to enter the field?
- Has the match referee been advised regarding the FIFA protocol regarding the SCA non-contact collapse protocol, three-minute concussion evaluation protocol and, if appropriate, the 30/30 lightning rule and three-minute cooling break protocol?

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