

Football emergency medicine

Emergency medicine in football is now regarded as a sub-speciality of emergency medicine.

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Efraim Kramer has been involved in out-of-hospital emergency medical care for 25 years and recently has become interested in the standards and provision of football emergency medicine. He has been instrumental in the initiation of a FIFA-endorsed football emergency medicine course internationally and is currently involved in research of sudden cardiac arrest on the field in footballers, football disasters and football emergencies.

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With the planning and preparation for effective and efficient medical service provision during the 2010 FIFA World Cup South Africa, the collaboration between the disciplines of sports and emergency medicine has resulted in the dawning of the subspecialty of football emergency medicine. Sports physicians and related health care professionals are primarily tasked with the well-being and optimum functionality of the football players under their care. Emergency physicians and related emergency health care professionals including nurses, paramedics and first aiders, on the other hand, are primarily in attendance in and around the football stadium and its immediate environment to provide adequate and appropriate emergency and related mass gathering medical care to those in need. These may include players, team support personnel, visiting dignitaries, football supporters, commercial vendors and security service personnel. In the main, sports and emergency health care providers remain focused within their respective medical areas of responsibility without each having to consider the practices and protocols of the other.

However, it is not unusual in many football matches worldwide that the team physician is the sole medical physician in attendance within the football stadium environment and may therefore be summoned to provide medical care for a life-threatening emergency beyond his/her primary responsibility. Similarly, any physician providing routine mass gathering medical duties within the football stadium may be called upon to intervene medically when a football player succumbs to a severe injury or life-threatening medical condition, necessitating professional medical intervention.

With the advent of the 2010 FIFA World Cup South Africa and the FIFA Medical Office requirement, not only of professional team physicians, but also for venue medical officers, doping control medical officers and players, dignitary and spectator medical doctor manned medical centres, expertise in football emergency medicine has become mandatory. If the need for cross-training of sport and emergency medical physicians in football emergency medicine is a necessity, how much greater is this need during the infrequent tragic occurrence of a football mass casualty event?

The football stadium during a match, accommodating up to 100 000 spectators, can be regarded as a small town of football followers, and as such requires provision of the essential services that would be provided to any town with a similar population, including safety and security services, emergency and primary health care medical services, fire and rescue services and so forth. Medically, the provision of essential medical services in this specific situation is categorised under mass gathering medicine principles and includes elements of:

- sports medicine
- emergency medicine
- primary health care medicine
- travel medicine
- occupational health and safety medicine
- mass casualty and disaster medicine.

A detailed discussion of the above-mentioned elements of medicine for a mass gathering is beyond the scope of this paper and the reader is referred to various texts on the subject. This paper will thus confine itself to the specifics and idiosyncrasies of football emergency medicine, which is of relevance to all physicians attending a football match in a professional capacity.

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Medical management limitations and adaptations

The physical design of a fully seated football stadium, designed to accommodate the maximum volume of spectators in a limited spatial setting, results in various challenges when acutely ill or injured patients require medical treatment and evacuation. It is therefore strongly recommended that all health care providers consider the following factors, either during pre-event operational planning when deliberation is given to the adequacy of on-site medical personnel, equipment and transportation, or during an emergency medical incident:

- Patient access – what are the physical limits that may either assist or limit access to patients during a medical incident, namely ramps, lifts, gangways, tier design, angle of steps and related elevations, seat spacing, physical partitions and barriers?
- Operational restraints – will various environmental factors, namely, the effects of ambient noise on patient communication and history taking, emergent radio communications and ambient lighting, limit or adversely affect patient management?

- Patient management concerns – will the open stadium environment prevent patient privacy and confidentiality and possibly affect the nature and provision of medical care in acute medical emergencies where medical management cannot be delayed until the patient is transferred to the nearest appropriate stadium medical station?

Considering the limitations that the physical structure and environmental factors may impose on patient access, communication, carriage and treatment, operational and equipment adaptations will be necessitated, all of which require pre-event practical training by those professionally on duty during the event.

Medical emergencies

Although mass gathering medicine strives to provide adequate and appropriate medical services to everyone present in and around a football stadium, for the time period before, during and after a football match, it is essential that, as a minimum, several time critical medical emergencies be effectively managed, and if possible stabilised, prior to transfer to the nearest appropriate medical facility. These conditions include:

- acute cardiac arrest
- acute chest pain
- acute anaphylaxis
- acute asthma
- acute hypoglycaemia
- acute generalised tonic/clonic seizure
- acute potential spinal injury.

Acute cardiac arrest

The occurrence of a cardiac arrest in a patient in a football stadium, which can be classified in the category of spectator sports involving large numbers of supporters seated in a closed stadium for a number of hours, is approximately 0.5 per 100 000 spectators present. For professional football players, this rate was 3.8 in 100 000 per player years but has decreased to 0.4 in 100 000 per player years since the recent introduction of mandatory cardiac diagnostics by FIFA. This means, practically, that there will be occasions where someone in the stadium or on the field will present with cardiac arrest and will require immediate management. This means that all health care professionals on duty must be able to start immediate basic life support resuscitation on any cardiac arrest victim, until advanced life support personnel arrive on the scene to assist, or until the victim can be transferred to the

nearest appropriate medical post or facility for advanced cardiac life support.

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Causes of acute cardiac arrest

Ischaemic: The commonest cause of cardiac arrest in a football stadium is a sudden ischaemic cardiac event, resulting in one of three life-threatening, non-perfusing cardiac arrhythmias, notably ventricular fibrillation, ventricular asystole or pulseless electrical activity. The most frequent of these three rhythms is acute ventricular fibrillation. As a result, expeditious defibrillation is required, followed by or, if necessary preceded by, effective external chest compressions,

whichever is appropriate. This means that there must be a manual or semi-automated defibrillator within the stadium in order to provide time-critical life-saving defibrillation within 3 - 5 minutes. The provision of effective external chest compression within the confines of a football stadium is not, however, as simple as achieved during standard CPR training classes. Patient access, carriage and positioning may present initial hurdles to timely external chest compression or defibrillation if not pre-empted and practised pre-event.

In addition, it may require 8 people to adequately and safely lift a non-responsive patient from a sitting position in a stand and carry him/her up a flight up stairs to the nearest horizontal gangway or passage.

Minimal interruption chest compression CPR, with uninterrupted external compressions for 10 minutes before rescue ventilation becomes necessary, is the method of choice when a defibrillator is not immediately available. This must continue until a defibrillator is available. All on-duty medical personnel must have adequate universal body secretion precautions, a pocket mask and effective communications in order to manage any cardiac arrest successfully. The provision of a defibrillator for each medical team is the ideal, but if not possible, one should be available within a maximum time of 4 - 5 minutes.

Asphyxial: The incidence of asphyxial cardiac arrest is not quoted in the literature for individual cases in the football environment. When this occurs in an individual, it is usually the result of a foreign body airway obstruction.



However, asphyxial cardiac arrest resulting from chest pressure asphyxiation is the major clinical manifestation of acute life-threatening incidents in supporter-related multiple casualty stampede incidents. Under these circumstances, rescue ventilation and external chest compression are the cornerstones of successful therapy and should be initiated and continued until signs of life are evident either in the patient or professional emergency personnel are able to diagnose continued asystole on a cardiac monitor/defibrillator. Triage of asphyxial patients in this situation will be discussed below.

Acute anaphylaxis

Acute anaphylaxis in the football environment, similar to that in any mass gathering, requires immediate diagnosis so that emergency medical management may be instituted. This is the prompt intramuscular injection of adrenaline into the anterolateral thigh (vastus lateralis muscle). Injectable adrenaline must be available at all stadium medical centres and/or mobile advanced life support teams. Injectable adrenaline should also be one of the essential medications carried in a doctor's sports medical bag, either in ampoule form with accompanying syringes and needles or as an EpiPen auto injector device. Glucocorticosteroids and antihistamines, although routinely administered, are not required as urgently as is adrenaline and may be delayed until the patient has been transferred to the stadium medical centre or nearest receiving medical facility.

Acute hypoglycaemia

Symptomatic hypoglycaemia is uncommon in football players but may be evident in other stadium participants and is managed as per standard medical protocols.

Acute asthma

Acute asthma is one of the most frequent medical presentations in the football stadium environment and may present in any player or supporter. Although standard medical management is applicable in these patients, pressurised oxygen-driven β_2 -stimulant nebulisation may not always be available. In these situations, administration via a pressurised multi-dose inhaler (pMDI) with a commercial, or even improvised, spacer is an effective alternative (Fig. 1).

Similarly, oral corticosteroid (prednisolone 0.5 mg/kg) administration may be easier to administer in this environment than intravenous hydrocortisone, and is just as effective, because the onset of action is similar. Remember that a therapeutic use exemption (TUE) is required for football

players who receive either emergency or chronic steroids.

Status epilepticus

The management of a patient with a seizure in the football stadium environment may be logistically challenging because of the physical constraints of space and difficulties transferring the patient, particularly in terms of preventing physical injury to the actively convulsing patient on scene and during transfer. Pre-emptive planning and training of medical personnel is therefore highly recommended.

If the seizure continues for longer than 5 minutes, especially if glucose has already been administered, then a benzodiazepine is indicated. The most

appropriate benzodiazepine in this environment is one that can be administered via multiple routes of administration, does not require refrigeration and can be repeated if necessary. Midazolam is the only benzodiazepine that adequately fits this profile as it can be administered intravenously, but can be also be administered via the intramuscular, nasal, buccal and rectal routes (Table I).

The administration of other benzodiazepines (e.g. diazepam, clonazepam and lorazepam) is, however, completely acceptable and indicated if they are available and can be safely and effectively administered by health care providers who have experience and knowledge of the medication concerned.

| Table I. Administration of midazolam | |
|--------------------------------------|--|
| Intravenous | <ul style="list-style-type: none"> • 5 mg over 30 seconds, repeat every 2 minutes until the seizure terminates • Doses in excess of 20 mg are not advised in the out-of-hospital setting for safety reasons |
| Intramuscular | <ul style="list-style-type: none"> • 10 - 15 mg as a single dose into the anterolateral thigh • Wait 5 minutes for an effect and repeat the dose if necessary |
| Nasal | <ul style="list-style-type: none"> • 10 - 15 mg administered via syringe injection into the nasal cavity slowly as a single dose • Close the nostrils after administration |
| Buccal | <ul style="list-style-type: none"> • 10 mg undiluted, rubbed onto the inside cheek as a single dose |
| Rectal | <ul style="list-style-type: none"> • 20 mg – for rectal administration of the injection solution, attach a plastic applicator or plastic needle cap protector onto the end of a syringe and gently push the plastic applicator through the anus into the rectum before injecting contents • Remove immediately after administration • If the volume of medication to be administered rectally is too small, water for injection may be added to increase the intended volume to 10 ml |



Fig. 1. Improved spacer using a 500 ml plastic bottle with an appropriate sized hole cut into the bottom to fit the nozzle of a pMDI. The patient breathes in the medication by placing the mouth around the screw top projection.

Acute potential spinal injury

The potential for an acute spinal column injury with resultant neurological fallout is always a possibility that must be considered in any player or patient whose mechanism of injury has resulted in either spinal acceleration/deceleration movements, severe distortions of the spinal column, direct trauma or severe spinal muscular spasms. All of these may result from injuries that include heading the football, player collisions, fall from a height, being trampled on and lightning injuries, to mention a few.

Whenever the mechanism of injury or clinical signs or symptoms indicate the possibility of an acute spinal column injury, the patient must be moved with particular care and concern, so as not to cause any initial or further neurological damage to the vulnerable spinal cord. Therefore, spinal column stabilisation is mandatory in any of the aforementioned situations and must be undertaken by a team of health care providers who should have been adequately trained and experienced in the required spinal immobilisation manoeuvres. Patients with potential spinal injuries may be found in a number of positions, all of which require spinal immobilisation, e.g. standing, prone, supine, sitting or in a crumpled position. Table II gives guidelines for the spinal immobilisation.



Table II. Spinal immobilisation of football players

- If the player is fully conscious, instruct him/her not to move from the position in which he/she is presently in.
- Request a health care provider to stabilise the patient's head and neck by placing one hand on either side of the patient's head and preventing any uncontrolled movements.
- If it is practical and appropriate, attempt to gently place a rigid cervical collar or equivalent around the patient's neck to stabilise the cervical spine and assist with manual stabilisation that is already in position.
- If the patient is standing in the vertical position, the patient must be fully secured to a long spinal board (or equivalent) before being slowly and carefully lowered into the horizontal, supine position on the ground. This is best accomplished using the body and upper limbs of two health care providers, placed on either side of the player and thereby manually pinning him/her to the board before it is lowered.
- If the patient is lying in the prone position, the patient must be carefully log-rolled onto a long spine board (or equivalent) so that the patient becomes positioned horizontally in the supine position. The patient is then adequately secured in this position before being transferred. The head and neck of the player must initially always be manually stabilised and remain so until a cervical collar and stabilisation head blocks (or equivalent) is in place.
- If the patient is found in the supine position, the team of health care providers may either simultaneously lift the patient, while a long trauma board is positioned under the patient, who is then lowered gently onto the board for adequate immobilisation, or alternatively log-roll the player as a single unit onto a trauma board prior to transfer.
- Before transferring any patient with a potential for a spinal column injury, always note the neurological function of all limbs with regard to motor and sensory neurological function, as this is the base line function from which all future medical management will proceed.

Football mass casualty incidents

Mass casualty incidents (MCI) in the football environment may be divided into those that are not supporter related, e.g. fire, structural collapse or lightning, the management of which follows conventional current medical practice, or supporter-related mass casualty incidents, management of which is specific to football. This specificity relates to the method of triage that is undertaken in this type of incident. In the non-supporter type of MCI, all patients who are non-responsive and apnoeic, and who do not commence breathing when the airway is opened via basic manoeuvres, are usually classified as 'deceased' and not treated. This practice is based on the utilitarian principle of achieving the greatest benefit for the greatest number, within the confines of the limited resources available in an MCI. A supporter-related MCI, particularly when due to supporter stampedes with resulting asphyxial crush-type injuries, requires immediate basic cardiopulmonary resuscitation (CPR) with effective external chest compressions and efficient rescue ventilation to all those who are unresponsive and apnoeic.

In this situation, resources are indeed not limited because every supporter in the football stadium is eligible to assist and if adequately instructed and supervised, is

able to provide life-saving resuscitation, particularly if called upon to assist. This practically means that if a football supporter-related MCI results in multiple patients in cardiac arrest, they must not be abandoned as 'deceased' in accordance with current recommendations, but, on the contrary, immediate CPR must be instituted on all such patients using whoever is available.

Acute asthma is one of the most frequent medical presentations in the football stadium environment and may present in any player or supporter.

In conclusion

In general, football emergency medicine is similar to most aspects of emergency and acute sports medicine, differing in those selected areas mentioned above. However, it is essential that these differences be appreciated in order to ensure that the medical services provided to all those

present in and around a football stadium are effective, efficient, timeous and in accordance with predicted clinical outcomes.

Further reading

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Further references (15) available on request.

In a nutshell

- A football stadium is an environment where large numbers of people gather regularly.
- Medical emergencies occur often in this environment and must be managed expeditiously, effectively and efficiently.
- Adequate and appropriate medical and allied professionals must be available to provide the necessary medical care.
- All medical and allied professionals require specific education and training to adequately manage patients in the football environment
- Disaster management triage principles in a crush-type football incident are specific to football and must be appreciated.

Single Suture

Unethical drama

It is as I always suspected, medical dramas do not provide a good portrayal of the profession. Matthew Czarny, a medical student and bioethics researcher at John's Hopkins University, concluded this after studying medical dramas such as *House MD* and *Grey's Anatomy*.

He watched a total of 46 episodes (how did he manage to stay awake?!) from the two series and counted the bioethical and professional breaches, as well as examples of good practice. Apparently the most common ethical issue, particularly in *House*, was obtaining consent from patients or giving them enough information to allow them to make an informed decision about a treatment. Half of the time that informed consent came up, the doctors failed the ethics test.

Patient confidentiality and use of experimental procedures also came up. Unsurprisingly (it makes for good drama) sex raised the greatest professional issues. In *House* there were 58 instances of sexual misconduct between doctors and nurses and 27 between these professionals and their patients.

Czarny is now going to explore how medical dramas affect the way in which people perceive and behave towards their doctors – I am looking forward to the paper.

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