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Review Article

Sport Medicine challenges in sporting events during the COVID-19 pandemic: a review of the recommendations for cardiopulmonary resuscitation

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Abstract:

Many 2020 athletic events have been canceled because of the COVID-19 epidemic, although some were postponed to 2021, making 2021 full of mass participation sporting events. As sports activities have been linked to minor and serious injuries, Sports medicine (SM) is a clinical subspecialty of Emergency Medicine developed to be in charge of treating sports-related injuries. While during the COVID-19 pandemic, Personal protective equipment (PPE) guidelines may lag emergency care delivery at sporting events. Athletes' unexpected death is uncommon, but it is a tragic accident for society and unfortunately, a sporting event attended by thousands of athletes the size of the Olympics is not far off. Basic life support (BLS) operations are essential to save the lives of these athletes; while no complete guideline has addressed BLS in the COVID-19 pandemic. Rapid cardiac defibrillation is most needed during cardiac attacks. Tokyo, the host of the 2021 Olympics, appears to have a good supply of defibrillators at medical centers and sports stadiums. Because of the increased risk of COVID-19 transmission, basic life support operations are still dangerous for rescuers and patients. Alternative methods are suggested in the literature as well as the prone position cardiopulmonary resuscitation (CPR) which is not fully supported by clinical shreds of evidence, especially in BLS. Mechanical chest compression devices could be used safely in CPRs in sports events. Minor concerns are about the management of the nasal or oral wounds that should be done discreetly to prevent COVID-19 infection.

Keywords: Sports medicine, cardiopulmonary resuscitation, COVID-19, Tokyo Olympics.

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Introduction

The global COVID-19 pandemic has led to the cancellation of many 2020 sporting events or delayed and unscheduled planning. The postponement of important sporting events has now made 2021 rich of these events. The Tokyo Olympics and the European Cup football tournament were the most important sporting events, which were postponed to 2021. However, with the continued spread of the new coronavirus worldwide, there is still the

possibility of postponing sporting events in 2021 *(1)*. Before returning to normal mass participation sporting events, the risk of transmission between athletes must be handled and minimized *(2)*. Researchers do not presume that an associated COVID-19 outbreak would then spread quickly or widely in Japan, but the scientific community all around the world must be ready to diagnose early and provide the necessary epidemiological data so that appropriate prevention measures and decisions can be made in advance of the Tokyo 2020 Olympic and Paralympic Games *(3)*. In this study, we aimed to review emergency medicine care in mass participating sports events in the COVID-19 era.

Sports medicine, a subspecialty of Emergency medicine

In today's world, with the development of machine life, sport, whether as a factor in maintaining the health of society or as a well-established profession, has found a special place in people's lives *(4)*. Sports activities might get associated with injury. Ligament ruptures, head traumas, and bone fractures are common injuries in sports that result in the athlete staying off competitions for a period of time. However, some of the athletes are at risk of sudden death, often with unknown causes *(5)*. Sports medicine (SM) is a clinical specialization that deals with the diagnosis and treatment of injuries and diseases that occur both in and out of the sports field. Recently, the majority of the athlete's care was handled by orthopedic specialists. Because the bulk of difficulties with athletes are non-operative musculoskeletal injuries and traumatic brain injuries, Emergency Medicine specialists have taken on a significant role in managing sports medicine (6,7). Despite the fact that sports and exercise-related injuries account for around 5% of the burden in Emergency Departments, sports medicine training is not required as part of the Higher Specialist Training curriculum *(8)*. These are generally directed at sports at the highest levels, where organizations have greater resources. It is acknowledged that the quality of medical first aid provided to athletes below the elite level differs between governmental authorities, athletic levels, environments, and nations *(9)*.

Sports medicine emergency care during COVID-19 pandemic

Personnel, resource, and investigation-intensive proposals have recently been made to limit the danger of COVID-19 in sports. Events and injuries that may happen throughout sports, might need emergency care; while Personal protective equipment (PPE) recommendations may lag emergency procedures. Health care is more difficult during an infectious epidemic and requires more careful consideration. Some common procedures for cardiopulmonary resuscitation (CPR) should be handled taking protecting patients from the infection into account, along with preventing the infection from spreading to other patients and medical staff, which requires an accurate set of predictions and preparations *(10)*.

Several of the UK's professional sports chief health professionals created a community to discuss ideas on how elite sport could effectively prepare for a comeback at the right moment in the COVID-19 pandemic. For suspected cervical spine injuries, simple airway procedures and manual in-line stabilization (MILS) are used. An airway can be damaged for a variety of causes; one of the most prevalent in sports is loss of consciousness, which puts the participant's tongue in danger of blocking their own airway. In the lack of any suspected head or neck injury, a simple head tilt chin lift could be used, followed by a jaw thrust after verifying there really is nothing obstructing the subject's airway. Nasal or oral wounds management might also increase the risk of aerosol or droplet spread *(10)*.

Sudden Death of athletes

The sudden death of an athlete is rare, but it is a catastrophic accident. In recent years, the sudden

death of several high-ranking athletes even in Iran, including Hadi Norouzi, a player for the Persepolis Tehran football team (2015); Majid Pasha Moghaddam, the late Iranian national basketball team (1984) has attracted special attention of the media and the international community *(11)*. The sudden death of athletes is a very unpleasant and traumatic event; Because this phenomenon destroys a person who is at the peak of heroism, power, and fame. The sudden death of athletes, known as the healthiest segment of society, often occurs without prior warning. This is a very sad and unusual event and its incidence rate has been reported from 1,300,000 to 7.3 per 100,000 athletes *(12)*. Despite being unusual due to interest and attention, such an event can have a severe impact on families and communities and in some cases be considered a tragedy. The sudden death of an athlete indicates the scientific inability of the authorities to predict and prevent it *(13)*.

Management of Sudden cardiac arrest of athletes in COVID-19 era

If a heart attack occurs outside the hospital, measures need to be taken to maintain the health of the rescuers. In such cases, the rescuers have less coverage than the hospital staff, and as a result, the rescuer is at greater risk if the patient has COVID-19. In such cases, the best way to resuscitate the patient is to use an automatic shock device because mouth-to-mouth resuscitation is very risky, which is why the availability of defibrillators has multiplied. Rapid and timely defibrillation during heart attacks plays a key role in saving human lives *(14)*. Public access to electroshock provides the basis for rapid defibrillation. Therefore, today one of the important research topics is to find the best and most effective places for electroshock placement in different cities. A study examined the incidence of out-of-hospital heart attacks and how the public has access to defibrillator devices in Japan *(15)*. From 2005 to 2013, 43,762 out-of-hospital heart attacks were recorded in Japan. Of these 4,499 cases, which is close to 10% of all patients, had access to a defibrillator device when the heart attack occurred. Of this number, only 1% received defibrillation in 2005 and 16.5% in 2013 at the right time, which shows increased the use of electroshock in these 8 years *(15)*. The Tokyo Olympics and Paralympics, the most important sporting event of 2020, have been postponed to the summer of 2021 due to the global pandemic. It seems that Tokyo would have good access to defibrillators in sports stadiums.

Patients' survival and neurological outcomes are much better in patients who have access to an electroshock device than in patients who do not have access to a defibrillator device, one month after a heart attack *(15)*. The other available alternative to reduce infection spread chance is Prone CPR. Prone CPR, a less common resuscitation method, can be used to reduce the risk of aerosol release if the medical staff has previous experience and appropriate conditions. In this procedure, the patient is placed in a prone position and the chest is massaged on the middle part of the thoracic vertebrae (about T7) and between the two scapulae. To increase the effectiveness of this method, it is better to place a firm plate (for example, a board, or a colleague's hand) between the patient's chest and the bed mattress. If defibrillation is required, one pad is placed on the left midaxillary line and the other on the right scapula (16,17). There are concerns about Endotracheal/tracheostomy extubating during CPR in the prone position, requiring the patient to be rotated for intubation *(17)*; while patients in BLS are not intubated. But this method was not considered in the American Heart Association guideline of CPR in suspected or confirmed COVID-19 cases *(18)* and Moscarelli et al.'s scoping study did not find sufficient evidence to warrant a prone resuscitation recommendation *(19)*. Application of the mechanical chest compression device is widely suggested for CPR operation in hospitals *(20)*, but sports centers seem not to be

equipped with such devices in Japan based on a gray literature review.

Conclusion

Basic life support procedures are still risky for rescuers and patients due to the higher risk of COVID-19 transmission. Alternative techniques, such as prone position CPR, are recommended in the literature but are not completely supported by clinical data, particularly in BLS. In sports events, mechanical chest compression devices might be utilized safely in CPRs. The care of nasal or oral wounds, which should be done quietly to minimize COVID-19 infection, is a minor issue.

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ER and AN designed the study. AN and NK participated in data collection and preprocesses of data. The manuscript was drafted by AN, NK, and ER. Revisions were conducted by NH, NK, and ER.

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