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Commotio Cordis Guidelines

Updated June 2023

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Acknowledgments

The Center for Sports Science & Safety ([Center for Sports Science & Safety | USA Lacrosse, sports-science@usalacrosse.com](https://www.usalacrosse.com/sports-science-safety)) at USA Lacrosse has a foundation rooted in the following three pillars: health and safety, training, and performance. The work of the Center is supported by external collaborators who generously provide their expertise on a wide range of topics. We offer a special thanks to the individuals (in alphabetical order) who contributed to the working group on the Commotio Cordis Guidelines.

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Introduction

It is important to have a clear and practiced plan for the management of commotio cordis. **This document was created to contain guidelines on commotio cordis, for licensed medical professionals, during medical emergencies.** The words and other content provided in these guidelines, in any linked materials or referenced resources (“referenced materials”) are not intended and should not be construed as medical advice.

We believe that the Healthcare providers who are responsible for caring for the lacrosse athletes should be familiar with the emergency action plan (EAP) of the host site and work with the local EMS to provide care for an injured athlete. These are guidelines only and are not intended as a standard of care and should not be interpreted as such. Individual treatment will depend on the specific facts and circumstances presented to the healthcare provider(s) managing care.

Never disregard professional medical advice or delay in seeking it because of something you have read in these guidelines or referenced materials. **In the event of a medical emergency and a licensed medical professional is not available, call 911 immediately.**

The views expressed within these guidelines or referenced materials have no relation to those of any academic institution with which the authors are affiliated.



SECTION 1.

Background



Background

Commotio Cordis is a rare but catastrophic phenomenon that can result in sudden cardiac arrest and death.¹⁻³ Commotio cordis occurs when a blunt, but often relatively mild, blow to the chest directly over the heart occurs during a precise moment of the heart's cycle, leading to sudden cardiac arrest.⁴ Examples of the blunt object may include: baseball, lacrosse ball, hockey puck, fist, shoulder or knee. The heart responds to the blow with an interruption of the electrical impulse, thus sending the heart into ventricular fibrillation. This causes insufficient blood flow, loss of oxygen to tissues and the brain and may result in death if not immediately treated. The location of the blow (directly over the left ventricle of the heart), timing of the blow in the cardiac cycle (10 – 30 milliseconds prior to the peak of the T wave), and the force of the blow all contribute to a commotio cordis incident.⁴⁻⁶ In addition the location of the blow and the hardness of the object are associated with commotio cordis events.^{5, 7} There may be some individuals who are more susceptible to commotio cordis, but we do not know how to test for this.⁸

Commercial chest protectors prior to 2020 likely did not reduce the risk of commotio cordis.⁹⁻¹¹ Recent studies have focused on finding a biomechanical means for the evaluation of chest protection technology in preventing commotio cordis. A commotio cordis surrogate has been developed to assess chest wall protectors for their ability to lower the risk of commotio cordis and a standard for chest protectors is currently maintained by NOCSAE (<https://nocsae.org/standard/standard-test-method-and-performance-specification-used-in-evaluating-the-performance-characteristics-of-chest-protectors-for-commotio-cordis-2/>).^{12, 13} Manufacturers' are currently using this standard in the testing of their chest protectors, and if they pass they can be marketed as NOCSAE certified in reducing the risk of commotio cordis. It is important that the correct size of the chest protector is worn and that fit is also confirmed so that it covers the cardiac silhouette during all movements.



SECTION 2.

Recommendations



Recommendations

USA Lacrosse Sports Science and Safety Committee recommend the following:

1. USA Lacrosse recommends that CPR and AED training for all team personnel, and especially the coach, and trainer.
2. Establishment of an emergency action plan.
3. Quick and easy access to an AED.
4. Teach athletes to avoid being hit directly in the chest by balls or body parts.
5. Educate all team personnel to recognize that strikes to the chest followed by collapse is commotio cordis and that quick action is necessary.
6. Educate all team personnel in the need for immediate CPR if a sudden cardiac arrest is suspected. The longer the delay in beginning CPR and AED treatment, the greater the likelihood of loss of life.
7. Understand that the current chest protectors, although useful in preventing traumatic injury, may not completely eliminate the threat of commotio cordis, even if NOCSAE certified.
8. Require all protective athletic equipment to meet all appropriate safety standards. NOCSAE currently has a chest wall protector standard. (<https://nocsae.org/standard/standard-test-method-and-performance-specification-used-in-evaluating-the-performance-characteristics-of-chest-protectors-for-commotio-cordis-2/>).
9. Ensure that size and fit of the protective equipment is appropriate and covers the left lower chest during all movements in sports.

SECTION 3.

Recognition of Commotio Cordis and Appropriate Action

Recognition of Commotio Cordis and Appropriate Action

Rapid recognition of commotio cordis and swift action are critical to survival.^{14, 15} US Lacrosse is committed to educating the national lacrosse community about the potential dangers of commotio cordis, as well as the life-saving value of having automated external defibrillators (AEDs) available during lacrosse games and practices.

Recognition of sudden cardiac arrest due to commotio cordis is the first step to improving survival. The scenario presents as the athlete sustains a blow to the center to left chest; they may collapse immediately or walk a few steps and then collapse. The key to survival is the recognition of that collapse being a sudden cardiac arrest. Observers must quickly take action by assessing consciousness, checking breathing and pulse (if they are trained in this), initiating CPR, activating the EMS system (call 911), and sending for the AED. CPR works to temporarily circulate blood to vital organs; however, CPR alone cannot restore a patient's heart in cardiac arrest to a healthy rhythm. The AHA states that the definitive survival treatment for an SCA victim is a defibrillation shock. As soon as the AED arrives, the pads should be applied and the device turned on. The AED will analyze the rhythm and decide whether to call for a shock. The average response time nationally for emergency medical personnel equipped with defibrillators is 10 minutes, making access to AEDs on-site or in first-responder vehicles (police cars, fire trucks, etc.) extremely important. Once EMS arrives they will take over the resuscitation.

According to the American Heart Association, each minute of delay in delivering a defibrillation shock to a cardiac arrest victim reduces the chances of survival by 10 percent, although that time may be greatly lengthened by effective CPR.¹⁶

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