Recognition and Management of Sudden Cardiac Arrest in Athletes

CENTER FOR SPORTS CARDIOLOGY

UW Medicine

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Disclosure Information

Editor-in-Chief

- British Journal of Sports Medicine

Volunteer Positions

- Parent Heart Watch – Medical Advisory Board
- Nick of Time Foundation – Medical Director
- Korey Stringer Institute – Scientific Advisory Committee
- USOPC – Research Steering Committee
- Seattle United FC – Chair, Medical Advisory Committee
- Who We Play For – Medical Advisory Committee
- WIAA – Sports Medicine Advisory Board

Research Funding

- NCCSIR – Division of Cardiac Injury in Sport
- AMSSM – Cardiac Outcomes Registry

BJSM The Journal of Sport & Exercise Medicine

Seattle United

Parent Heart Watch
THE NATIONAL VOICE
PROTECTING YOUTH FROM SUDDEN CARDIAC ARREST

WHO WE PLAY FOR

NICK OF TIME FOUNDATION
"time to make a difference"

WIAA Est. 1905
WASHINGTON INTERSCHOLASTIC ACTIVITIES ASSOCIATION

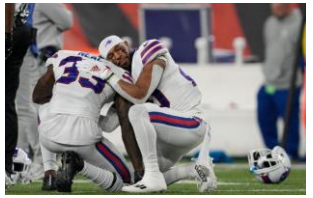
KSI 77
Korey Stringer Institute
University of Connecticut
Preventing sudden death in sport

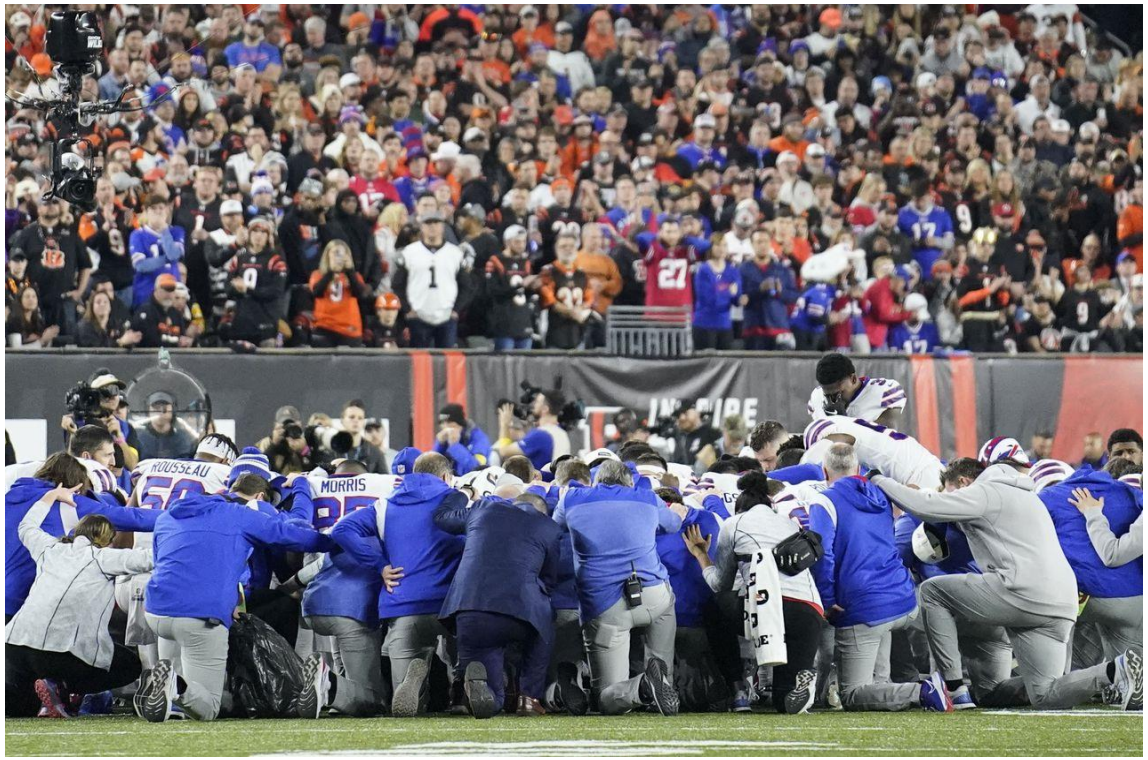
NCCSIR
National Center for Catastrophic Sport Injury Research

AMSSM
AMERICAN MEDICAL SOCIETY FOR SPORTS MEDICINE

PUT THE PADS ON


LOVE FOR DAMAR 3





Damar Hamlin Clip

CNN health

Audio Live TV Log In

Is your school equipped to save a life? Here's how you'll know

By Dr. Sanjay Gupta, CNN Chief Medical Correspondent

Updated 12:23 PM EST, Fri February 10, 2023

The New York Times

Super Bowl LVII › | How Kansas City Won | See the 65-Yard Punt Return | 10 Things You May

'We're Going to Need Everybody': Recordings Captured Response to N.F.L. Crisis

When Damar Hamlin's heart stopped during a game on Monday night, medical personnel can be heard responding to the kind of emergency the league hoped it would never face.

Give this article | 485

HBO

SIGN IN | GET HBOMAX

Real Sports with Bryant Gumbel

REAL SPORTS WITH BRYANT GUMBEL | SEASON 29 | EPISODE 1

Real Sports with Bryant Gumbel (January 2023)

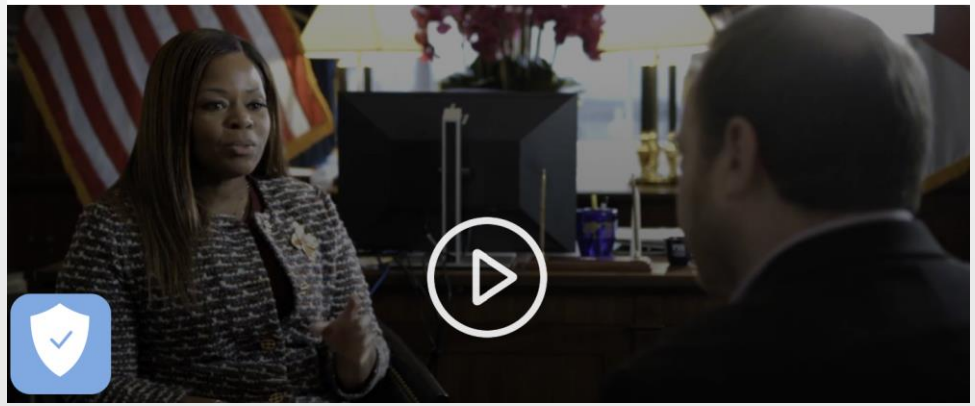
SCRIPPS NEWS

FOLLOW US

Documentaries and Investigations

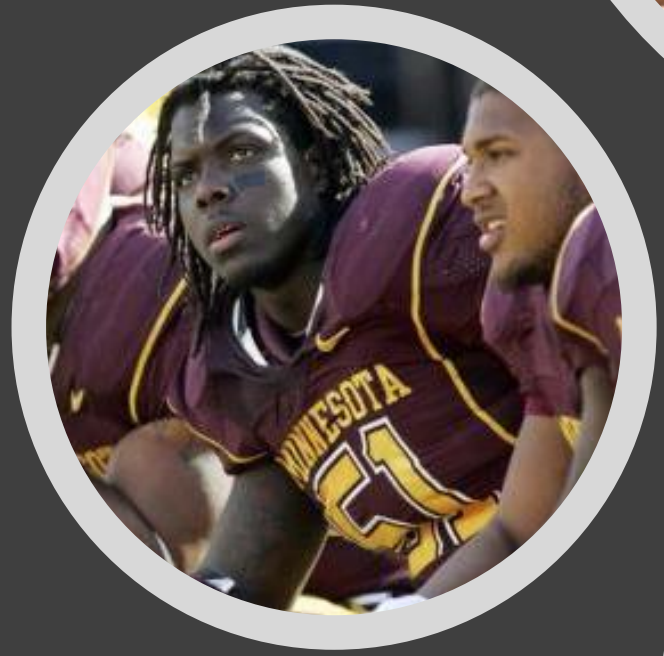
Scripps News school AED probe gets attention in Congress

Rep. Cherfilus-McCormick, a Florida Democrat, will lead a bipartisan push for more school AEDs. The NFL & American Heart Association are endorsing.



Sudden Cardiac Arrest in Young Athletes

- **Leading cause** of death in young athletes during sport
- **Exercise is trigger** for SCA in athletes with underlying cardiac disorder



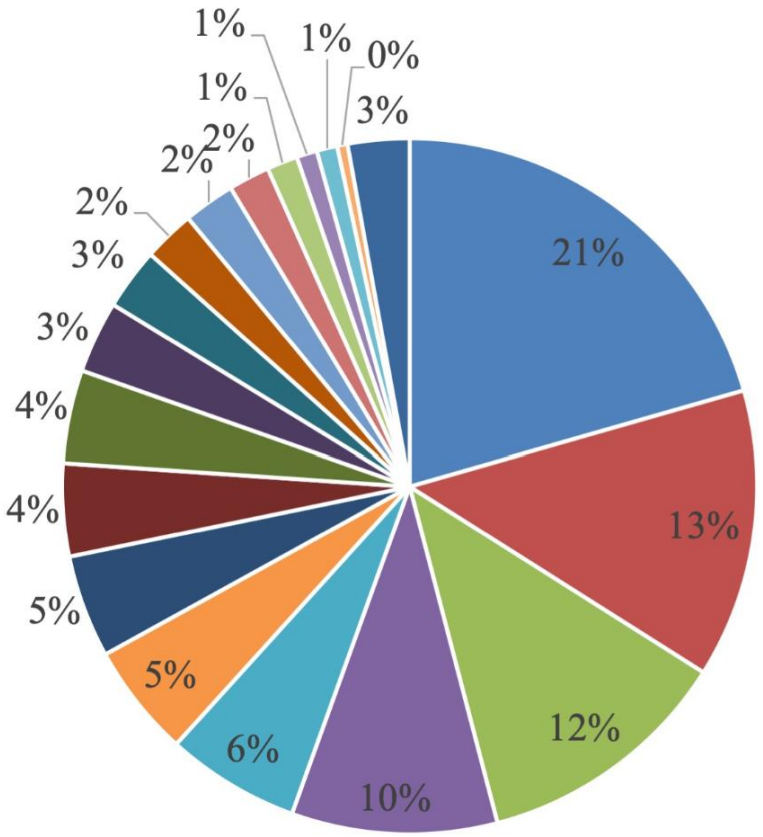
Quick Stat

75% of all fatalities during sports are cardiovascular related

HBO/Real
Sports Clip

Outline

1. Epidemiology of SCD in athletes
2. Survival outcomes: 2 decades in review
3. Recognition and management of SCA
4. Gaps: improving survival
5. Case studies



BJSM 2020

- Hypertrophic cardiomyopathy (43, 20.6%)
- Idiopathic left ventricular hypertrophy (28, 13.4%)
- Coronary artery anomalies (25, 12.0%)
- Autopsy negative sudden unexplained death (20, 9.6%)
- Arrhythmogenic cardiomyopathy (13, 6.2%)
- Long QT syndrome (11, 5.3%)
- Commotio cordis (10, 4.8%)
- Wolff-Parkinson-White (9, 4.3%)
- Myocarditis (9, 4.3%)
- Aortic dissection/rupture (7, 3.3%)
- Dilated cardiomyopathy (6, 2.9%)
- Valve disorder (5, 2.4%)
- Coronary atherosclerosis (5, 2.4%)
- Complications of a congenital heart defect (4, 1.9%)
- Catecholaminergic polymorphic ventricular tachycardia (3, 1.4%)
- Hypertensive heart disease (2, 1.0%)
- Left ventricular noncompaction (2, 1.0%)
- Restrictive cardiomyopathy (1, 0.5%)
- Other (6, 2.9%)

Original research

OPEN ACCESS

Aetiology and incidence of sudden cardiac arrest and death in young competitive athletes in the USA: a 4-year prospective study

Danielle F Peterson,[1] Kristen Kucera,[2] Leah Cox Thomas,[3] Joseph Maleszewski,[4] David Siebert,[5] Martha Lopez-Anderson,[6] Monica Zigman,[5] Jared Schattenkerk,[7] Kimberly G Harmon ,[5] Jonathan A Drezner [8]

Prospective surveillance

July 2014 – June 2018

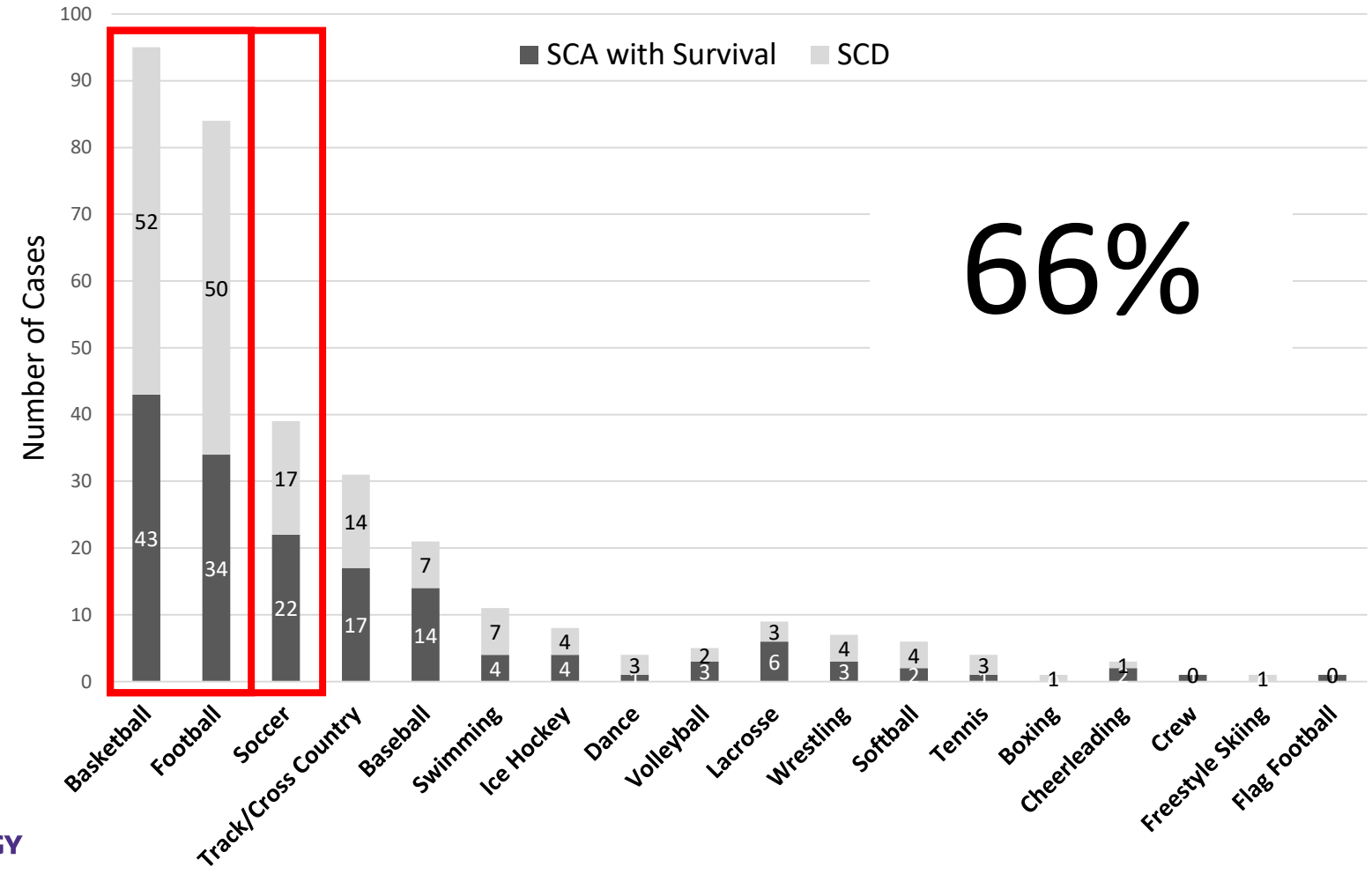
331 cases of confirmed SCA/D

NCCSIR

National Center for Catastrophic Sport Injury Research

SCA & SCD by Sport in U.S. Competitive Athletes

July 1, 2014 – June 30, 2018 (n=331)



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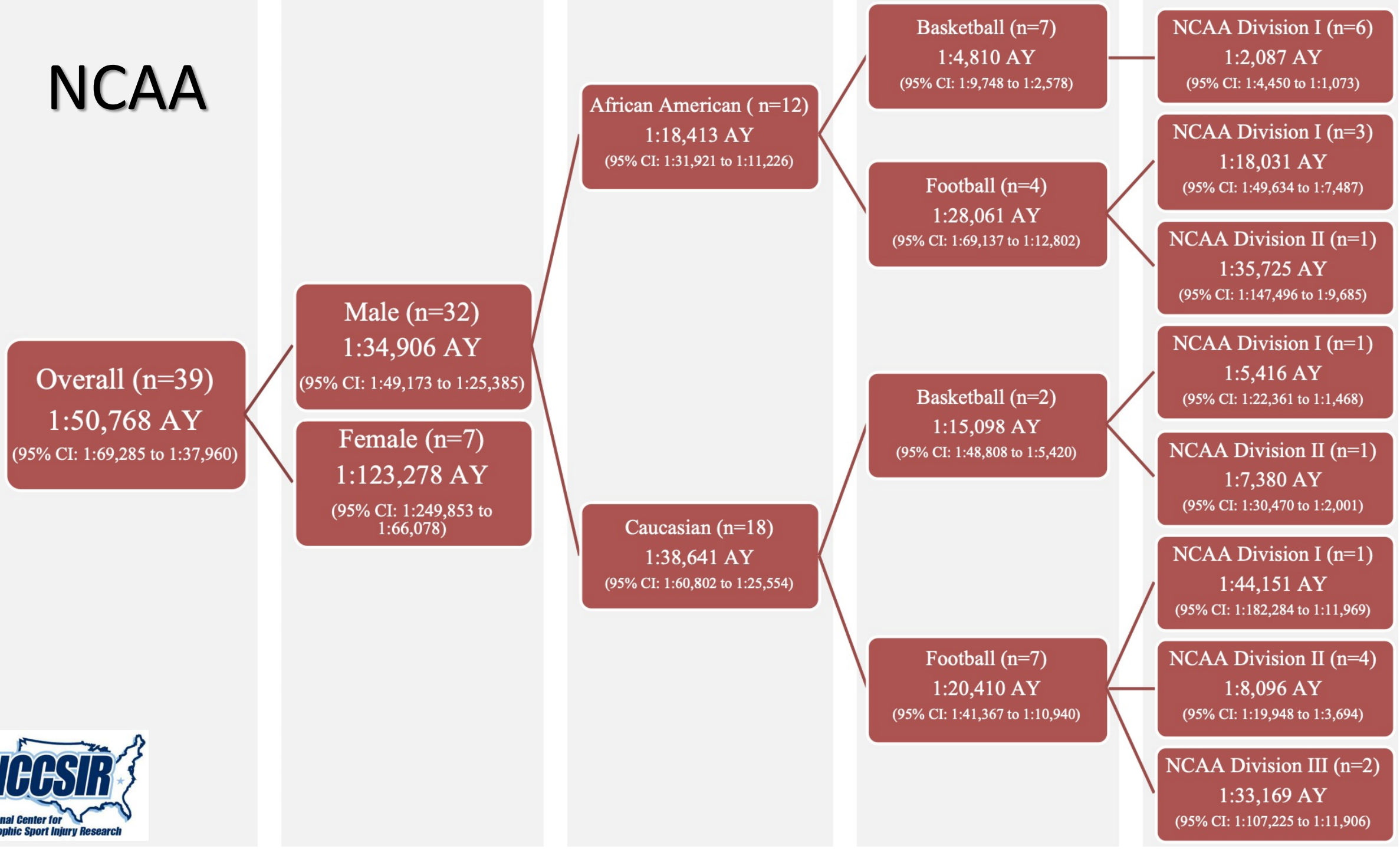
NCCSIR

National Center for Catastrophic Sport Injury Research

NCAA



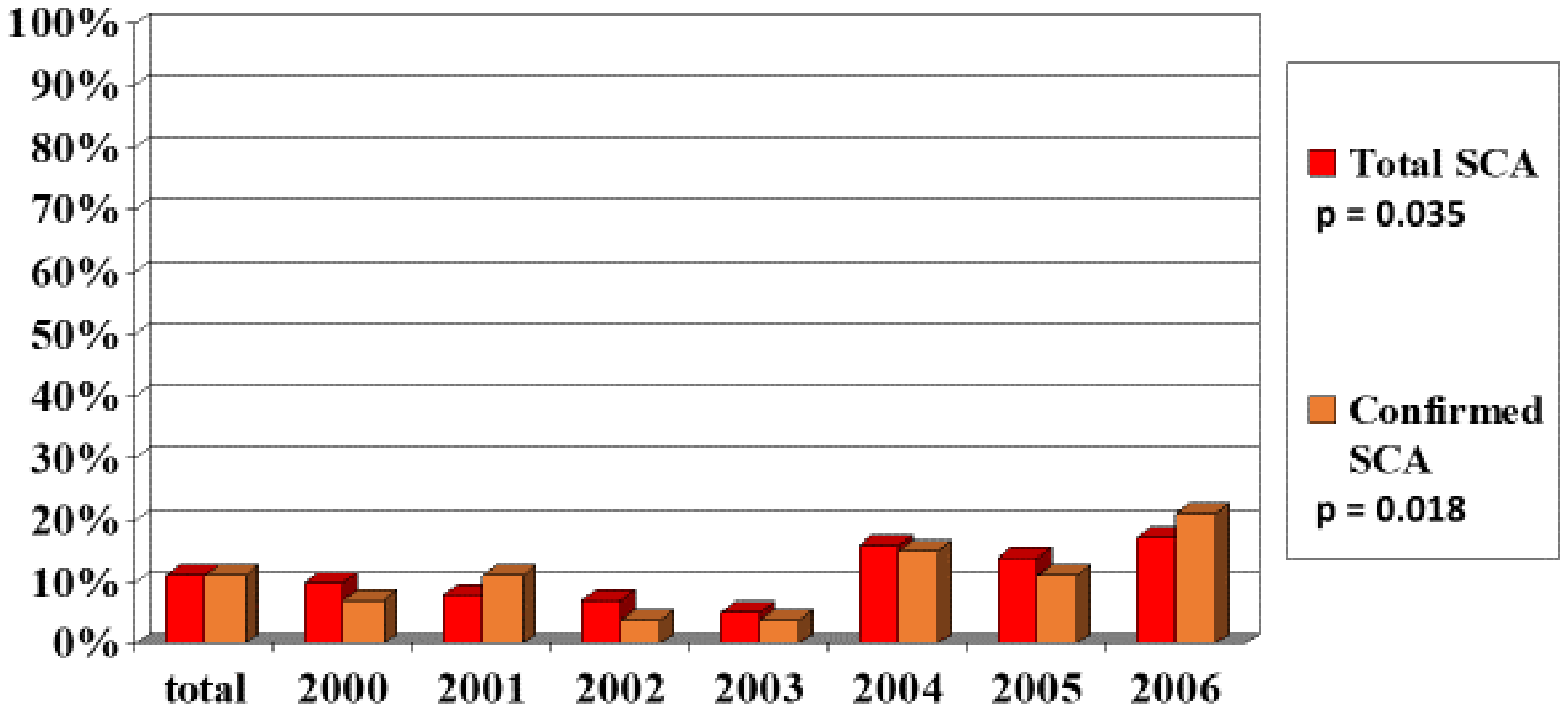
NCCSIR
National Center for Catastrophic Sport Injury Research

Survival from SCA in athletes:

2 decades in review

Survival trends in the U.S. following exercise-related SCA in the youth: 2000-2006

[N=486; average survival 11%; range 4-21% per year]



Drezner; *Heart Rhythm* 2008

Suspect SCA in any Collapsed & Unresponsive Athlete

Inter-Association Task Force Recommendations on Emergency Preparedness and Management of Sudden Cardiac Arrest in High School and College Athletic Programs: A Consensus Statement

Jonathan A. Drezner, MD, Ron W. Courson, ATC, PT,† William O. Roberts, MD,‡ Vincent N. Mosesso, Jr MD,§ Mark S. Link, MD,¶ and Barry J. Maron, MD‖*

2007

1 Recognition

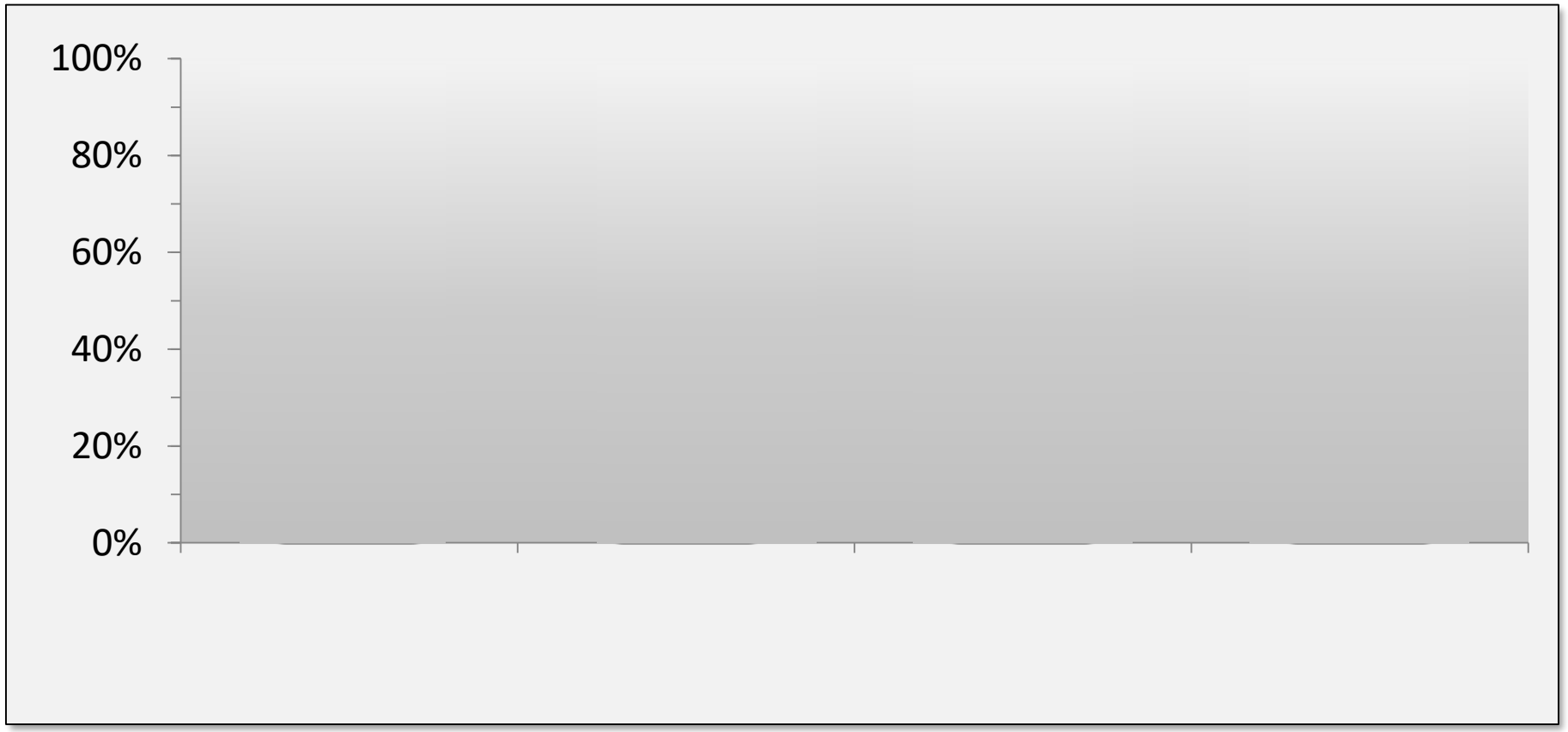
2 Chest compressions

3 AED

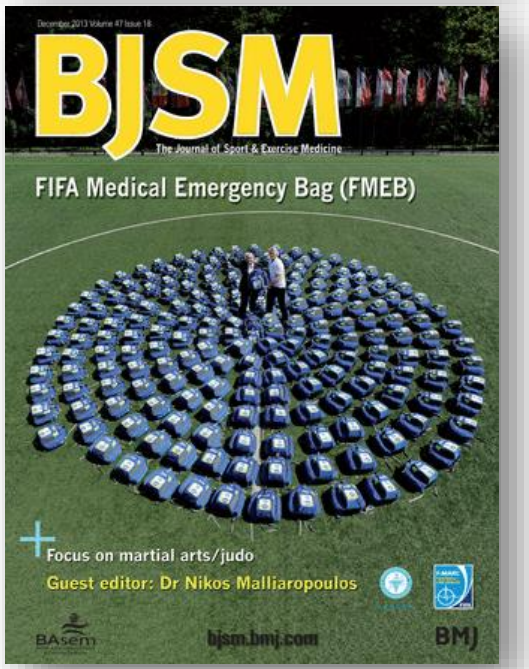
Outcomes from sudden cardiac arrest in US high schools: a 2-year prospective study from the National Registry for AED Use in Sports

Jonathan A Drezner,[1] Brett G Toresdahl,[1] Ashwin L Rao,[1] Ella Huszti,[2] Kimberly G Harmon[1]

- 2-year prospective observational study
- 2,149 high schools
- 87% with AED program



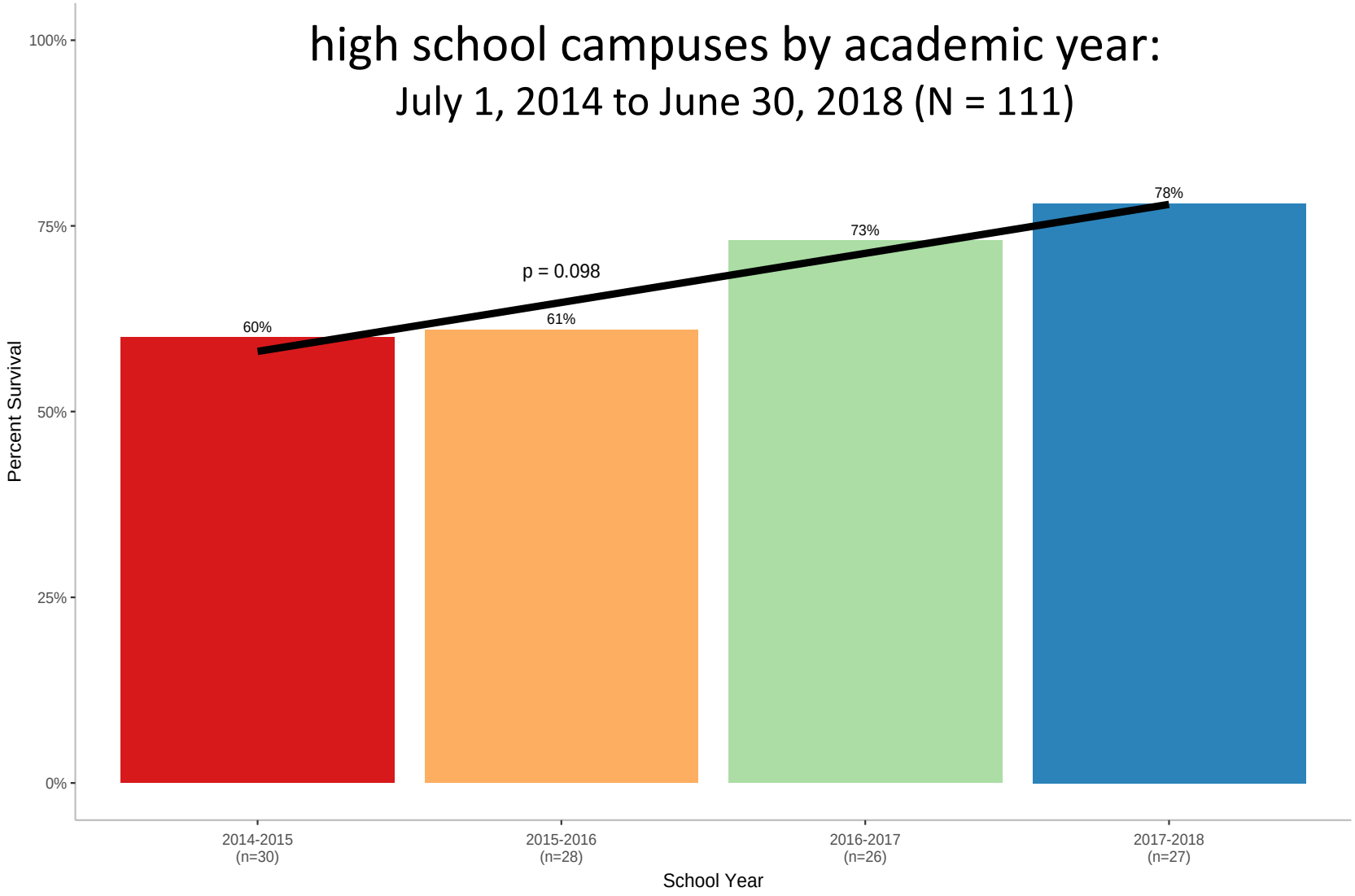
UW Medicine SCHOOL OF MEDICINE
AED SPORTS
WWW.AEDSPORTS.COM
NATIONAL REGISTRY FOR AED USE IN SPORTS



2013

Survival for exercise-related SCA in student-athletes on high school campuses by academic year:

July 1, 2014 to June 30, 2018 (N = 111)



Original research

OPEN ACCESS

Socioeconomic factors and outcomes from exercise-related sudden cardiac arrest in high school student-athletes in the USA

Jared Schattenkerk,[1] Kristen Kucera,[2] Danielle F Peterson,[3] Robert A Huggins,[4] Jonathan A Drezner [5]

68% overall survival

83% if on-site ATC

85% if on-site AED used

NCCSIR

National Center for Catastrophic Sport Injury Research

The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE

Mobile Automated External Defibrillator Response System during Road Races

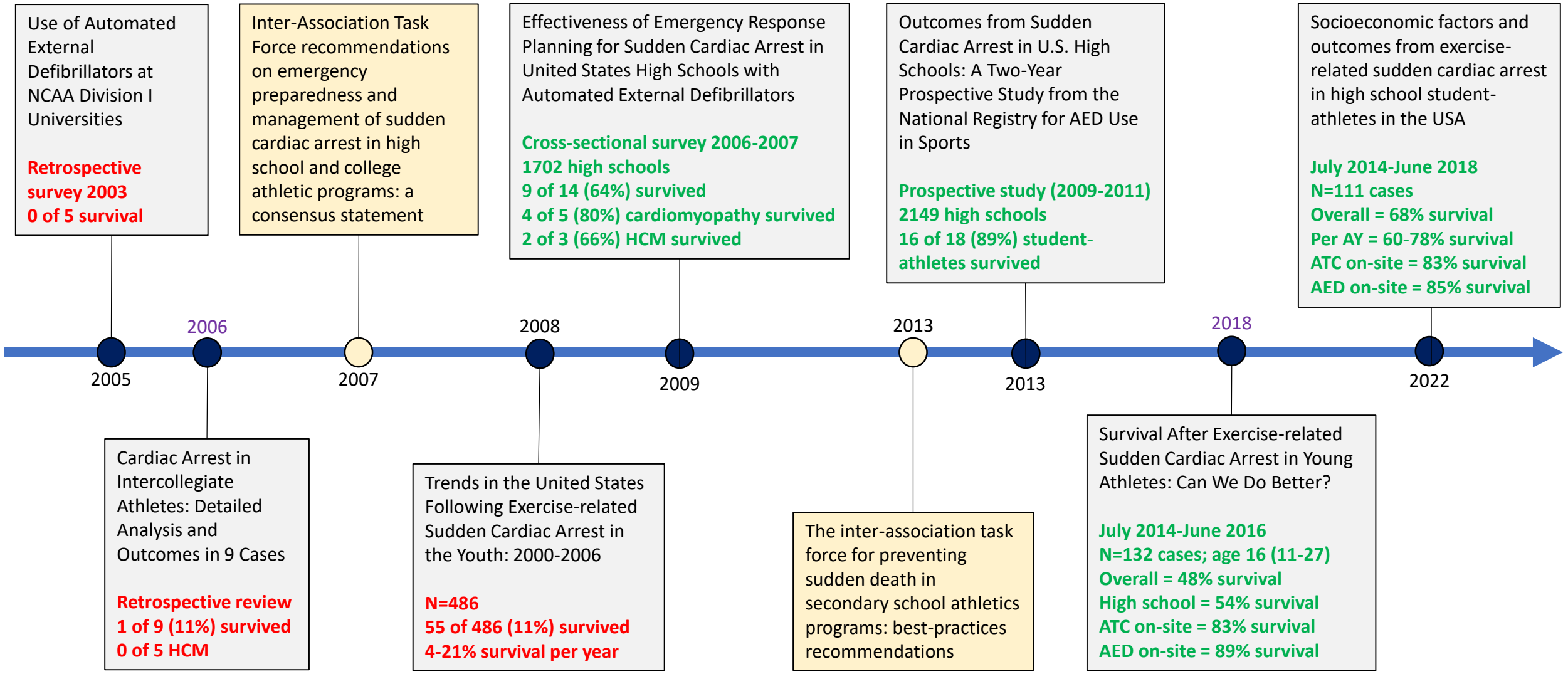
NEJM 2018

Tomoya Kinoshi, M.S.Sc.
Shota Tanaka, B.S.
Ryo Sagisaka, Ph.D.
Takahiro Hara, Ph.D.
Toru Shirakawa, M.E.M.
Etsuko Sone, M.E.M.
Hiroyuki Takahashi, Ph.D.
Masaru Sakurai, M.D., Ph.D.
Akira Maki, M.D., Ph.D.
Hiroshi Takyu, Ph.D.
Hideharu Tanaka, M.D., Ph.D.

28 runners with witnessed SCA
Gasping noted in 89%
Mean time to CPR 0.8 min
Mean time to AED shock 2.2 min
86% in V-fib
100% survival

SCA in athletes is largely a survivable event through prompt treatment and access to an AED

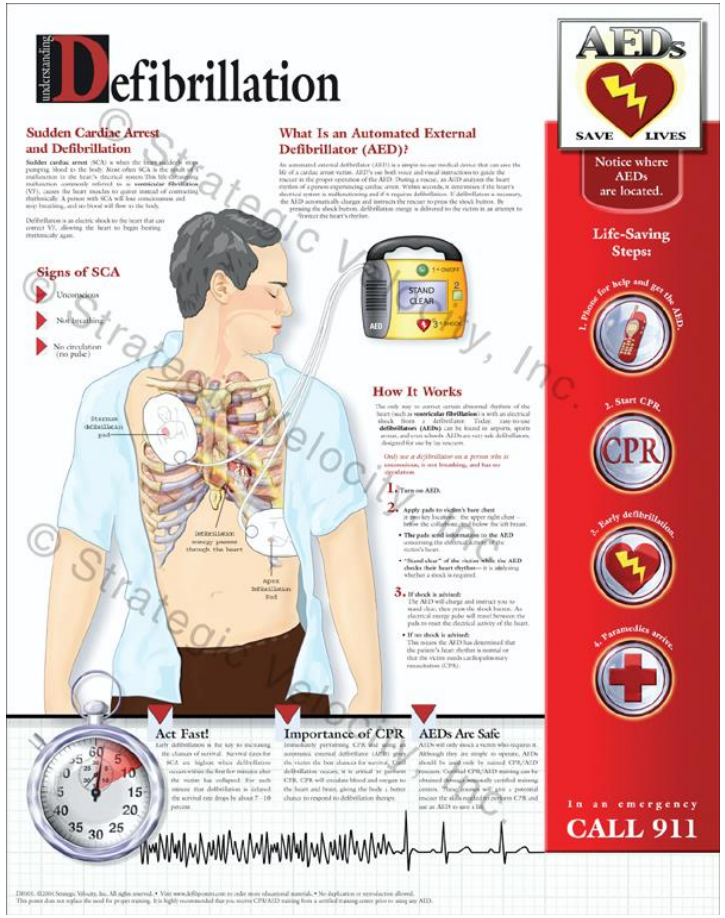
Evolution of Evidence Supporting AEDs in Schools and Improved Survival from Sudden Cardiac Arrest in Young Athletes



Preparing for SCA in Sport

It’s NOT just about AEDs…

EMERGENCY PREPAREDNESS



- ☑ Written Emergency Action Plan for SCA
- ☑ EAP coordinator
- ☑ All staff awareness of AED locations
- ☑ Trained responders in CPR/AED
- ☑ Emergency communication
- ☑ Immediate access to AED (<3 min collapse to shock)
- ☑ Venue-specific transportation routes for EMS
- ☑ Review and rehearsal of the EAP at least annually
- ☑ Integration of AEDs into local EMS system
- ☑ Maintenance of AEDs (battery and lead replacement)

Practical management of sudden cardiac arrest on the football field

Efraim Benjamin Kramer,[1] Martin Botha,[1] Jonathan Drezner,[2] Yasser Abdelrahman,[3] Jiri Dvorak[4]

BJSM 2012

Box 1 Key recommendations for emergency planning for sudden cardiac arrest on the football field

- Every team and venue hosting football training or competition should have a written emergency response plan for SCA.
- Potential responders to SCA on the field (ie, coaches, referees, physiotherapists, athletic trainers, and other medical staff) should be regularly trained in CPR and AED use, and demonstrate skills proficiency in this regard.
- An AED should be immediately available on the pitch during competitions.
- Both teams should review prior to the match the location of the AED and details of the emergency response plan.

AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; SCA, sudden cardiac arrest.

Chaos…Uncertainty…Fear…

LINK TO YOUTUBE CLIP

April 14, 2012

Recognition and Management of SCA in Athletes

Witnessed Collapse and Unresponsive During Exercise = SCA

RECOGNITION

- Sudden collapse
- Unresponsive
- Eyes open and rolled back
- Gasping/respiratory movements
- Seizure/shaking/twitching

RESPONSE

- Call for help
- Chest compressions
- AED

Keyontae Johnson

December 12, 2020

GMA YOUTUBE CLIP

CLIP

The “face” of sudden cardiac arrest

Marc-Vivien Foé
2003

CLIP

Fabrice Muamba
2012

Abdelhak Nouri

July 8 , 2017

CLIP

Emergency Action Plan for SCA

Universal Response to the Collapsed Athlete

COLLAPSED AND UNRESPONSIVE*

Assume SCA

*Unresponsive to verbal stimuli

DISTRACTORS:
Continued respirations/gasping
Seizure-like activity/twitching
Eyes open/rolled back
Falsely assuming a pulse

Call EMS

Begin Hands-only CPR (chest compressions)

Retrieve and apply an AED as soon as possible

Improving survival for SCA in sport:

Where are the gaps?

May 8, 2018
Rafeal Perry
17 yo
AAU

May 21, 2018
Darrell Rogers
16 yo
AAU practice

May 17, 2018
Javon Craddock
16 yo
Boys & Girls Club
AAU

May 27, 2018
James Hampton
17 yo
Nike's EYBL

#1 Gap: Emergency Preparedness in Non-School Sports

	High School (n=34)	AAU (n=13)	
Survival	70.6%	38.5%	p=0.043
Bystander CPR	91.2%	53.9%	p=0.004
AED use	79.4%	30.8%	p=0.002

Circulation: Cardiovascular Quality and Outcomes 2022

COLLAPSED ATHLETE

1. SUDDEN CARDIAC ARREST

UNRESPONSIVE

Sudden Collapse, Seizure, Gasping, Eyes Open

2. EXERTIONAL HEAT ILLNESS

CONFUSED

Dizzy, Headache, Slurred Speech, Altered MS, LOC, Seizure

3. SICKLE CELL TRAIT

DISTRESS

Leg, Back, or Chest Pain, Muscle Cramps, Fatigue, SOB

4. HEAD/NECK

TRAUMATIC

Concussion, Neck Pain, Cervical Cord Neuropraxia, Impact Seizure

Emergency Action Plan for SCA

Universal Response to the Collapsed Athlete

COLLAPSED AND UNRESPONSIVE*

Assume SCA

*Unresponsive to verbal stimuli

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Emergency Action Plan for SCA

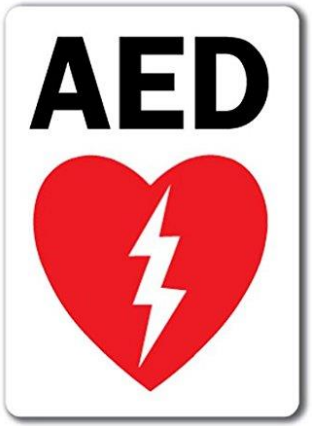
Universal Response to the Collapsed Athlete

COLLAPSED AND UNRESPONSIVE*

Assume SCA

*Unresponsive to verbal stimuli

Uncertainty:
Exertional heat illness
Sickle cell trait
Head/neck trauma
Syncope



Call EMS

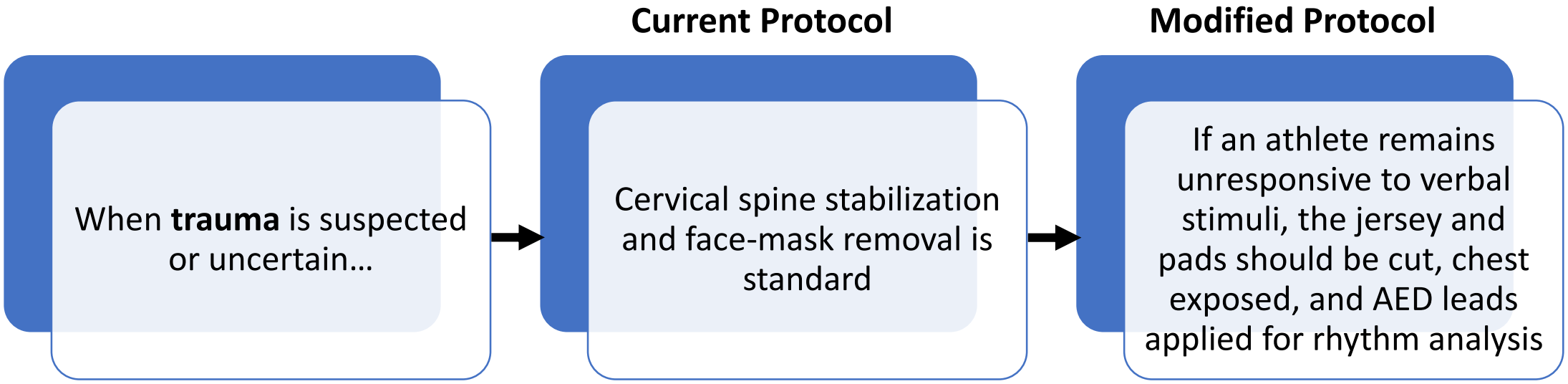
PUT THE PADS ON

rieve and apply AED as soon as possible

Protocol Update?

Management of the collapsed football player

Unresponsive: On-Field Rescue



PUT THE PADS ON

Christian Eriksen – June 12, 2021

Video Clip Slide 43

UNIVERSAL RESPONSE

Cardiac Emergency Response Plan

SCA

Sudden **C**ardiac **A**rrest

Sudden **C**ollapse **A**thlete

RECOGNIZE

Sudden collapse
Unresponsive
Eyes open
Gasping
Seizure

REACT

Call 9-1-1
Retrieve AED
Expose chest
Access airway
Clear area

RESCUE

Start CPR
Apply AED
Rhythm analysis
Shock
Resume CPR

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Thank You

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