The Inter-Association Task Force for Preventing Sudden Death in Collegiate Conditioning Sessions: Best Practices Recommendations

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In January 2012, the National Athletic Trainers’ Association, along with the National Strength and Conditioning Association, convened a meeting in Colorado Springs, Colorado. Its purpose was to hold an interdisciplinary forum and gather input to address sudden death in collegiate conditioning sessions. Based on these discussions, a writing group drafted the following recommendations. To date, these best practices have been endorsed by the American College of Emergency Physicians, American College of Sports Medicine, American Medical Society for Sports Medicine, American Osteopathic Academy of Sports Medicine, Canadian Athletic Therapists’ Association, Collegiate Strength and Conditioning Coaches association, Gatorade Sports Science Institute, Korey Stringer Institute, National Academy of Sports Medicine, National Athletic Trainers’ Association, and National Strength and Conditioning Association. Other reviewers and meeting participants are listed with the professional organizations they represent at the end of this article.

Maximizing strength and conditioning sessions has become fundamental to sport. The right combination of strength, speed, cardiorespiratory fitness, and other components of athletic capacity can complement skill and enhance performance for all athletes. A sound and effective training program that relies on scientific principles of exercise physiology and biomechanics intended to produce outcomes that are sensitive and specific to the sport should be the goals. Unfortunately, the athlete’s development, health, and safety are sometimes overshadowed by a culture that values making athletes tough, instilling discipline, and focusing on success at all costs.

This ill-conceived philosophy has been a contributor to the alarming increase in collegiate athlete deaths and serious injuries during conditioning sessions. A total of 21 National Collegiate Athletic Association (NCAA) football players have died during conditioning workouts since 2000.1 The 3 most common causes of the fatalities were (in order) exercise-related sudden death associated with sickle cell trait (SCT), exertional heat stroke, and cardiac...
conditions. Seventy-five percent of the fatalities (n = 16) were Division I football players.

Also, the incidence of exertional rhabdomyolysis in collegiate athletes appears to be increasing. Excesses in strength training and conditioning—workouts that are too novel, too much, too soon, or too intense (or a combination of these)—have a strong connection to exertional rhabdomyolysis. Introducing full-intensity workouts too quickly is especially high risk: 11 of the 21 deaths occurred during day 1 or day 2 workouts.

Rule changes enacted in 2003 related to heat acclimatization procedures during August football practices have been extremely effective. In the NCAA Division I Football Bowl Subdivision, no player died from practicing or playing in a game between 2000 and 2011. However, conditioning workouts continue to be a catalyst for catastrophic outcomes. It is imperative that similar guidelines be implemented to improve the safety of conditioning sessions. This consensus statement provides specific conditioning recommendations with the intent of ending conditioning-related morbidity and deaths of collegiate athletes.

(1) Acclimatize Progressively for Utmost Safety

Conditioning periods should be phased in gradually and progressively to encourage proper exercise acclimatization and to minimize the risk of adverse effects on health. The first 7 to 10 days (at minimum, the first 4 separate-day workouts) of any new conditioning cycle (including but not limited to return in January, after spring break, return in summer, and return after an injury) are referred to as transitional periods. A written, progressive program of increasing volume, intensity, mode, and duration should be instituted for all transitional periods. These conditioning programs should be approved by a credentialed strength and conditioning coach ([S&CC] see following paragraphs). The S&CC should work cooperatively with medical staff (certified athletic trainer, team physician, or both) when developing transitional workout plans, particularly if the athlete is recovering from an injury or if any uncertainty exists regarding the pace of exercise progression.

Transitional periods should invoke an appropriate work-to-rest ratio for the sport. A 1:4 work-to-rest ratio (with greater rest permissible) when conducting serial activity of an intense nature, for example, is a good starting place to emphasize recovery.

A qualified S&CC is knowledgeable about and uses acclimatization principles. Participation in summer workouts on campus under the supervision of an S&CC is preferable to unsupervised workouts elsewhere or workouts conducted by unqualified individuals.

Training programs should be individualized. Some athletes will require a longer acclimatization process. An athlete at a different level of preparedness from his or her teammates (due to injury or time away from training) should use a training program tailored to his or her level.

(2) Introduce New Conditioning Activities Gradually

Any new exercise introduced into a strength and conditioning program should be added in a deliberate, gradual fashion by a qualified S&CC. This guideline is true for any aspect of the regimen but is particularly important during the early stages of a conditioning program.

(3) Do Not Use Exercise and Conditioning Activities as Punishment

Physical activity should not be used as retribution, for coercion, or as discipline for unsatisfactory athletic or academic performance or unacceptable behavior. No additional physical burden that would increase the risk of injury or sudden death should be placed on the athlete under any circumstance.

(4) Ensure Proper Education, Experience, and Credentialing of S&CCs

(A) Education. All S&CCs are required to obtain an undergraduate degree to sit for the examination and become credentialed. It is recommended that the degree be in exercise science or a related field of study.

The strength and conditioning profession is urged to establish an accredited educational curriculum at the collegiate level for entry-level programs. A suitable amount of coursework should be dedicated to the health and safety concerns of and challenges facing athletes, with a focus on preventing sudden death. This includes the prevention, recognition, and management of on-field emergencies. Continuing education requirements should ensure that certified S&CCs engage in educational opportunities that provide applicable, up-to-date information regarding important health and safety topics, emergency procedures, and preventing sudden death. Content should be reviewed annually, so that timely topics can be incorporated.

(B) Experience. Collegiate S&CCs should have adequate mentoring and experience to independently design and implement individual and team conditioning programs.

(C) Credentials. All S&CCs should be required to pass a certification examination credentialed by an independent accreditation agency. Competency standards, ongoing assessment, and continuing education requirements should be clearly documented.

All S&CCs should maintain certification in first aid, cardiopulmonary resuscitation (CPR), and use of an automated external defibrillator (AED).

(5) Provide Appropriate Medical Coverage

An S&CC should be present during all strength and conditioning sessions and be prepared to provide first aid as soon as an athlete shows signs of distress. The S&CC should be able to administer CPR, apply an AED, and activate the emergency action plan (EAP) if needed. An athletic trainer or team physician should be present during each high-risk collegiate conditioning session (eg, sprinting, timed sessions, mat drills, stations). For lower-risk conditioning sessions and the strength portion of a conditioning program, an S&CC should be present and an athletic trainer should be on campus and accessible to assist if a problem arises. The institution should determine the need for and level of medical coverage for conditioning sessions. Among the factors to be considered are squad
A heat-acclimatization plan should be in place for transi-

tional-period practice sessions that take place in warm or hot

environments. 

(6) Develop and Practice EAPs

Strength and conditioning venues should have EAPs

specific to the venue, sport, and circumstances. The EAP

should be developed by the sports medicine staff with the

input of all concerned parties, approved by the head team

physician, and most importantly, reviewed and rehearsed at

least annually by all staff involved. A conditioning session

should not take place if those supervising the session are

not familiar with the EAP.

(7) Be Cognizant of Medical Conditions

The most prevalent medical conditions associated with

sudden death during collegiate strength and conditioning

sessions are atrumatic cardiac conditions, exertional

collapse associated with SCT, exertional heat stroke, and

asthma.4–9 The designated medical supervisor must be

familiar with the characteristics of exertional collapse and

the differential diagnosis of the conditions listed earlier.

Institutional, governing, and credentialing agencies for

S&CCs, sport coaches, and sports medicine professionals

should require ongoing continuing education covering these

major health concerns.

The National Athletic Trainers’ Association position

statement10 on preventing sudden death in sport is a

recommended resource for recognition and treatment of

these conditions. The likelihood of preventing problems is

enhanced when S&CCs, sport coaches, and the medical

staff are aware of the athlete’s medical history, supplement

use, medications, conditioning status, and acute illnesses, as

well as other predisposing risk factors.

(A) Exertional sickling and SCT-related concerns:

• Athletes should know their SCT status. Athletes who do not

  know their status should be encouraged to undergo testing

  and not invoke the waiver.

• The S&CCs, sport coaches, and medical staff should be

  aware of the SCT status of each athlete as they would be

  aware of any other medical condition that may predispose an

  athlete to exertional collapse and death.

• The supervising staff should know the common prevention,

  recognition, and treatment strategies for exertional collapse

  in those athletes with SCT.10

• Athletes tested for SCT should be made aware of the health

  implications of both positive and negative tests for SCT and

  be provided genetic counseling and education regarding the

  prevention and recognition of exertional sickling.

(B) Exertional heat stroke:

• An exertional heat-stroke cooling plan (using a cooling

  modality with proven effectiveness) should be developed for

  each venue.

• A heat-acclimatization plan should be in place for transi-

  tional-period practice sessions that take place in warm or hot

  environments.

• Appropriate work-to-rest ratios based on intensity of activity,

  environmental conditions, and individual factors should be

  implemented. These breaks allow the body to cool and

  provide ample time for rehydration.

• All S&CCs, sport coaches, and medical staff should be well

  versed in common prevention, recognition, and treatment

  strategies.

(C) Cardiac conditions:

• Initial management of sudden cardiac arrest includes early

  activation of the emergency medical services system, early

  CPR, and early defibrillation.

• Sudden cardiac arrest of traumatic or atrumatic origin

  should be suspected in any collapsed and unresponsive

  athlete and an AED applied as soon as possible.

• A collapsed athlete experiencing seizures should be treated

  as having sudden cardiac arrest until proven otherwise.11

• Prompt resuscitation of young athletes with sudden cardiac

  arrest maximizes survival rate.10

(D) Exertional rhabdomyolysis:

Exertional rhabdomyolysis should also be comprehen-

sively addressed. This condition can have serious health

ramifications, but it is easily prevented when basic

precautions as outlined in (1) and (2) are followed.

(8) Administer Strength and Conditioning Programs

A strength and conditioning coach and a sports medicine

staff member (athletic trainer or physician [or both]) should

be part of the institution’s athletics administration to

encourage institutional ownership of the sports perfor-

mance and sports medicine programs and effectively

manage health- and safety-related concerns for the

student-athlete. Ideally, a sport coach should not serve as

the primary supervisor for an athletic health care provider

or for an S&CC, nor should he or she have sole hiring or

firing authority over those positions. The S&CC should

work closely and cooperatively with the sports medicine

staff. It is critical that S&CCs and athletic trainers have a

harmonious, synergistic working relationship with open

lines of communication.

A meeting should be held between the strength and

conditioning staff and the sports medicine staff at the

beginning of each semester and training season to discuss

the health and safety concerns of at-risk athletes, including

the sharing of pertinent medical information and conditions

(eg, SCT status, asthma, diabetes, history of exertional heat

illness) and applicable educational materials, including

updates on sudden death risks and prevention strategies.

The EAP should be reviewed and rehearsed to ensure

proper assignment and execution of duties and responsibil-

ities in the event the plan must be implemented.

(9) Partner With Recognized Professional

Organizations

The key organizations responsible for athletes’ safety

during strength and conditioning sessions should formalize

a partnership to periodically review these best practices.

The organizations include relevant athletic, coaching,
sports medicine, and strength and conditioning organizations.

(10) Provide Adequate Continuing Education for the Entire Coaching and Medical Teams

The task force strongly recommends that key professions—S&CCCs, sport coaches, athletic trainers, and team physicians—adopt requirements for education and training and require individuals to demonstrate knowledge in the area of preventing sudden death in sport. Each reporting cycle should require a continuing education component on managing emergencies and preventing sudden death in athletes.

REFERENCES


Additional task force participants were Julie Gilchrist, MD, of the Centers for Disease Control and Prevention; Peter Indelicato, MD, of the American Orthopaedic Society for Sports Medicine; Christine Lawless, MD, FACC, FACSM, CAQSM, and Reginald Washington, MD, of the American College of Cardiology Council on Sports and Exercise Cardiology; Bill Moreau, DC, DACBSP, CSCS, of the United States Olympic Committee; and Brian Robinson, MS, LAT, ATC, of the National Athletic Trainers’ Association.

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