

Sports Preparedness: Heat Illness & Equipment Laden Athlete

Brian Wheeler, AT
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Objectives

- Recognize the signs & symptoms of EHS
- Be familiar with the modalities involved with CWI
- Recognize CWI as the gold standard for treatment of EHS in the athletic population
- Recognize the signs & symptoms of cervical spine injury
- Demonstrate proper technique with equipment removal
- Demonstrate proper SMR and transport of patient via EMS

Emergency Procedures:

- Heat Illness
- Equipment Laden Athlete



Heat Illness

- Exercise Associated Muscle Cramps
- Heat syncope
- Heat Exhaustion
- Exertional heat injury
- Exertional Heat Stroke



Exercise Associated Muscle Cramps

- Dehydration
- Thirst
- Sweating
- Transient Muscle Cramps
- Fatigue



Heat syncope

- Dehydration
- Fatigue
- Tunnel vision
- Pale or sweaty skin
- Decreased pulse rate
- Dizziness
- Lightheadedness
- Fainting



Heat Exhaustion

- Normal or elevated body-core temperature
- Dehydration
- Dizziness
Lightheadedness
- Syncope
- Headache
- Nausea
- Hyperventilation
- Diarrhea
- Decreased urine output
- Persistent muscle cramps
- Pallor
- Profuse sweating
- Chills
- Cool, clammy skin
Intestinal cramps
- Urge to defecate
- Weakness

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Exertional heat injury

A moderate to severe heat illness that is like exertional heat stroke where body temperature is usually but not always greater than 105 F.



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Exertional Heat Stroke

- Core Rectal temperature >105 F
- Altered mental state
- CNS Dysfunction
- Hot & wet or dry skin
- * If a suspected EHS victim exhibits CNS dysfunction below 105 treat as EHS



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Exertional Heat Stroke Dx & Tx

- *Core body temperature can only be determined reliably by rectal temperature.*
- Accurate core temp. allows for differential diagnoses



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DataTherm II



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Cooling Methods

- Immediate cooling by immersion in water 35-59 degrees Fahrenheit
- Body Bag
- Rubbermaid Tubs
- Tarp (TACO Method)
- Polar Life Pod



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Tarp Assisted Cooling w/ Oscillations (TACO)



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Polar Life Pod



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Literature

Journal of Athletic Training, 2009;44(1):34-39
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systematic review

Acute Whole-Body Cooling for Exercise-Induced Hyperthermia: A Systematic Review

Brendon P. McDermott, MS, ATC¹; Douglas J. Casa, PhD, ATC, FNATA, FACSM²; Matthew S. Gano, MS³; Rebecca M. Lopez, MS, ATC⁴; Susan W. Yeargin, PhD, ATC⁵; Lawrence E. Armstrong, PhD, FACSM⁶; Carl M. Maresh, PhD, FACSM⁷

Mean Cooling Rate (*C·min⁻¹)

Figure 2. Mean cooling rates from case reports and critically reviewed articles. Mean cooling rates defined as unacceptable are <0.078°C·min⁻¹, acceptable are 0.078°C to 0.154°C·min⁻¹, and ideal are ≥0.155°C·min⁻¹. IV indicates intravenous.

- a Ice-water immersion, 2°C (n = 7): 0.35°C·min^{-1,22}
- b Ice-water immersion, 1–3°C (n = 14): 0.2°C·min^{-1,18}
- c Cold-water immersion, 20°C (n = 7): 0.19°C·min^{-1,22}
- d Cold-water immersion, 8°C (n = 7): 0.19°C·min^{-1,22}
- e Fine spray (temperature not reported) (n = 2): 0.175°C·min^{-1,28}
- f Cold-water immersion, 14.03°C (n = 17): 0.16°C·min^{-1,21}
- g Ice-water immersion, 5.15°C (n = 17): 0.16°C·min^{-1,21}
- h Dousing with water while fanning (n = 52): 0.15°C·min^{-1,28}
- i Cold-water immersion (temperature not reported) (n = 39): 0.15°C·min^{-1,19}
- j Cold-water immersion, 14°C (n = 7): 0.15°C·min^{-1,22}
- k Continual dousing with ice-bag massage (n = 5): 0.14°C·min^{-1,30}
- l Cold-water immersion, 7°C (n = 7): 0.129°C·min^{-1,21}
- m Ice-wet towels (n = 7): 0.11°C·min^{-1,18}
- n IV fluids and ice packs at major arteries (n = 1): 0.107°C·min^{-1,31}
- o Helicopter downdraft with spraying (n = 2): 0.102°C·min^{-1,30}
- p IV fluids and ice-wet towels (n = 1): 0.097°C·min^{-1,31}
- q IV fluids (n = 1): 0.076°C·min^{-1,21}
- r Fine spray, compressed air, and fanning (n = 6): 0.076°C·min^{-1,20}
- s Fine spray with fanning (n = 6): 0.073°C·min^{-1,20}
- t Cold IV and dousing with water (n = 1): 0.054°C·min^{-1,9}
- u Dousing with water (n = 1): 0.044°C·min^{-1,9}
- v Cold-water immersion, 14.4°C (n = 5): 0.044°C·min^{-1,20}
- w IV fluid with haloperidol (n = 1): 0.041°C·min^{-1,9}
- x Fanning and compressed air (n = 6): 0.041°C·min^{-1,20}
- y Ice packs at major arteries and dousing with fanning (n = 5): 0.039°C·min^{-1,19}
- z Dousing with water while fanning (n = 5): 0.035°C·min^{-1,19}
- aa Ice packs covering body (n = 5): 0.034°C·min^{-1,19}
- ab Ice packs at major arteries (n = 5): 0.028°C·min^{-1,19}
- ac Lying on stretcher (n = 5): 0.027°C·min^{-1,19}
- ad Fanning only (n = 6): 0.027°C·min^{-1,20}
- ae Repeated gastric lavage (n = 1): 0.018°C·min^{-1,9}
- af IV fluid with paracetamol (n = 1): 0.015°C·min^{-1,9}
- ag Ice cubes on chest (n = 1): 0.006°C·min^{-1,9}
- ah Cooling blankets (n = 1): 0.0076°C·min^{-1,25}
- ai Cooling blankets (n = 1): 0.0°C·min^{-1,27}

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▼ real time demonstration ▼

Requires only 30-60 gallons of on-site ice water

01:02

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- a Ice-water immersion, 2°C (n = 7): 0.35°C·min^{-1,22}
- b Ice-water immersion, 1–3°C (n = 14): 0.2°C·min^{-1,18}
- c Cold-water immersion, 20°C (n = 7): 0.19°C·min^{-1,22}
- d Cold-water immersion, 8°C (n = 7): 0.19°C·min^{-1,22}
- e Fine spray (temperature not reported) (n = 2): 0.175°C·min^{-1,28}
- f Cold-water immersion, 14.03°C (n = 17): 0.16°C·min^{-1,21}
- g Ice-water immersion, 5.15°C (n = 17): 0.16°C·min^{-1,21}

Immersion in water
35-59 degrees Fahrenheit
2-3 mins per degree Fahrenheit

- When immersion is not feasible or during transport, application of ice bags, cold towels, sponging with water should be performed
 - Armpits, groin, neck contain major blood vessels

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Exertional Heat Stroke Survival at the Falmouth Road Race: 180 New Cases With Expanded Analysis

Rebecca L. Stearns, PhD, ATC¹; Yuri Hosokawa, PhD, ATC²; Luke N. Belval, PhD, ATC, CSCS³; David G. Martin, MS⁴; Robert A. Huggins, PhD, ATC⁵; John F. Jardine, MD⁶; Douglas J. Casa, PhD, ATC⁷

- 454 cases over 26 yrs
- Avg 15 per race
- 2.07 EHS per 1000 Runners
- 0 Fatalities
- 100% Survival Rate

Cold Water Immersion: The Gold Standard for Exertional Heatstroke Treatment

Douglas J. Casa, Brendon P. McDermott, Elaine C. Lee, Susan W. Yeargin, Lawrence E. Armstrong, and Carl M. Maresh
Department of Kinesiology, University of Connecticut, Storrs, CT

“The key to maximize the chances of surviving exertional heatstroke is rapidly decreasing the elevated core body temperature.”

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Assessment		
Pediatric Considerations <ul style="list-style-type: none"> • May not exhibit typically • Do not thermoregulate well 	Signs & Symptoms <ul style="list-style-type: none"> • History of heat exposure • Cramping • Hot or flushed skin • Excessive sweating • Nausea/vomiting • Mental status changes 	Differential Diagnosis <ul style="list-style-type: none"> • Thyroid storm • Excited delirium • Malignant hyperthermia • Alcohol • Epilepsy • Insulin • Trauma • Infection • Psychosis • Stroke
Treatment Algorithm		
<ul style="list-style-type: none"> • Move patient to a cool environment • Remove patient's clothing • Continuously apply water to the skin to cool the patient, use fan for evaporation if available • Apply cold packs to underarms and groin area • Cold water submersion is an acceptable method for cooling heat stroke patients. You may encounter patients in cooling body bags. The goal is to lower temperature to less than 102.5°F • If conscious and not vomiting or extremely nauseous, provide oral fluids • Be prepared for seizures • Consider other medical conditions (e.g., overdose, hypoglycemia, CVA) and treat accordingly • Hyperthermia patients should be transported to a Trauma Center • If hypotensive or mental status changes: <ul style="list-style-type: none"> • A IV fluid 500 ml IV • B 10 Fluid 1000ml IV (max 500) • May repeat both adult and pediatric fluid bolus one time • Additional IV fluid, if indicated • Consider other medical conditions (e.g., overdose, hypoglycemia, CVA) and treat accordingly • No additional orders at this level 		
Consult		
<ul style="list-style-type: none"> • For additional (more than 2) fluid challenges in adults 		
Clinical Pearls		
<ul style="list-style-type: none"> • Geriatric patients, pediatric patients, patients with a history of spinal injury, and diabetics are most likely to suffer heat-related illnesses • Other contributory factors may include heart medications, diuretics, cold medications, and psychiatric medications • Heat exposure can occur due to increased environmental temperatures, prolonged exercise or a combination of both • Environments with temperatures above 90°F and humidity over 60% present the most risk 		
END OF SECTION		

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Greater Miami Valley EMS Council	Administrative	7013
Subject: Hospital Capabilities Chart	Effective: June 1, 2021	Last Modified: Jan. 5, 2024

- As per protocol transport hyperthermic patients to a trauma facility
- Please refer to protocol 7013 for your closest trauma center

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Equipment Laden Athlete

- Primarily Involves
 - Football
 - Lacrosse
 - Ice Hockey
- Secondary concerns
 - Baseball / Softball catchers
 - Batting Helmets
- Cervical injury
 - Neurological findings

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Literature

Journal of Athletic Training 2020;55(6):563-572
doi: 10.4085/1062-6050-0434.19
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www.natajournals.org

Prehospital Care of the Spine-Injured Athlete

Consensus Recommendations on the Prehospital Care of the Injured Athlete With a Suspected Catastrophic Cervical Spine Injury

Journal of Athletic Training 2009;44(3):306-331
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position statement

National Athletic Trainers' Association Position Statement: Acute Management of the Cervical Spine-Injured Athlete

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original research

Lacrosse Helmet Facemask Removal

Journal of Athletic Training 2015;50(7):681-687
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original research

Emergent Access to the Airway and Chest in American Football Players

Journal of Athletic Training 2020;55(6):545-562
doi: 10.4085/1062-6050-430.19
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www.natajournals.org

Prehospital Care of the Spine-Injured Athlete

Best Practices and Current Care Concepts in Prehospital Care of the Spine-Injured Athlete in American Tackle Football March 2–3, 2019; Atlanta, GA

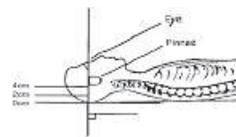
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Helmets and Shoulder Pads

- Considered as “Unit”
- Together maintain cervical alignment



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Spinal Motion Restriction Trauma Protocol 3017 Equipment Issues 3017.6

- In an emergency situation with equipment intensive sports such as football, hockey and lacrosse, the protective equipment shall be removed prior to transport to an emergency facility.

NO HELMET CAN PREVENT SERIOUS HEAD OR NECK INJURIES A PLAYER MIGHT RECEIVE WHILE PARTICIPATING IN FOOTBALL.

Do not use this helmet to butt, ram or spear on opposing player. This is in violation of the football rules and such use can result in severe head or neck injuries, paralysis or death to you and possible injury to your opponent. Contact in football may result in CONCUSSION-BRAIN INJURY which no helmet can prevent. Symptoms include: loss of consciousness or memory, dizziness, headache, nausea or confusion. If you have symptoms, immediately stop playing and report them to your coach, trainer and parents. Do not return to a game or practice until all symptoms are gone and you have received medical clearance. Ignoring this warning may lead to another and more serious or fatal brain injury.

1. Helmet must be properly fitted. See instructions.
2. Do not modify, change or alter helmet in any way.
3. Do not remove labels on helmet. See terms of limited warranty.
4. Helmet protection will be reduced seriously by some applied common substances without damage being visible to the user. It is recommended that user employ only factory authorized paints, cleaners, waxes, adhesives, guards and attachments as instructed.

The warranty on helmet shells is five (5) years for polycarbonate (Varsity) helmets and three (3) years for ABS (Youth) helmets from the original date of purchase, provided there has been normal use and proper maintenance. It is recommended that your helmet be reconditioned every year by a Riddell Factory Authorized Reconditioner. Proper maintenance requires reconditioning of your helmet at least every two (2) years by NOCSAE Licensed Reconditioner using only new factory replacement liners in the reconditioning process. Evidence of any of the following conditions will operate to void this warranty:

1. Failure to have the helmet reconditioned at least every two (2) years by a NOCSAE Licensed Reconditioner.
2. Installation of non-OEM parts whenever a liner replacement is necessary.
3. Where shells have been damaged by a chemical reaction from the use of incompatible materials such as:
 - a. Attachment of a guard, face mask or component of another manufacturer or mismatched material.
 - b. Use of cleaners, waxes or paints of another manufacturer or failure to follow recommended cleaning and painting instructions.

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Rationale for on site removal

- Access to chest / immediate ACLS
- Expedited access at emergency facility
- Advances in equipment / constantly evolving
- Highest level of familiarity / expertise

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Riddell



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Riddell Speed



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Riddell Speedflex



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Riddell Axiom



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Riddell Axiom



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Riddell Axiom



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Schutt & Vics



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Schutt



Schutt F7 2.0 PRO



Quarter Turn Hardware Set

Schutt F7 2.0 PRO



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Schutt F7 2.0 Collegiate



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Schutt Vengeance



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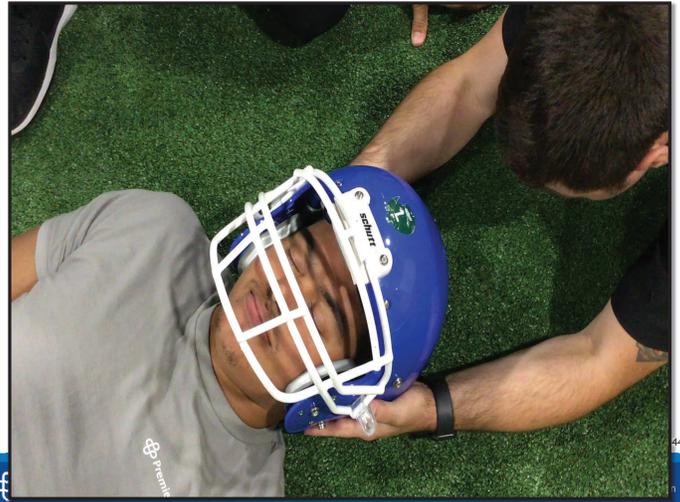
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Schutt F7



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Schutt Release Mechanism



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VICIS



VICIS ZERO2 QB & ELITE



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VICIS ZERO2 QB & ELITE



VICIS ZERO2



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VICIS ZERO2 TRENCH



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VICIS ZERO2



VICIS ZERO2 TRENCH



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Vicis ZERO1



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Xenith



X2E

Shadow

Shadow XR

Xenith X2E



Xenith Shadow



Xenith Shadow XR



Xenith



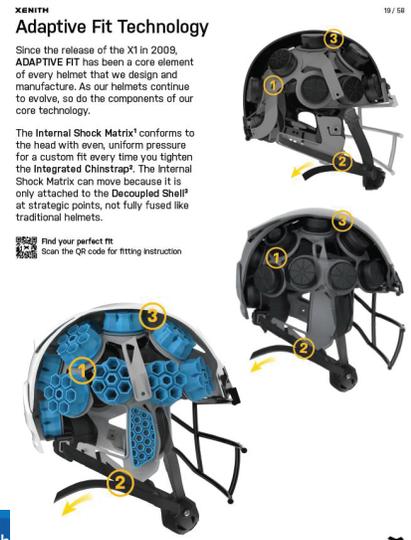
Xenith

Adaptive Fit Technology

Since the release of the X1 in 2009, ADAPTIVE FIT has been a core element of every helmet that we design and manufacture. As our helmets continue to evolve, so do the components of our core technology.

The Internal Shock Matrix[®] conforms to the head with even, uniform pressure for a custom fit every time you tighten the Integrated Chinstrap[®]. The Internal Shock Matrix can move because it is only attached to the Decoupled Shell[®] at strategic points, not fully fused like traditional helmets.

Find your perfect fit. Scan the QR code for fitting instruction.





Lacrosse Helmet Anatomy



Cascade XRS



Cascade XRS



Cascade XRS



Cascade XRS



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Cascade CPV-R



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Cascade CPV-R



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Cascade CPV-R



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Cascade R



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Cascade R



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Cascade R



Cascade Ratchet Strap



Warrior Burn



Warrior Burn



Warrior Burn



Warrior Evo



Warrior Evo



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Warrior Evo



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Warrior Evo



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Warrior



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Schutt STX Stallion



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Schutt STX Stallion



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Schutt
STX
Stallion



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Shoulder Pads



Shoulder Pads



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Shoulder Pads



Shoulder Pads



Shoulder Pads



Shoulder Pads



Shoulder Pads



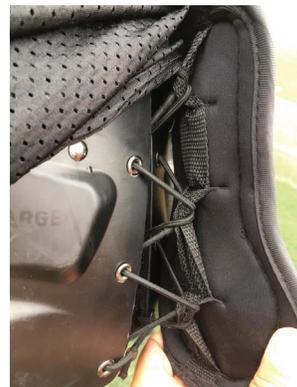
Shoulder Pads



Shoulder Pads



Shoulder Pads



Shoulder Pads

- Lacrosse



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Shoulder Pads

- Lacrosse



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Facemask Removal



- Tools
 - Cordless Screwdriver
 - Trainers Angel
 - Fmextractor
 - Anvil Pruning Shears
 - Riddell Pin Tool
 - Ball Point Pen

Facemask Removal



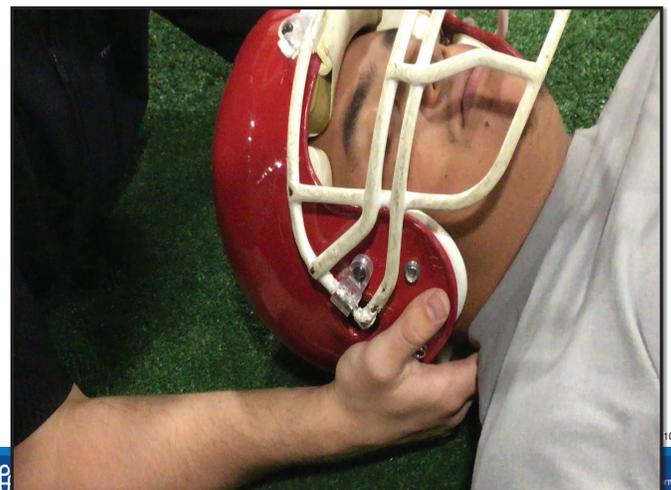
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Facemask Removal



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Facemask Removal

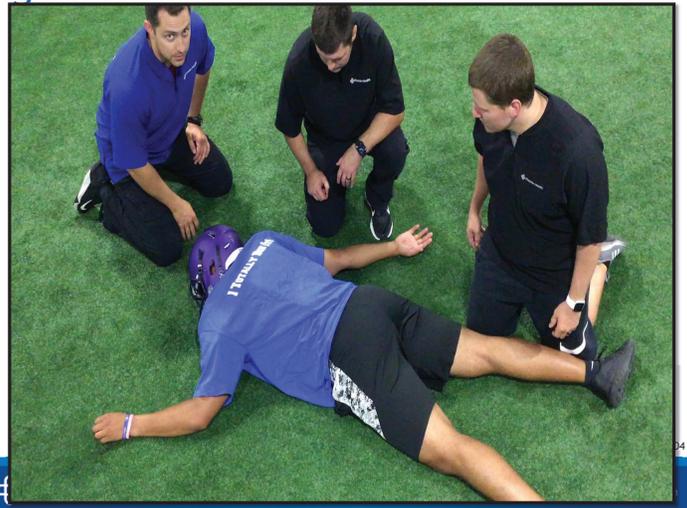


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Facemask Removal



Log Roll



Equipment Removal

- Establish C-spine
- Remove facemask
 - May not be necessary in newer helmets
 - Face mask design, helmet fit and facial features may dictate



Equipment Removal

- Remove (cut) jersey
 - Cut center and sleeves away from face
- Cut shoulder pad straps / laces
 - If you see it cut it
- Cut chin strap
 - Do not unbuckle



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- Cut shoulder pad straps / laces
 - If you see it cut it
- Cut chin strap
 - Do not unbuckle

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- Transfer C-spine to front
 - Verbalize
 - Position



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Equipment Removal

- Rescuers from either side place hands between shoulder pads and shoulder blades
- Athlete's torso is elevated 11/2 -2 inches
- Helmet is removed
 - Slight distraction on sides
 - Excessive distraction deforms helmet
 - Pull straight off of athletes head
 - Slight forward rotation to clear occiput

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Equipment Removal



- Shoulder pads are slid out from under athlete
- Athlete's torso is lowered
- C-spine is transferred to the head
 - verbalize
- Collar is applied

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