On Field Management of the Critically Injured Athlete

Implimentation and Scene Management

Success is where preparation and opportunity meet

Bobby Unser

Hello and Thank you

- 15th Annual Cutting Edge Concepts in Orthopaedics and Sports Medicine Seminar
  - Andrew Reber
  - Dr. Randy Schwartzberg

Collaborators and Supporters

- Darryl Conway, MA, AT, ATC (UM)
- David Berry, PhD ATC (SVSU)
- MD State Police Aviation Command
- Univ of MD Shock Trauma Center Staff

Introduction

- Certified Athletic Trainer (1997)
- EMT-B (97), I(06) Paramedic (10)
- Alpine Ski Patroller (1999)
- Certified Flight Paramedic (2013)
- Certified Tactical Paramedic (2017)

Positions

- Maryland State Police Aviation Command
- Liberty Mountain Ski Patrol
- Rotational ATC, US Ski and Snowboard

It is one thing to plan for this

It is another to live it.

Why are we here?

Conflict of Interest

- The views expressed in these slides and today's discussion are mine

- My views may not be the same as the views of my colleagues

ALWAYS use local protocols and treatments or interventions approved by your medical director or employer.

Disclosures

- I do not have financial or other associations with the manufacturers of commercial products, suppliers of commercial services, or commercial supporters.
- No Conflict of Interest or Financial relationships
- There was no commercial support for this activity.
- The views expressed in these slides and the today's discussion are mine

Participants must use discretion when using the information contained in this presentation

Overview of Presentation

At the conclusion of this afternoon:

- Explain concepts in Managing Critical Injuries
- Discuss treatment options for various situations
- Review Critical injury management

Take Home Point

What is going to kill them first…….

Treat that first……..

This is why we are here!

NATA Position Statements

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

Erik E. Swartz, PhD, ATC*; Barry P. Boden, MD†; Ronald W. Courson, ATC, PT,

National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports

Douglas J. Casa, PhD, ATC, FNATA, FACSM* (co-chair); Kevin M. Guskiewicz, PhD, ATC, FNATA, FACSM† (co-chair); Scott A. Anderson, ATC‡; Ronald W. Courson, ATC, PT, NREMT-I, CSCS§; Jonathan F. Heck, MS, ATC‖; Carolyn C. Jimenez, PhD, ATC¶; Brendon P. McDermott, PhD, ATC#; Michael G. Miller, PhD, EdD, ATC, CSCS**; Rebecca L. Stearns, MA, ATC*; Erik E. Swartz, PhD, ATC, FNATA††; Katie M. Walsh, EdD, ATC‡‡

National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Helen M. Binkley*; Joseph Beckett†; Douglas J. Casa‡; Douglas M. Kleiner§; Paul E. Plummer‖

Overview of Presentation

- Bleeding and Wound Care
- High Performance CPR
  - Pit Crew Concepts of CPR
- Airway Management
  - Basic Adjuncts
  - Supraglottic Airways
  - Chest Trauma and Decompression
- Spinal Injury Management
- Advanced Splinting
- Heat Illness

Initial Care

Initial Assessment:

- MARCH
  - Massive Hemorrhage
  - Airway Management
  - Respiratory Support
  - Circulation
  - Hypothermia/Head Injury

Where do I focus my Attention:

  - ABCD
  - Depending on Triage Criteria
  - Depending on Resources
- Is Airway management more important? ABCD
- Is Gross Bleeding most important?


HD ORF eins
INTERMEDIATE
1 -0.10
2 -0.02
3 +0.30
4 +0.31
5 +0.22
Peter FILL 1:30.77
A. SVINDAL 1:30.1

Bleeding and Wound Care

"As the profession of athletic training continuously evolves and ATs practice in various settings, these healthcare providers must have the ability to maintain a high level of preparation and proficiency in all aspects of immediate and emergency care. This ability is critical to minimizing risk to the injured participant." – BOC, 2015

- Everything has advantages and disadvantages
- Each option can be implemented in a variety of situations

There is no "Gold Standard"

Stopping blood loss in a severe hemorrhage is really the Gold Standard

Shock Management

Compensated shock	Decompensated shock	Irreversible shock
• Pulse rate increases • Respirations increase • Weak pulse • Cool, clammy skin • Anxious, restless, combative • Thirsty, weak	• Very weak or absent pulses • Severe drop in blood pressure • Altered mental status or unconsciousness • Slow breathing to apnea	• Cell death • Organ system failure • Washout • Hemorrhaging all over • Patient dies
Stage I and II hemorrhages 500-1250ml blood loss 5-25% blood volume lost	**Stage III and IV hemorrhages** 1250-1750+ ml blood loss 25-35%+ blood volume lost	**Stage IV hemorrhage** 1750+ ml blood loss 35%+ blood volume lost
THIS IS WHERE YOU NEED TO WORK YOUR MAGIC. Stop the bleeding. Oxygenation. Give fluids. Keep the patient warm. Get them to definitive care	WORK VERY FAST. You MAY be able to get the patient back, but you need to work very fast. Praying helps.	STICK A FORK IN HIM. HE'S DONE.

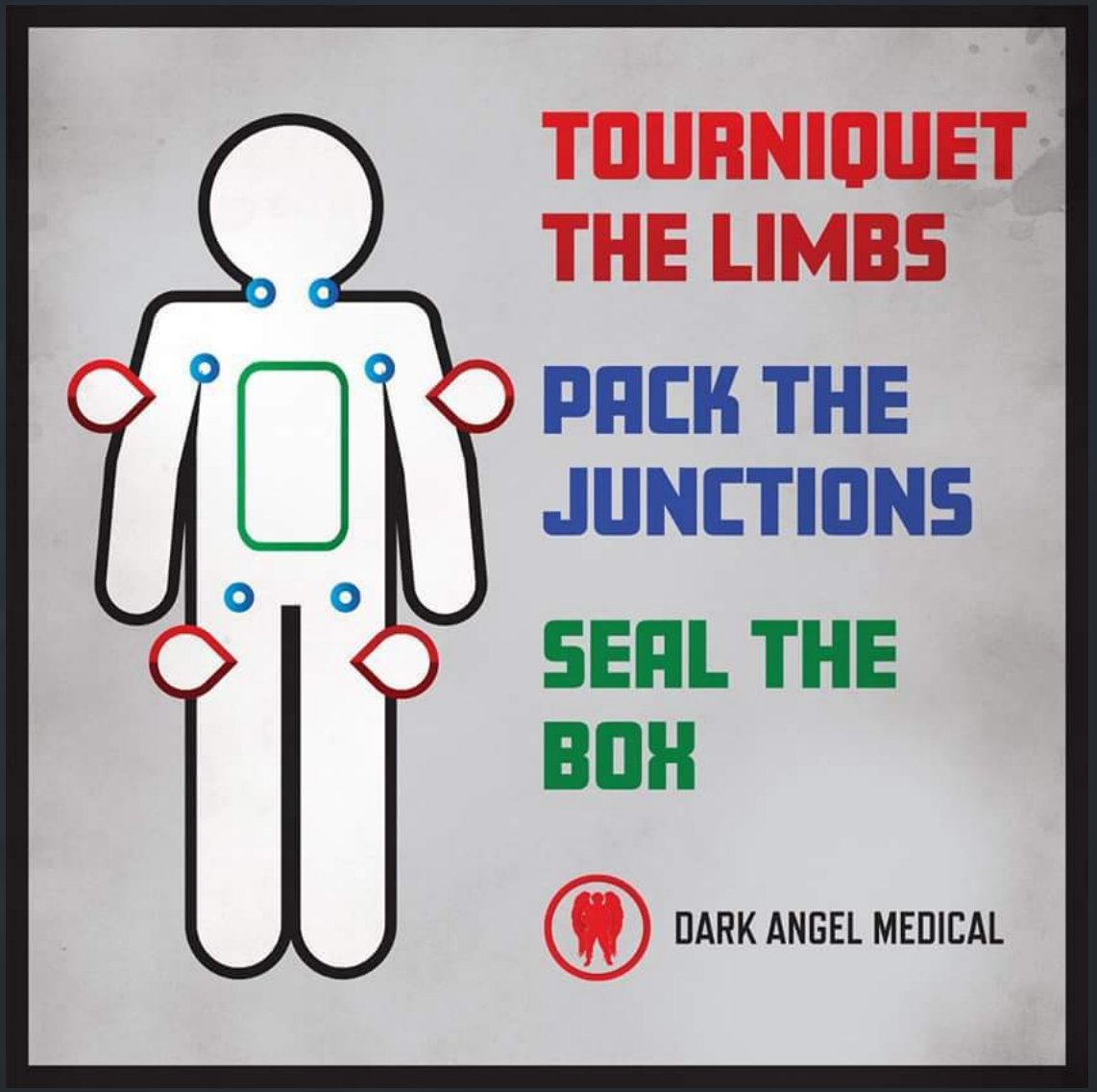
Controlling Bleeding

Direct Pressure or
Pressure Bandage

Tourniquet

Wound Packing

Clotting Agents



Direct Pressure/Pressure Dressing

Most venous hemorrhages or simple arterial hemorrhages from the distal third of an extremity are generally well controlled with an absorbent bandage placed direct over the wound

The Closer an artery is to the left ventricle, the great the force exerted on the vessel's wall. The more proximal an arterial is to the heart, the greater amount of force needed to tamponade the vessel and stop hemorrhage

120 lbs of pressure to occlude a proximal to a femoral artery hemorrhage

Proximal Arterial Hemorrhage is life threatening

Tourniquets

Commercial tourniquets

- 2-3 inches above the wound
- Watch for other sites of bleeding
  - above the wound
- Multiple bleeding sites
  - » proximal application

- Should be tight enough to stop bleeding
- The tourniquet should never be placed
  - Joint (knee or elbow)
  - Over an impaled object
- Extremity should be exposed
- Document application time
  - Write on patient!

Wound Packing

- Open clothing around wound

- If possible, remove excess pooled blood from the wound while preserving any clots already formed in the wound

- Locate source of most active bleeding

- Pack the wound
  - Don’t release Pressure
  - Swapping fingers or Side by each
  - Pack all voids

Add, Add,
Add and then
Add some more

Airway Management

Basic Adjuncts

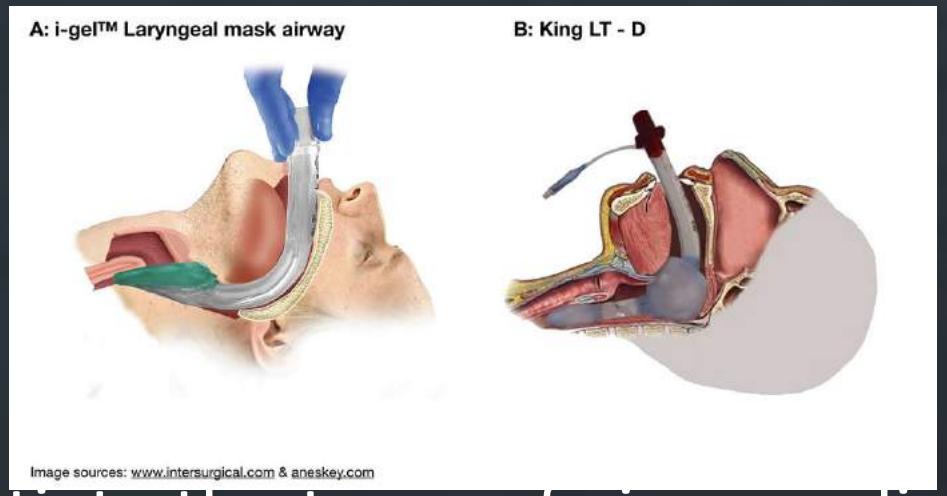
- BVMs

- NPA’s

- OPA’s

Supraglottic Airways

- King Tube and I-Gel or LMA



Differentiate the types of airway adjuncts (oropharyngeal airways [OPA], nasopharyngeal airways [NPA] and supraglottic airways [King LT-D or Combitube]) and their use in maintaining a patent airway in adult respiratory and/or cardiac arrest. (AC-9)

Hyperventilation

- DO NOT HYPERVENTILATE, ESPECIALLY WITH A HEAD INJURY

- Hyperventilation will cause vasoconstriction and allows more blood into the cranial vault worsening the injury.

- ONLY if they show signs of Herniation

"If rescue breathing becomes necessary, the person with the most training and experience should establish an airway and begin rescue breathing using the safest technique."

National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports

Douglas J. Casa, PhD, ATC, FNATA, FACSM* (co-chair); Kevin M. Guskiewicz, PhD, ATC, FNATA, FACSM† (co-chair); Scott A. Anderson, ATC‡; Ronald W. Courson, ATC, PT, NREMT-I, CSCS§; Jonathan F. Heck, MS, ATC‖; Carolyn C. Jimenez, PhD, ATC¶; Brendon P. McDermott, PhD, ATC#; Michael G. Miller, PhD, EdD, ATC, CSCS**; Rebecca L. Stearns, MA, ATC*; Erik E. Swartz, PhD, ATC, FNATA††; Katie M. Walsh, EdD, ATC‡‡

“The jaw-thrust maneuver is recommended over the head-tilt technique, which produces unnecessary motion at the head and in the cervical spine.”

“Advanced airway management techniques (e.g., laryngoscope, endotracheal tube) are recommended when appropriately trained and certified rescuers are present.”

“If rescue breathing becomes necessary, the individual with the most training and experience should establish an airway and commence rescue breathing using the safest technique(s).”

“During airway management, rescuers should cause as little motion as possible.”

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Erik E. Swartz, PhD, ATC*; Barry P. Boden, MD†; Ronald W. Courson, ATC, PT,

Why Progress beyond NPA/OPA

This is on a continuum

- Can you mask ventilate?
  - Does an NPA Help? Do they accept OPA?
- Athlete presentation
  - Are they getting better or worse
- Do I need to move the patient?
- Where is the equipment?
- How comfortable are you with the skill?

Keys to Successful CPR

- Emphasis on maximizing compressions
- Ensuring chest compressions of adequate rate
- Ensuring chest compressions of adequate depth
- Allowing full chest recoil between compressions
- Minimizing interruptions in chest compressions
- Avoiding excessive ventilation

Keys to Successful CPR

- Chest Compression Depth
- Chest Recoil
- Minimizing Interruptions in Chest Compressions
- Controlled Ventilations
- Early Defibrillation

Teamwork helps achieve goals of High Quality “High Performance” CPR

Goals include:

- Quality compressions (2-2.4 inches)
- Quality rate (100-120)
- Avoiding excessive ventilation
- Maximizing chest compression fraction (60-80%)
- Minimizing all pauses, especially the longest

High Performance CPR

High Performance CPR typically consists of expertly performed BLS with strict attention to:

- Minimally interrupted chest compressions
- Controlled ventilations
- Defibrillation

Pit Crew Concepts

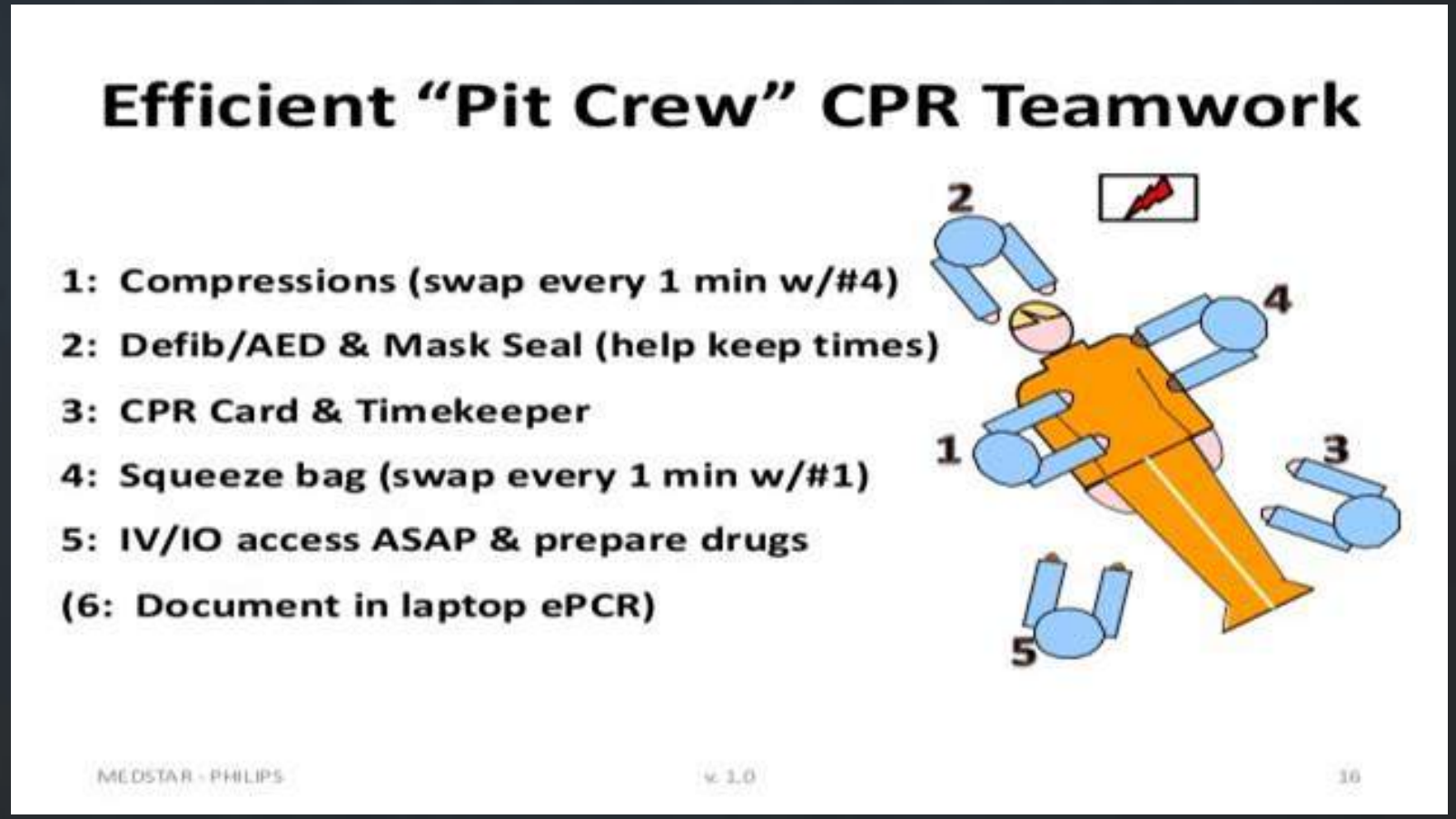
- Systems based approach
- Each person has a specific pre-assigned duty
- Each person is strategically placed to maximize effectiveness
- Each duty is coordinated for efficiency
- As personnel integrate into the system ⇨ add interventions
- Frequent practice

Team Approach to Resuscitation

How do we achieve quality CPR?

TEAMWORK!!!

-



Effective Teams

Assign team roles in an EAP, or before the beginning of an event;

- Reduces unnecessary discussion during initial assessment
- Creates clear communication and standards

Train together

- We train like we fight, and we fight like we train (make training and practice a team-based evolution)

Communicate

- Effective teamwork requires communication. Appropriate feedback and closed loop communication is key. Must be clear, concise and professional.
- Effective communication inhibits misunderstanding and increases collaboration

Indications for Splinting

Immobilizes injured extremities and the spine to:

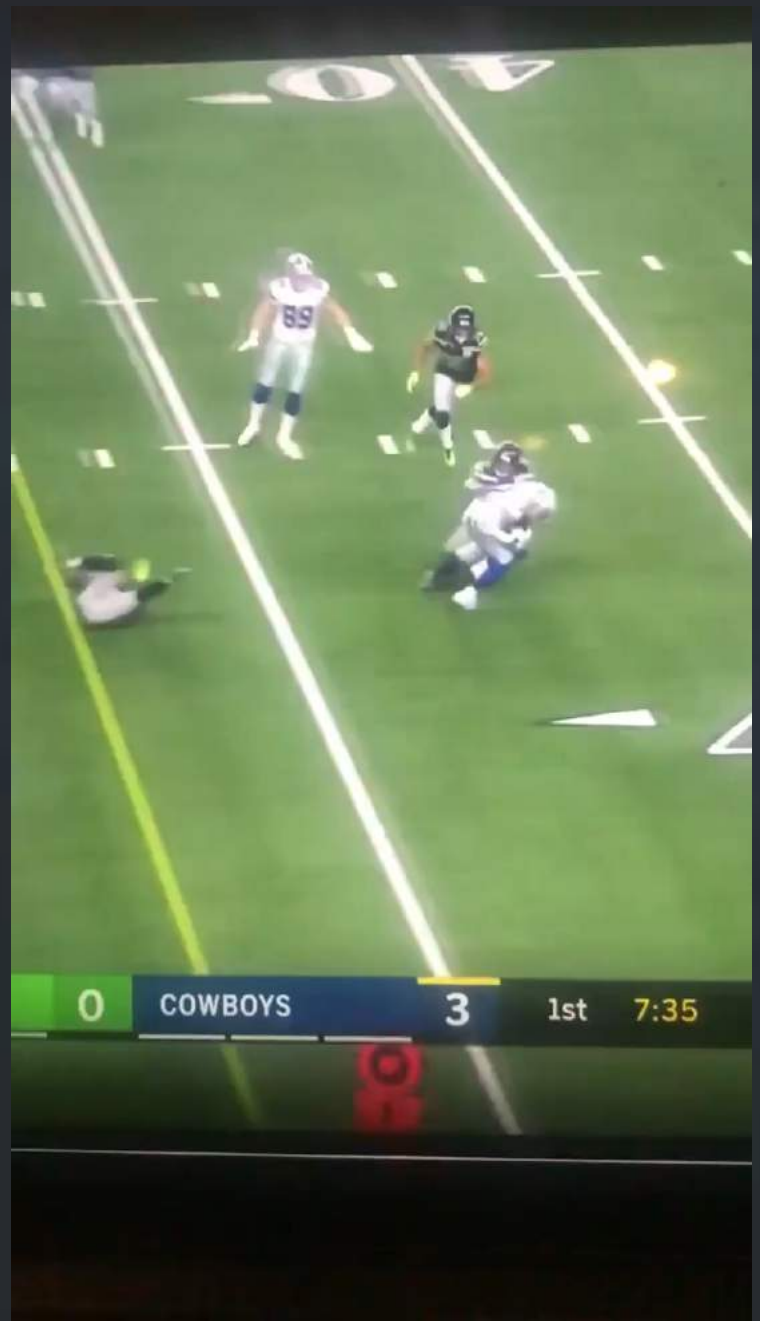
1. Decrease pain from impaired neurological function or muscle spasm and bleeding, and allow promote healing
2. Decrease swelling associated with injury by reducing blood and fluid loss into the soft tissues
3. Facilitate healing following surgical repair of muscles and tendons.
4. Prevent further injury

Advanced Splinting

WHEN IT COMES TO IMMOBLIZATION OF MUSCULOSKELETAL INJURIES???

Position Statements

This is why we are here!



Advanced Splinting

Traction Splints

- Designed during World War I- traction splint are used with isolated closed and open fractures of the femoral shaft (Bledsoe & Barnes, 2004; Lee & Porter, 2005) and are designed to apply a constant pull along the length of the limb to stabilize the fracture, reduce blood loss, reduce quadriceps muscle spasms, and help maintain the athlete's distal vascular supply (Wood et al, 2003).

Traction Splints

- The placement of a traction splint requires two well-trained individuals, one to apply initial manual traction and another to set up and apply the mechanical traction
- Several types of traction splints are available, always following the manufacturer's guidelines

Pelvic Fractures

- Serious pelvic and acetabular fractures are rare and account for ≈3% to 8% of all fractures

- Often the result of high energy blunt trauma, most patients sustaining pelvic injuries are at high risk of associated injuries which strongly influences outcome and survival rates…

Hauschild O, et al. Mortality in patients with pelvic fractures: results from the German pelvic injury register. *J Trauma.* 2008;64(2):449-55. doi: 10.1097/TA.0b013e31815982b1.

Pelvic Fractures

- Hypovolaemia is often a significant contributing factor to these deaths

- If hemorrhage from pelvic injuries could be controlled or reduced in the prehospital environment, then survival rates may increase

Papakostidis C, Giannoudis PV. Pelvic ring injuries with haemodynamic instability: efficacy of pelvic packing, a systematic review. *Injury*. 2009;40(Suppl 4):S53–61.

Lee C, Porter K. The prehospital management of pelvic fractures. *Emerg Med J.* 2007;24:130–3.

Pelvic Binders

1. A **pelvic binder** is a treatment intervention rather than a packaging intervention and should be applied early.
   - Applying a pelvic binder early provides stability and allows clot formation. This may prevent ongoing hemorrhage and the often-lethal trauma-induced coagulopathy.

2. No one pelvic binder device can currently be recommended over another
   - Ideal binders should (1) stabilize the pelvis to reduce hemorrhage and pain, (2) be easy to apply, (3) not cause further harm, (4) allow radiological and surgical intervention without need for removal

- Insufficient evidence to support one device over another

- Adequate training must be provided to avoid misplacement of devices.
  - Evidence exists that misplacement of pelvic binders can reduce the degree of fracture reduction (Bonner, et al, 2011)

Pelvic Binders

3. Associated femoral fractures should also be reduced

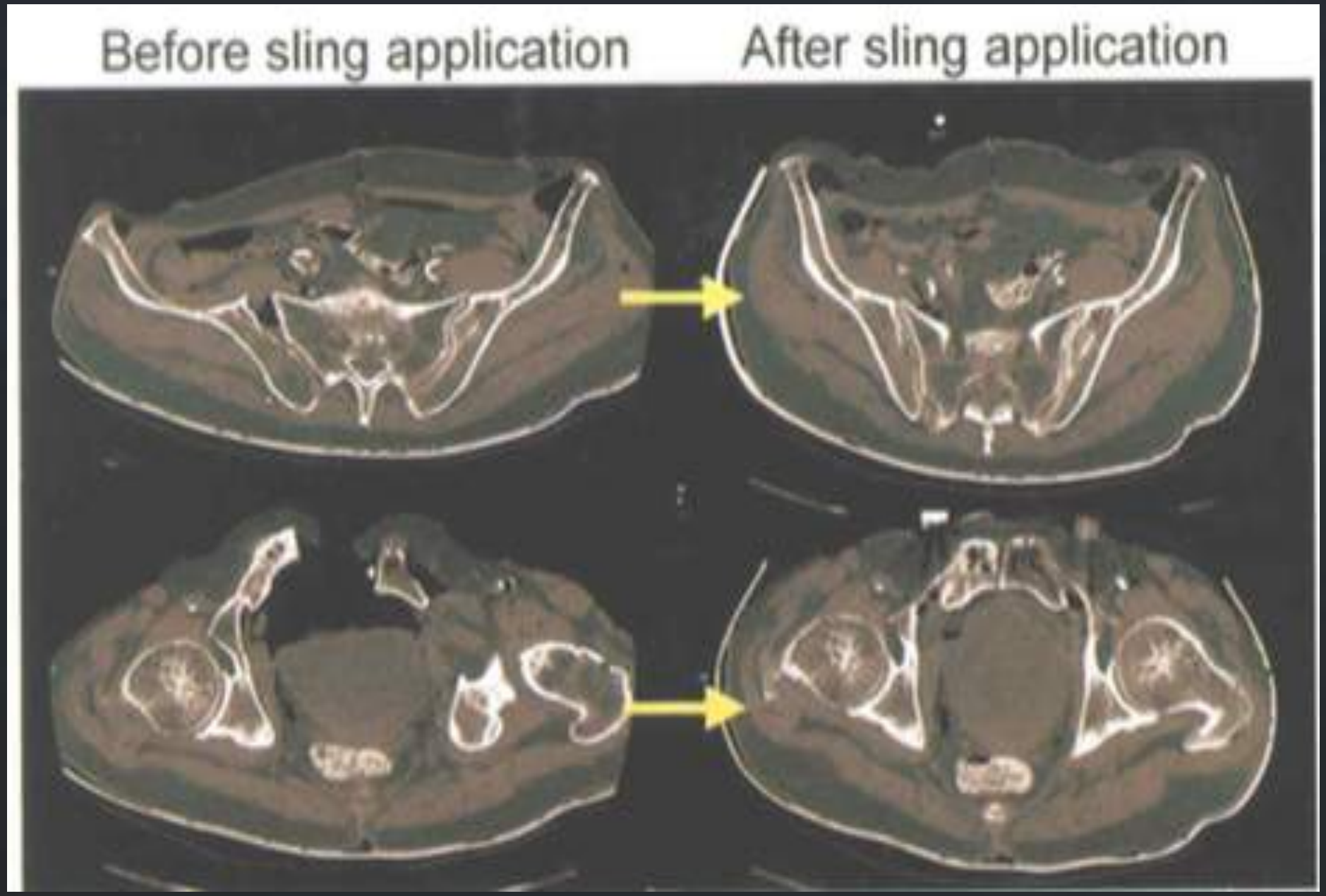
4. Patients should not be log rolled or transported on a spinal board

5. The use of pelvic binders is associated with the risk of low pressure skin necrosis

6. The pelvic binder should be placed next to skin

7. The pelvic binder should be applied prior to extrication

Pelvic Binders



Pelvic Binders

Spinal Injury Management

National Athletic Trainers' Association Position Statement: Head-Down Contact and Spearing in Tackle Football

Jonathan F. Heck*; Kenneth S. Clarke†; Thomas R. Peterson‡; Joseph S. Torg§; Michael P. Weis‖

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Spinal Injury Management

Current NATA Position Statement Recommendations

Focus on prevention, recognition, and management of cervical spine injured (CSI) athletes.[1,2,3]

Advocate emergency planning and preparation to increase management efficiency.[1,2,3]

Review management of equipment-related issues in sports such as football, hockey, and lacrosse.[2,3]

1.Heck JF, et al. National athletic trainers' association position statement- head-down contact and spearing in tackle football. *J Athl Train*. 2004;39(1)-101-111.

2.Swartz EE, et al. National athletic trainers' association position statement- acute management of the cervical spine-injured athlete. *J Athl Train*. 2009;44(3)-306-331.

3.Casa DJ, et al. National athletic trainers' association position statement- preventing sudden death in sports. *J Athl Train*. 2012;47(1)-96-118.

Spinal Injury Management

Skills requiring training and regular practice may include… (eg, gaining access to the airway or chest), and immobilization methods (eg, long spine board, cervical collar application).

But what should I do if I need to perform other interventions?

What Options do I have in Unique Environments?

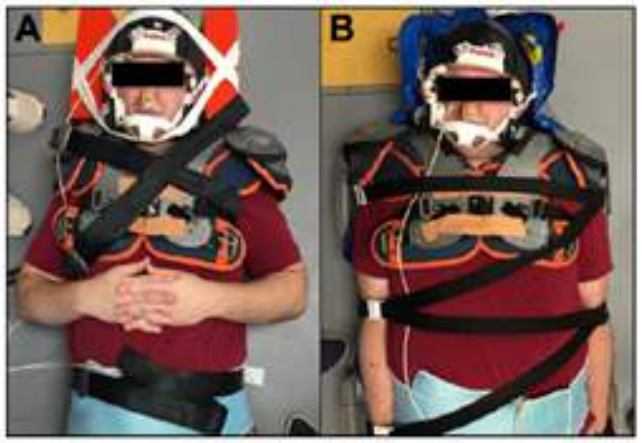


Figure 1. (A) Immobilization on the rigid spine board. (B) Immobilization in the vacuum splint.

Figure 2. (A) Vacuum-mattress splint and (B) rigid spine board.

Spinal Injury Management

Transfer Techniques

For the supine CSI athlete, a lift-and-slide technique (eg., 6–plus-person lift, straddle lift and slide) produces less head and cervical spine motion compared to the log-roll technique, and should be used in appropriate situations.[2]

Log-roll

6+ person lift

Straddle lift-n-slide

2.Swartz EE, et al. National athletic trainers' association position statement- acute management of the cervical spine-injured athlete. *J Athl Train*. 2009;44(3)-306-331.

Unique Environments

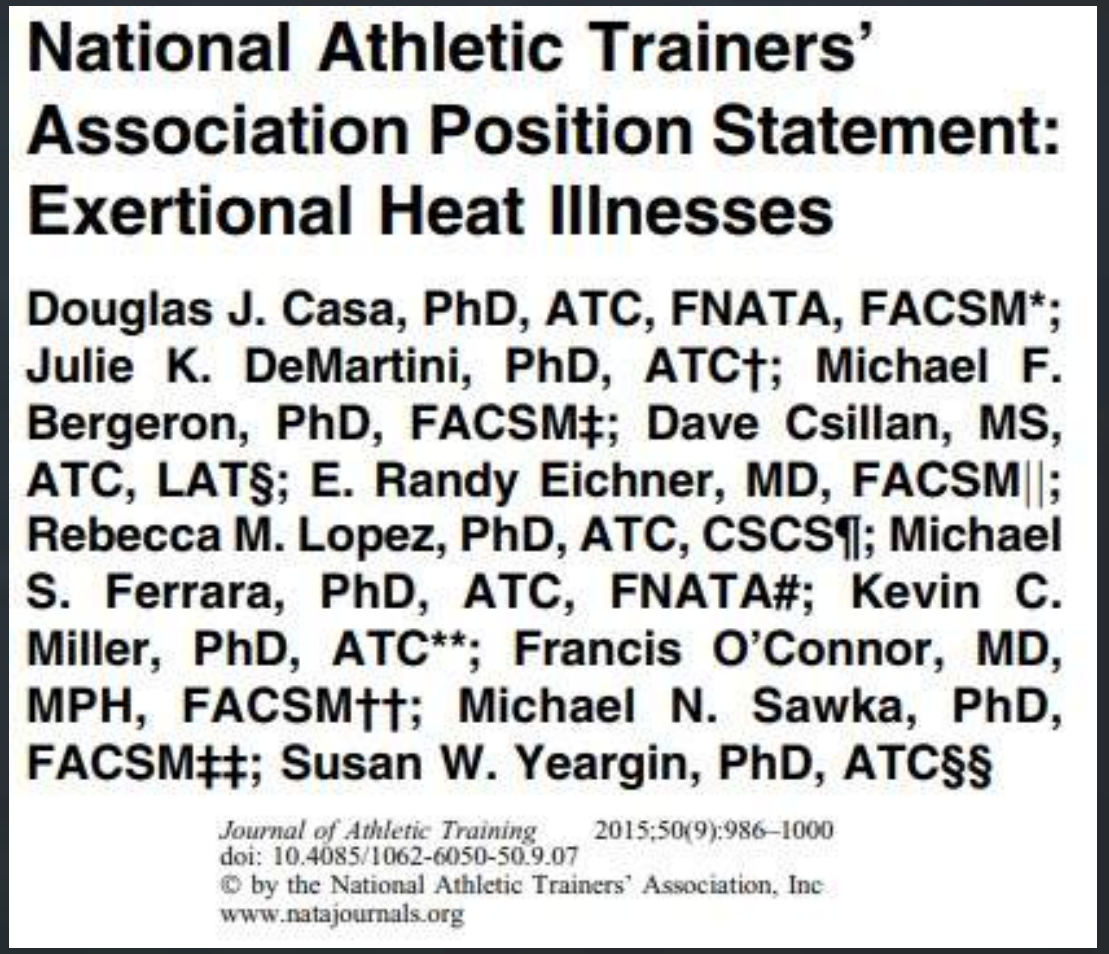
Heat Illness

Plan ahead

- NATA Position Statement
- State Athletic Board
- School protocols

Changes

- Adapt Practice Times and Duration
- Water readily available
- Shade
- COLD IMMERSION



National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

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Journal of Athletic Training 2015;50(9):986–1000
doi: 10.4085/1062-6050-50.9.07

www.natajournals.org

Heat Illness

- Evaluation
  - Assess Responsiveness and Vitals
  - Sideline or Rapid removal
  - Rectal Temperatures
  - Ice-Water Immersion
  - Continual Temperature Monitor
- IDEAL TEMPERATURE <102^{o}F

Meet with EMS to Share and Practice your management plan

Closing

The management techniques are mechanical skills that **MUST** be mastered by properly trained prehospital care providers

These are perishable skills and must be maintained through regular training

If rescue techniques becomes necessary, the person with the most training and experience should initiate care using the safest techniques.

Questions?

Resources and References

- Appropriate Prehospital Management of the Spine-Injured Athlete 8/15
- Exertional Heat Illnesses (September 2015)
- Management of Sport Concussion (March 2014)
- National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports(Feb. 2012)
- National Athletic Trainers' Association Position Statement: Emergency Planning in Athletics 2007
- Catastrophic Incident Guideline Plan, May 2003 NATA News, Timothy Neal, MS, ATC
- National Incident Management System
- https://www.fema.gov/national-incident-management-system
- NCAA 2014-15 Sports Medicine Handbook

Resources and References

- National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports. Journal of Athletic Training 2012:47(1):96-118.
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- How and When to Escalate hemorrhage Control to More Invasive Means. https://www.jems.com/articles/print/volume-41/issue-7/features/how-and-when-to-escalate-hemorrhage-control-to-more-invasive-means.html
- Athletic Trainers and EMS Collaboration is best for injured athletes. https://www.ems1.com/ems-training/articles/22073048-Athletic-trainers-and-EMS-collaboration-is-best-for-injured-athletes/
- Update on critical care for acute spinal cord injury in the setting of polytrauma. Yue, JK. Et.al. Neurosurg Focus 2017;43(5):1-9