

# Current Issues and Review of Prehospital Trauma Care

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# Overview of Trauma Systems



# Trauma Centers and Systems

- Comprehensive care of the trauma victim
- Maximization of resources
- Link to specialized services
- Statistical analysis of trends
- Injury prevention programs and community involvement

# American College of Surgeons (ACS)



- Professional group that verifies that trauma centers have met criteria for levels of care
- ACS does not “designate” trauma centers, only “verifies” they have met application standards
- “Designation” done by NYS DOH as part of statewide trauma system
- 2013 marked beginning of change in process

# NYS v ACS Trauma Center Categories



## Past NYS Levels

- Regional Trauma Center
- Area Trauma Center

*(often mistakenly called Level 1 and Level 2)*

## Present ACS Levels

- Level 1
- Level 2
- Level 3
- Level 4

# ACS Trauma Center Categories Key Requirements- Level 1 and 2



***“The standards for the provision of clinical care to injured patients for Level 1 and Level 2 Trauma Centers are identical”***

***(source: “Resource for the Optimal Care of the Injured Patient 2014”, American College of Surgeons)***

# ACS Trauma Center Categories Key Requirements- Level 1 and 2



## ***So what's the difference? Level 1 Centers:***

- ***1200 cases or 240 admissions with Injury Severity Score of greater than 15.***
- ***Dedicated surgical Critical Care Unit***
- ***Cardiothoracic surgery services with bypass capability available 24 hours***
- ***Trauma research with 20 peer reviewed publications/year***
- ***More stringent requirements for some subspecialties***

# ACS Trauma Center Categories

## Key Requirements- Level 1 and 2

### *What's the same?*

- *Dedicated OR 24 hours*
- *OR team in house*
- *CT Scanning 24 hours with radiologist interpretation*
- *Neurosurgery response*
- *Trauma surgeons respond to all trauma alerts/codes*
- *Trauma surgeon - 15 minute response 80% compliant*
- *Leadership role in trauma system*



# ACS Trauma Center Categories Level 3

- *Provide prompt assessment, resuscitation, emergency operations, and stabilization for the majority of trauma patients.*
- *Arrange for transfer to a facility that can provide definitive trauma care when needed for subspecialty care*
- *Established transfer agreements to Level 1 and 2 centers*
- *Surgeon present in ER within 30 minutes of notification, 80% compliance*
- *Emergency department physicians 24 hours*

# ACS Trauma Center Categories Level 4

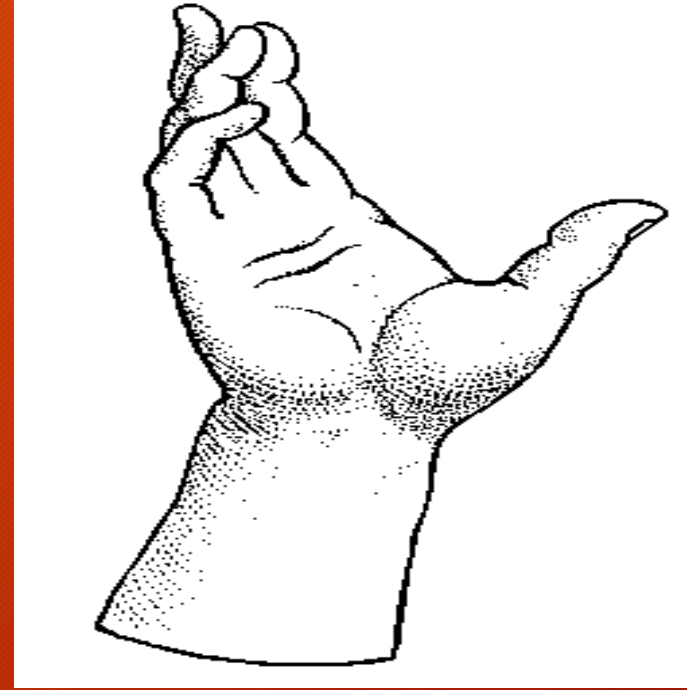
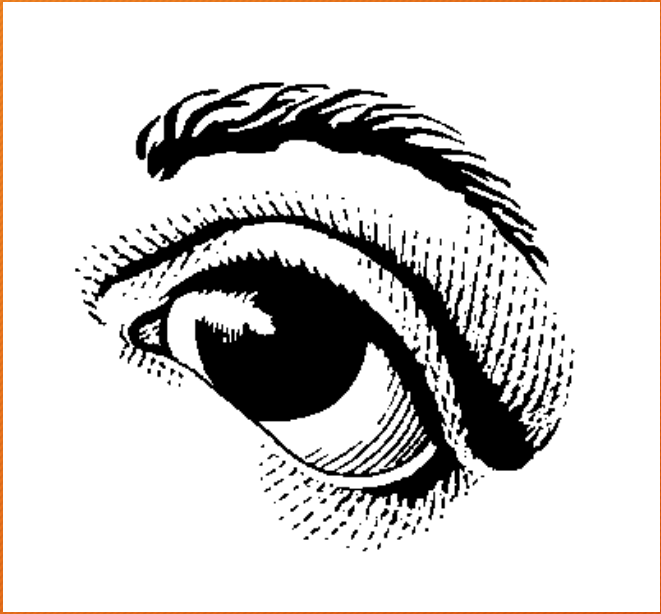
- *Provide the initial evaluation and assessment of injured patients, and transfer patients pursuant to a well-defined transfer plan.*
- *Ensure 24-hour emergency coverage by a physician or mid-level provider.*
- *Be continuously available for resuscitation, with coverage by a registered nurse and physician or mid-level provider, and it must have a physician director*
- *Typical of rural or critical access hospitals; shows commitment to system participation and integration v. non verified hospital*



# Trauma Assessment



**The Most important Tools  
to Gather Information are....**





***Step 1: Actually touch patients, or  
you ain't s\*\*\*t***

***Step 2: See step 1***

**- Dr. Zubin Damania  
“ZDoggMD”**

# MARCH System (TCCC)

- Massive Hemorrhage
- Airway Control
- Respiratory Support
- Circulation
- Hypothermia / Head Injury

# XABCDE System (PHTLS)

- eXsanguinating hemorrhage
- Airway
- Breathing
- Circulation
- Disability
- Expose



***BUT...MY  
SKILL  
SHEET  
SAYS.....***



A close-up of Darth Vader's helmet, centered in the frame. The helmet is black and highly reflective, showing highlights from the city lights in the background. The background is a blurred city skyline at night, with numerous yellow and white lights from buildings and streetlights. The overall tone is dark and dramatic.

**THERE IS NO**

**CONFLICT**



“They know their doctrine, often derived from lessons learned...but refuse to let that turn into dogma. Woe to the unimaginative one who, in after action reviews, takes refuge in doctrine”.

- *Former SECDEF James Mattis*

# Don't Let Doctrine Become Dogma!

## *Skill Sheets*

- Linear, step by step
- Designed to evaluate individuals
- Useful for individual evaluations
- Show the “right” way
- Basic knowledge

## *Field Application*

- Dynamic, in changing environment
- Most often performed by teams
- Relies on critical thinking
- May require innovation and improvisation
- Recognizes “right” principles may have differing approaches

***This does NOT excuse the fools who ignore sound principles of care and act carelessly because “theres what you do in class and what you do in the real world” !!***



***It recognizes the difference between rote knowledge and application in solving problems!***



**You have to say  
scene safety BSI,  
do A-B-C and  
consider spinal  
first !!**

***Yes, but you can  
bleed out in 2  
minutes !!***





# Treatment of Spinal Injuries



# Backboards







# **Why the Change??**

- **No evidence to support routine use**
- **No evidence that non use results in increase in secondary injury**
- **LOTS of evidence of complications**

# Why the Change??

- Pain (head, neck, back, bony prominences)
- Skin breakdown
- Unnecessary X rays and CT scans
- *EMS took years to catch up to the trauma community*

# So, are backboards totally out???

- Short answer...NO
- Transport devices from scene to ambulance
- Rescue situations
- MCI
- Special situations
- Temporary stabilization



**REMEMBER THESE?**



# IMMOBILIZING PENETRATING THORACIC TRAUMA



# Rigid Cervical Collars

- The next thing to go?
- Evidence suggests maybe
- “Internal decapitation”
- Skin injuries
- Return to soft collars?

# Atlanto-Occipital Dislocation (Internal Decapitation)







***OK....***

***Maybe not  
THIS bad,  
but.....?***

***Do rigid cervical collars prevent movement ?***

***Do they cause internal decapitation when applied?***

***Is the risk/benefit worth it v. soft collars?***

***Can we clear c-spines in the field on conscious patients?***





**MORE**  
*Coming Soon!*



# Bleeding Control

# Tourniquets and Hemostatic Dressings

- Direct pressure stops all bleeding, right?



# Tourniquets



# Tourniquets

*You might remember hearing*

- “When you are in the woods.....”
- “Save the life, lose the limb”
- “Last resort”
- “Direct pressure, pressure points, elevation....”



**RESEARCH HAS  
SHOWN**



**THAT WAS A LIE**





**BEWARE**

**OF CHEAP  
BARGAIN BASEMENT  
TOURNIQUETS**

# Hemostatic Dressings and Wound Packing





We're the *FIRST*  
to feature

**TAMPAX!**

Mrs. F. S. Frederick,

Special TAMPAX  
Consultant, in  
Our TOILETRIES  
Dept. All This Week.  
Street Floor.

The modern invisible sanitary napkin was designed by a physician, so it is safe. So very comfortable it is worn without any consciousness whatsoever. Absolutely invisible, even with the most perfectly fitted gown. Enjoy today the greater comfort, freedom, sanitation and safety of TAMPAX.

Trial Package  
of 3  
Tampax..... **15¢**

**TRY IT TODAY!**

Package  
of 10..... **45¢**

**Rudge & Guenzel Co**

***Tactical  
Tampon Use  
In EMS  
Hemorrhage  
Control***



**YES**

**NO**



Tampon meme Courtesy: Eric Totel

**Where to  
properly  
place  
“Tactical”  
Tampons:**



***Pack deep wounds with hemostatic dressings***



## CFR AND ALL PROVIDER LEVELS

### EMT

- Immediate intervention for severe bleeding:
  - Apply pressure directly on the wound with a dressing
    - Hemostatic gauze\* may be applied with initial direct pressure
    - Rolled gauze may be used if hemostatic gauze is not available
    - Pack wound and hold pressure
  - If bleeding soaks through the dressing, apply additional dressings
  - If bleeding is controlled, apply a pressure dressing to the wound
  - If severe bleeding persists through conventional dressings and hemostatic dressing becomes available, remove all conventional dressings, expose site of bleeding, and apply hemostatic dressing\*
  - Cover the dressed site with a pressure bandage
- Immediate intervention for uncontrollable bleeding from an extremity:
  - Place tourniquet 2-3 inches proximal to the wound
  - If bleeding continues, you may place a second tourniquet proximal to the first, or above the knee or elbow, if wound is distal to these joints
  - Note the time of tourniquet application and location of tourniquet(s)



### CFR AND EMT STOP

#### KEY POINTS/CONSIDERATIONS

- Do not remove a tourniquet that was placed for life-threatening bleeding
  - If a tourniquet had been placed for apparently non-life-threatening bleeding,



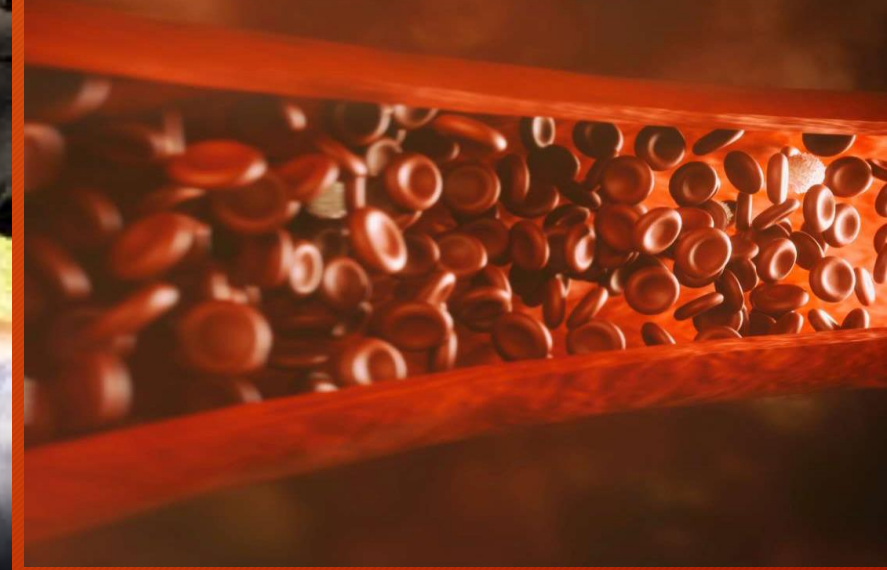
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## **CFR AND EMT STOP**

### **KEY POINTS/CONSIDERATIONS**

- **Do not remove a tourniquet that was placed for life-threatening bleeding**
  - If a tourniquet had been placed for apparently non-life-threatening bleeding, the tourniquet may be released while maintaining the ability to immediately reapply and otherwise control the hemorrhage should significant bleeding occur
- These steps are not intended to be used in sequence; interventions should be taken using the best judgement of the EMS professional
- Hemodialysis access sites may result in life threatening hemorrhage. Direct digital pressure should be used first followed by tourniquet ONLY in the setting of life-threatening hemorrhage when other means of hemorrhage control have been unsuccessful.



# Treatment of Shock



# BLOOD PRESSURE IS NOT THE REAL PROBLEM



- Shock (of any kind) is defined as ***“INADEQUATE TISSUE PERFUSION”***
- Hypotension is a contributing factor, but the real problem is on the cellular level
- Cells deprived of oxygen either die or do not function normally
- Simply raising blood pressure does not solve the problem, especially if it means diluting what oxygen carrying blood is left

# **BLOOD PRESSURE IS NOT THE REAL PROBLEM**



- **Blood pressure may be the last measurable factor to change in shock.**
  - **When a drop in blood pressure is evident, shock is well developed.**
  - **Particularly true in infants and children**
- **The stages in the progression of shock:**
  - **Compensated shock**
  - **Decompensated shock**
  - **When shock has progressed too far, it is irreversible.**

# The Progression of Shock

- **The first signs can be subtle**
- **Change in mental state**
- **Irritability/agitation**
- **Changes in pulse and breathing rates**
- **Skin Color**
- **Skin moisture**
- **Pulse oximetry**
- ***Serial assessments are necessary to spot early signs of shock***



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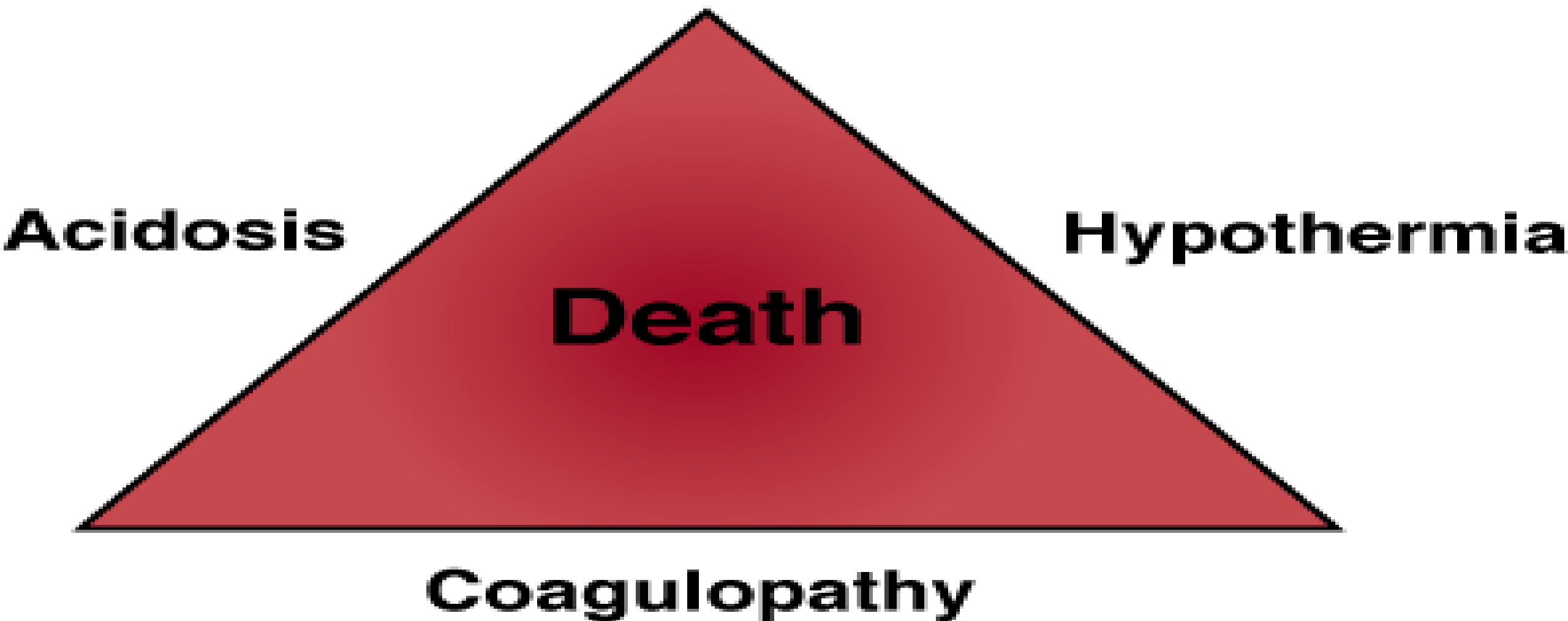
**Table 12-1****Causes of Shock**

Cause	Type of Shock
Pump Failure	Cardiogenic shock Obstructive shock <ul style="list-style-type: none"><li>■ Tension pneumothorax</li><li>■ Cardiac tamponade</li><li>■ Pulmonary embolism</li></ul>
Poor Vessel Function	Distributive shock <ul style="list-style-type: none"><li>■ Septic shock</li><li>■ Neurogenic shock</li><li>■ Anaphylactic shock</li><li>■ Psychogenic shock</li></ul>
Low Fluid Volume	Hypovolemic shock <ul style="list-style-type: none"><li>■ Hemorrhagic shock</li><li>■ Non-hemorrhagic shock</li></ul>



Adapted from  
JB Learning  
Emergency  
Care of the  
Sick and  
Injured 11<sup>th</sup>  
Edition

# The Lethal Triad



Source: Mattox KL, Moore EE, Feliciano DV: *Trauma, 7th Edition*:  
[www.accesspharmacy.com](http://www.accesspharmacy.com)

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# DRAMATIC, CUTTING EDGE EMS SHOCK TREATMENT!!

***Now available in multiple  
colors-Order now!  
Operators are standing by!!***





***Coagulopathy = an impaired ability of the coagulation system to synthesize blood clots.***



***As a patient's core temperature decreases, so does the body's ability to stop bleeding.***

***Impaired platelet function, inhibition of the clotting factors, and inappropriate activation of clot breakdown.***

***<https://www.jems.com/articles/print/volume-39/issue-4/patient-care/trauma-s-lethal-triad-hypothermia-acidos.html>***



**MASSIVE IV FLUID INFUSION IS NOT THE ANSWER!!**



# The Future of EMS Trauma Care

New things coming...or already here!

# PERMISSIVE HYPOTENSION

- **Ken Mattox, MD - [www.trauma.org](http://www.trauma.org), 2003**
- **Risk v Benefit of Raising BP in Exsanguinating Trauma**
- ***“The cyclic hyper resuscitated patient arrives in the operating room from the ambulance dock or the emergency center, already with a preventable coagulopathy even before the first incision or onset hypothermia. AND, those who caused the coagulopathy were never aware that they presented the surgeon with a situation that made optimal therapy much more difficult. “***
- **Accept lower BP, observe mental state, restrict crystalloid use**

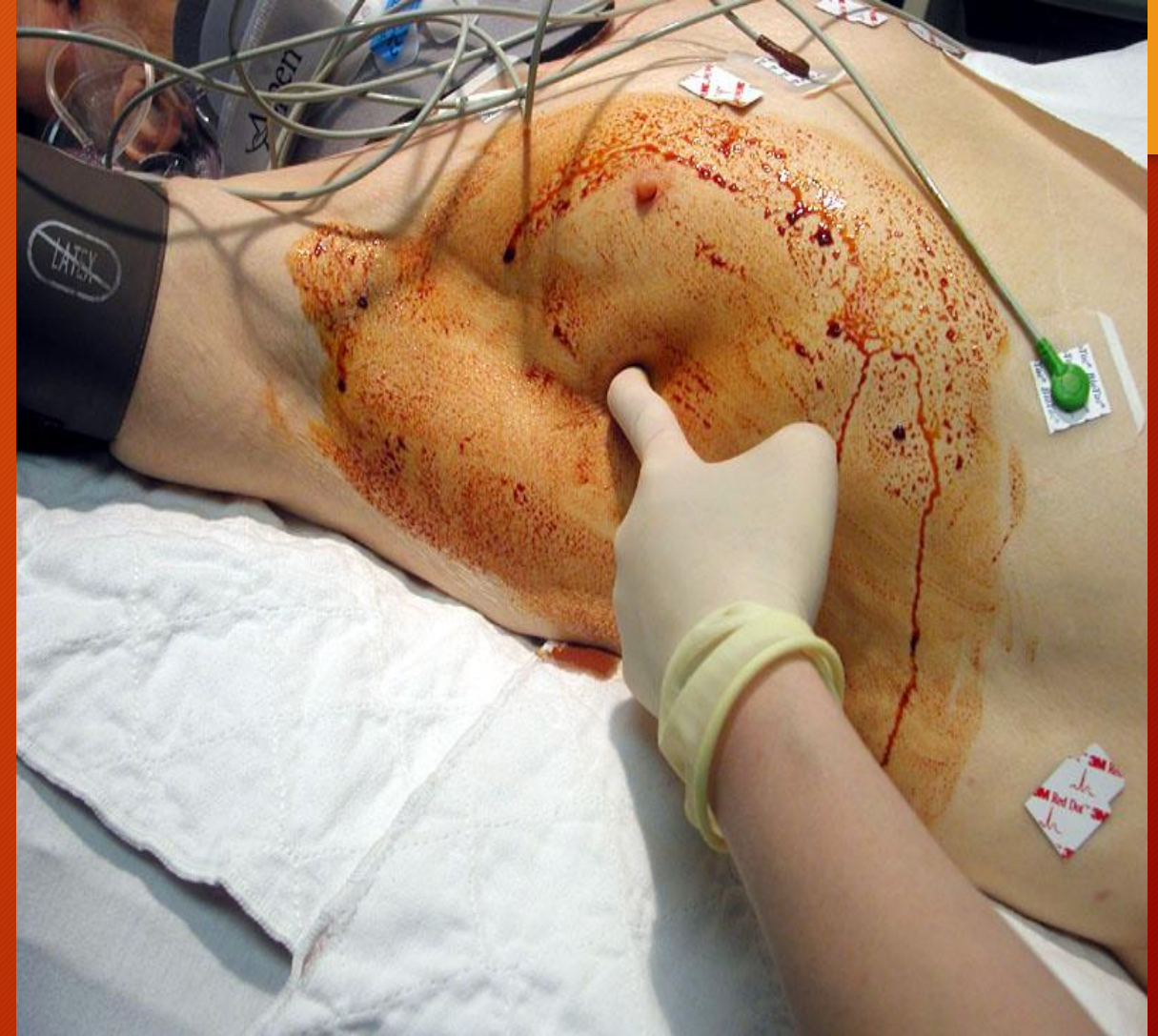
# TRANEXAMIC ACID

- ***Tranexamic Acid, or TXA, is an antifibrinolytic agent***
- “The Clinical Randomisation of an Antifibrinolytic in Significant Haemorrhage (CRASH-2) study, completed by researchers at the London School of Medicine, and Military Application of Tranexamic Acid in Trauma Emergency Resuscitation study (MATTERs) showed that when TXA can be administered within three hours of injury, the mortality of severely injured patients is reduced by up to 30%.”  
Thomas, Jon E “The Benefits of TXA”, EMSWorld, <http://www.emsworld.com/article/12042127/tranexamic-acid-for-prehospital-hemorrhage>, accessed 8/11/16
- ***Used in Trauma Centers, but controversy remains re effectiveness and risk/benefit. Research is continuing.***



# **FINGER THORACOSTOMY v. NEEDLE DECOMPRESSION**

- ***Needle decompression failure rates of 42-60% in some recent studies- the catheter never penetrated the chest cavity for a variety of reasons***
- ***Finger thoracostomy involves an incision in the chest wall at the fourth/fifth interspace, mid axillary line, with the ostomy widened by use of a curved clamp. A finger is then inserted to confirm entry into the thoracic cavity. The wound is then covered with an occlusive dressing***
- ***Training and QA issues***



<https://emcrit.org/emcrit/needle-finger-thoracostomy/>

# **RESUSCITATION OF TRAUMATIC ARREST**

- **ATLS, many studies: arrest secondary to blunt trauma = 100% mortality**
- **Penetrating traumatic arrest slightly better**
- **Many EMS systems still “work up” traumatic arrests regardless of type**
- **Should we give this another look?**
- **Studies continue, with conflicting evidence**



# PREHOSPITAL BLOOD TRANSFUSION

- **Previously limited to HEMS**
- **Several systems have experimented**
- **Value in rural areas**
- **Whole blood v Packed Red Cells**
- **Risk/Benefit**
- **Storage, legal issues**
- ***<https://www.jems.com/articles/print/volume-43/issue-2/features/whole-blood-in-ems-may-save-lives.html>***

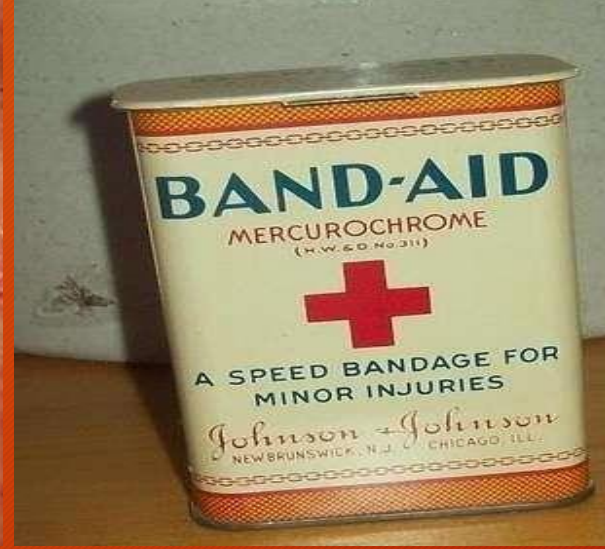
# **VASOPRESSIN IN HEMORRHAGIC SHOCK**

- **Pressor drugs previously shunned**
- **New studies show promise of early use**
- **Alternative to filling vascular space with fluids**
- **Shrinks vascular space**
- **May have positive impact on brain perfusion (CPP)**
- **More study needed – still not recommended by ATLS**
- ***<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5374828/>***

# PREHOSPITAL ULTRASOUND

- Multiple uses in trauma (and elsewhere)
- Becoming more common
- Devices are getting smaller
- Many progressive systems use it already
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5852915/>





**“I know a guy who knows a guy...”**

**Evidence Based Practice, Not  
Anecdotes and War Stories**

# A FEW WORDS ABOUT “RESEARCH”

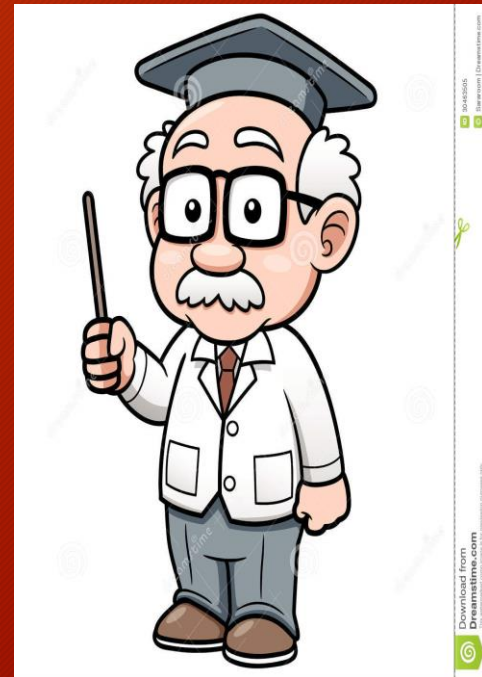


# THINGS TO CONSIDER WHEN READING RESEARCH ARTICLES

- **READ THE WHOLE THING! ( not just the abstract or title!)**
- **Consider the source**
- **Look for bias**
- **Look for sample size**
- **Does the conclusion answer the original question?**
- **Is it replicable?**
- **Is it applicable to your practice settings?**
- **Is there other literature that supports or conflicts with the study?**

# REMEMBER THE PHRASE “PUBLISH OR PERISH”

- ***“THERE ARE LOTS OF ACADEMICS LOOKING FOR TENURE WHO WRITE WORTHLESS ARTICLES IN OBSCURE JOURNALS THAT NO ONE READS” - G. Iannuzzi, 2016***
- ***There is a tremendous amount of pressure to get articles published***
- ***Many articles are not “peer reviewed”***
- ***Many that are peer reviewed are published even though flawed***
- ***Many articles just rehash other people’s work with a seemingly new spin***





**THINK  
CRITICALLY  
AND  
DEMAND  
EVIDENCE**

***"It worked for me" is  
not evidence in  
medicine, law, or  
science."***

***- Wes Ogilvie, MPA, JD, LP***



# BE A SKEPTIC!

- About “the way we’ve always done it”
- About “established protocol”
- About “skill sheets”
- About the latest fad or flavor of the month
- About “war stories” as a basis for practice
- About EVERYTHING!
- ***TAKE CONTROL OF YOUR OWN PRACTICE,  
OR SOMEONE ELSE WILL!***

