Traumatic Cardiac Arrest

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MEDICAL COLLEGE OF WISCONSIN

EMS
DIVISION OF EMS MEDICINE

- I have no conflicts of interest

Objectives

- Discuss the state of clinical guidelines across the nation and recognize gaps in guidance for EMS
- Discuss the characteristics of traumatic arrest and clinical controversies
- Translate best evidence-based recommendations into a sample protocol

Trauma Guidelines

- Spinal motion restriction
- Hemorrhage Control
- Extremity Trauma
- Rapid Transport

NAEMSP/ACSCoT 2012

NAEMSP/ACSCoT 2012

- No signs of life
- No ROSC despite appropriate field EMS treatment

NAEMSP/ACSCoT 2012

- No signs of life
- No ROSC despite appropriate field EMS treatment
- ***What else is appropriate field EMS treatment***

NAEMSP/ACSCoT 2012

- Blunt Trauma Arrest
  - EMS to hold resuscitation if found apneic, pulseless and without organized electrical activity

NAEMSP/ACSCoT 2012

- Blunt Trauma Arrest
  - EMS to hold resuscitation if found apneic, pulseless and without organized electrical activity
- Penetrating Trauma Arrest
  - EMS to hold resuscitation if found apneic, pulseless and no other “signs of life”
    - Spontaneous movement
    - ECG activity
    - Pupillary response

Reality of Prehospital Medicine

Thirty-three of the nation’s largest EMS Systems would transport what percentage of these patients?

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A penetrating, asystolic traumatic cardiac arrest?

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A penetrating, asystolic traumatic cardiac arrest?

46%

Thirty-three of the nation’s largest EMS Systems would transport what percentage of these patients?

A penetrating, asystolic traumatic cardiac arrest? 46%

A blunt, asystolic traumatic cardiac arrest?

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21%

Thirty-three of the nation’s largest EMS Systems would transport what percentage of these patients?

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A blunt, asystolic traumatic cardiac arrest? 21%

A penetrating, PEA traumatic arrest?

Thirty-three of the nation’s largest EMS Systems would transport what percentage of these patients?

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82%

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61%

Thirty-three of the nation's largest EMS Systems would transport what percentage of these patients?

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A blunt, asystolic traumatic cardiac arrest? 21%

A penetrating, PEA traumatic arrest? 82%

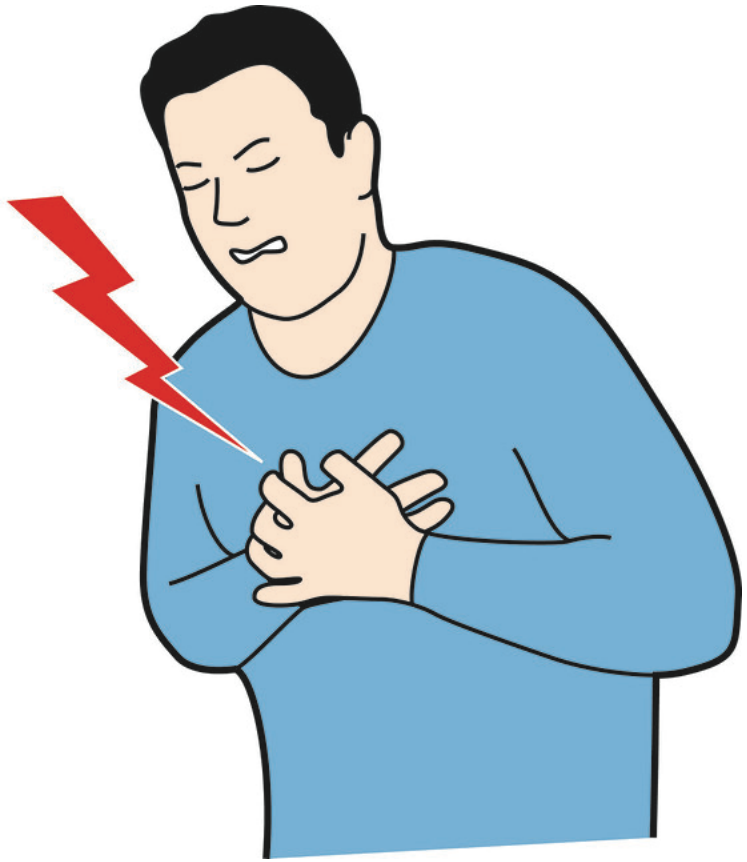
A blunt, PEA arrest? 61%

THANK YOU for the guidance….

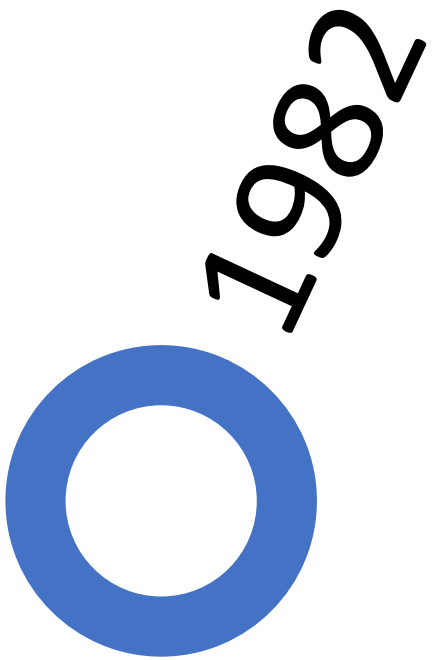
“Leave the transport decision to the EMS provider….”

“Further research is appropriate to determine optimal…..”

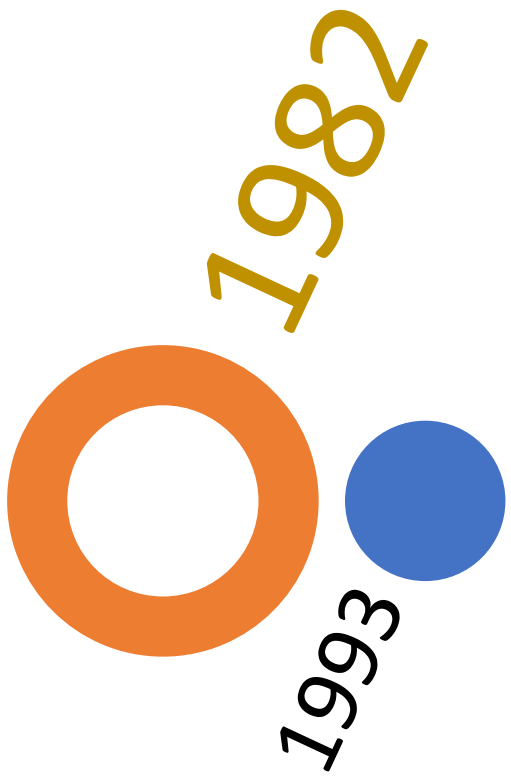
“EMS field treatment isn’t uniformly defined”



CPR > 3min
blunt or penetrating
No survivors



No survivors who had CPR
“wisdom of transport must be questioned”



No RR+No SBP+GCS3=dead on scene

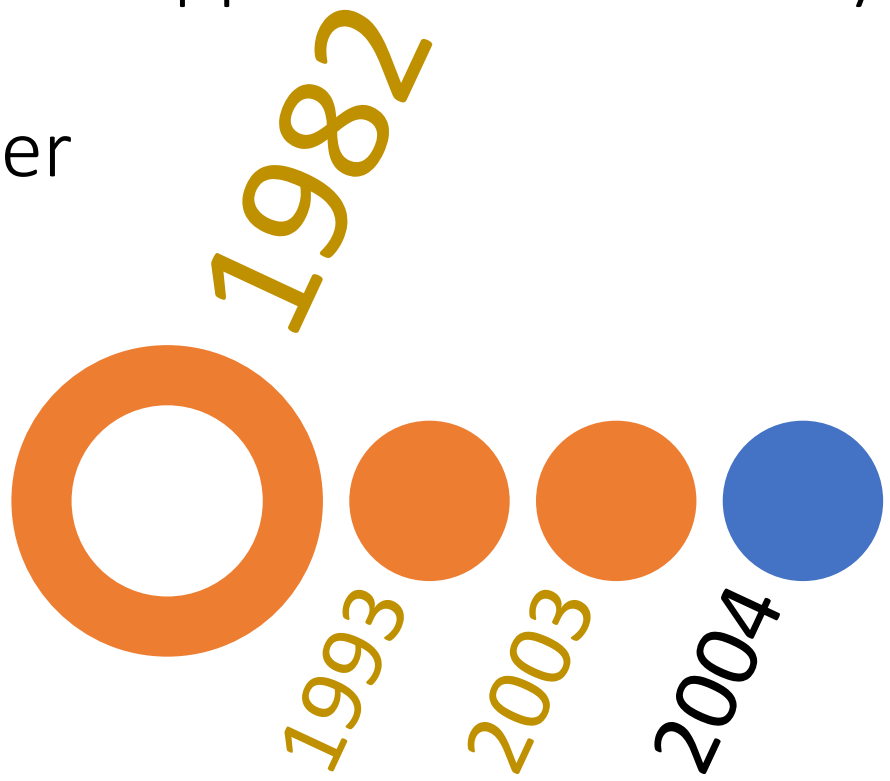
7.6% survived to DC

21% CPR >15 mins (3 of 14)

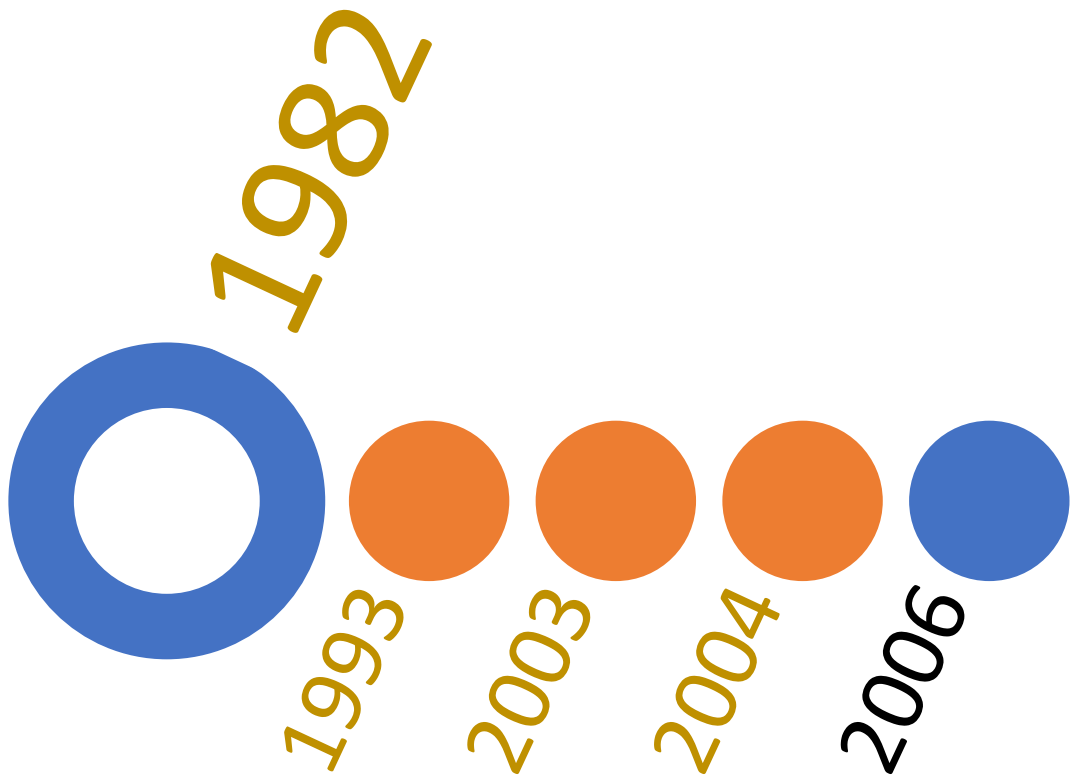
93% had transport times > 15 mins

“guidelines may not be applicable to urban systems with rapid transport to

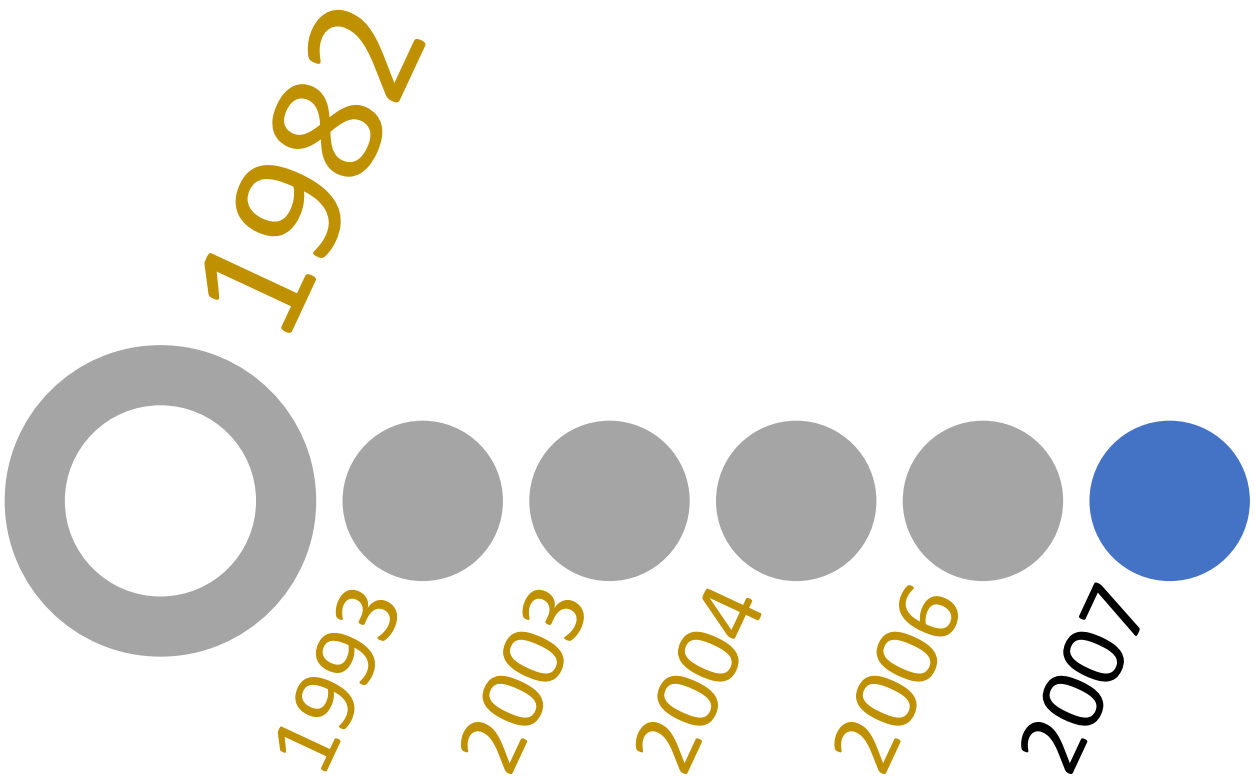
Level I trauma center



7.5% survival to DC
London Air Ambulance - Physician model



17.2% survival to DC
94.3% were blunt trauma patients
German EMS-Physician model



49.1% ROSC
6.6% neurologically intact
Spain EMS-physician model

What does this tell us?

- Current state of traumatic cardiac arrest
- Inconclusive literature
- Management is complex and possibly hard to standardize

Trauma Arrest Characteristics

- Penetrating v. Blunt

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  - Higher survival from penetrating TA

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- High v. low velocity

Trauma Arrest Characteristics

- Penetrating v. Blunt
  - Higher survival from penetrating TA
- High v. low velocity
  - Higher survival from low velocity injuries

Trauma Arrest Characteristics

- Rhythm analysis
  - Asystole
  - PEA
    - <40

Trauma Arrest Characteristics

- Rhythm analysis
  - Asystole
  - PEA
    - <40
  - Wide-Complex
    - Perhaps underlying medical cause?

Trauma Arrest Characteristics

- Witnessed v. Unwitnessed
  - Unwitnessed
    - Asystolic, either mechanism---poor outcome

Trauma Arrest Characteristics

- Witnessed v. Unwitnessed
  - Unwitnessed
    - Asystolic, either mechanism---poor outcome
  - Witnessed
    - LSI candidates
    - Distance
    - Time

Clinical considerations

Clinical considerations

- Hypovolemia
- Hypoxia
- Hydrogen Ion
- Hypo/hyperkalemia
- Hypoglycemia
- Hypothermia
- Toxins
- Tamponade
- Tension Pneumothorax
- Thrombosis
- Trauma

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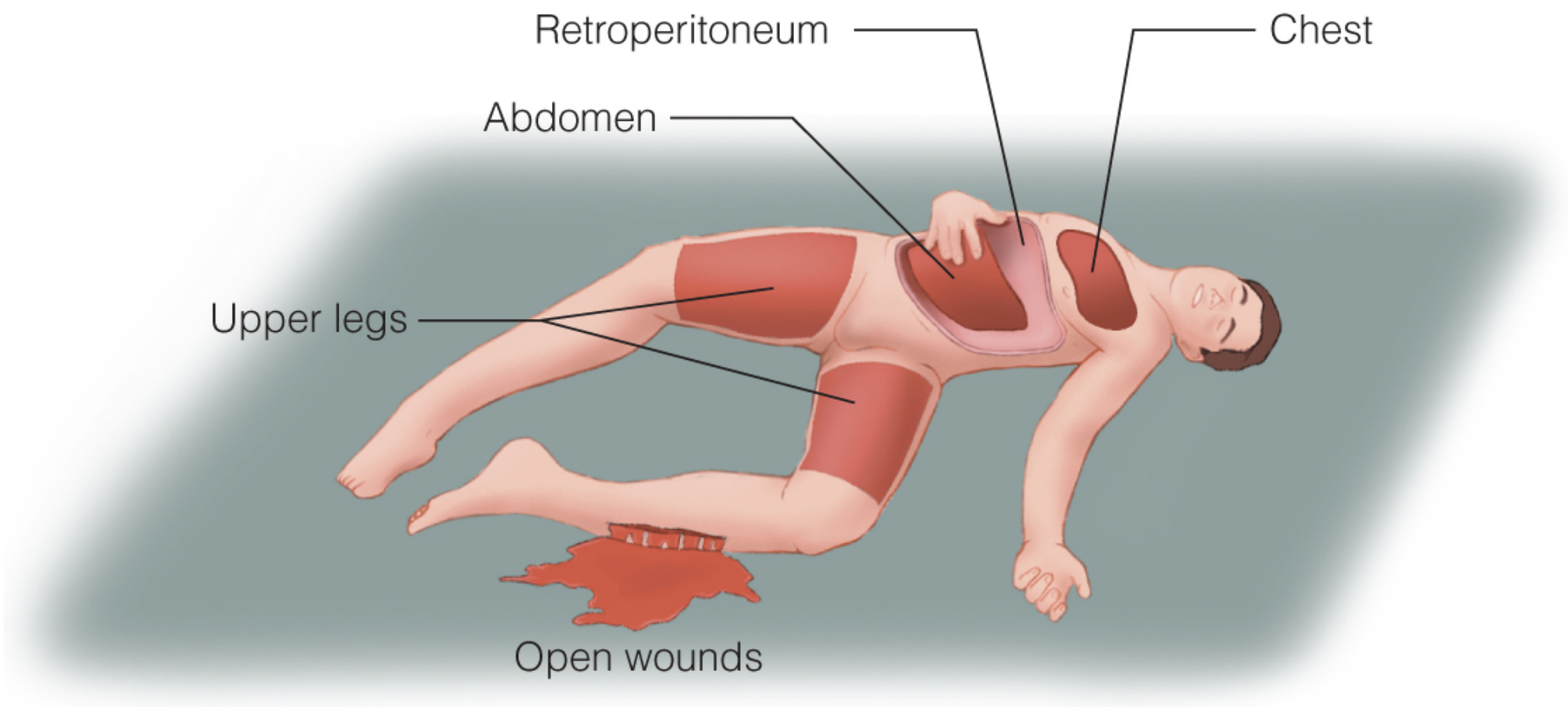
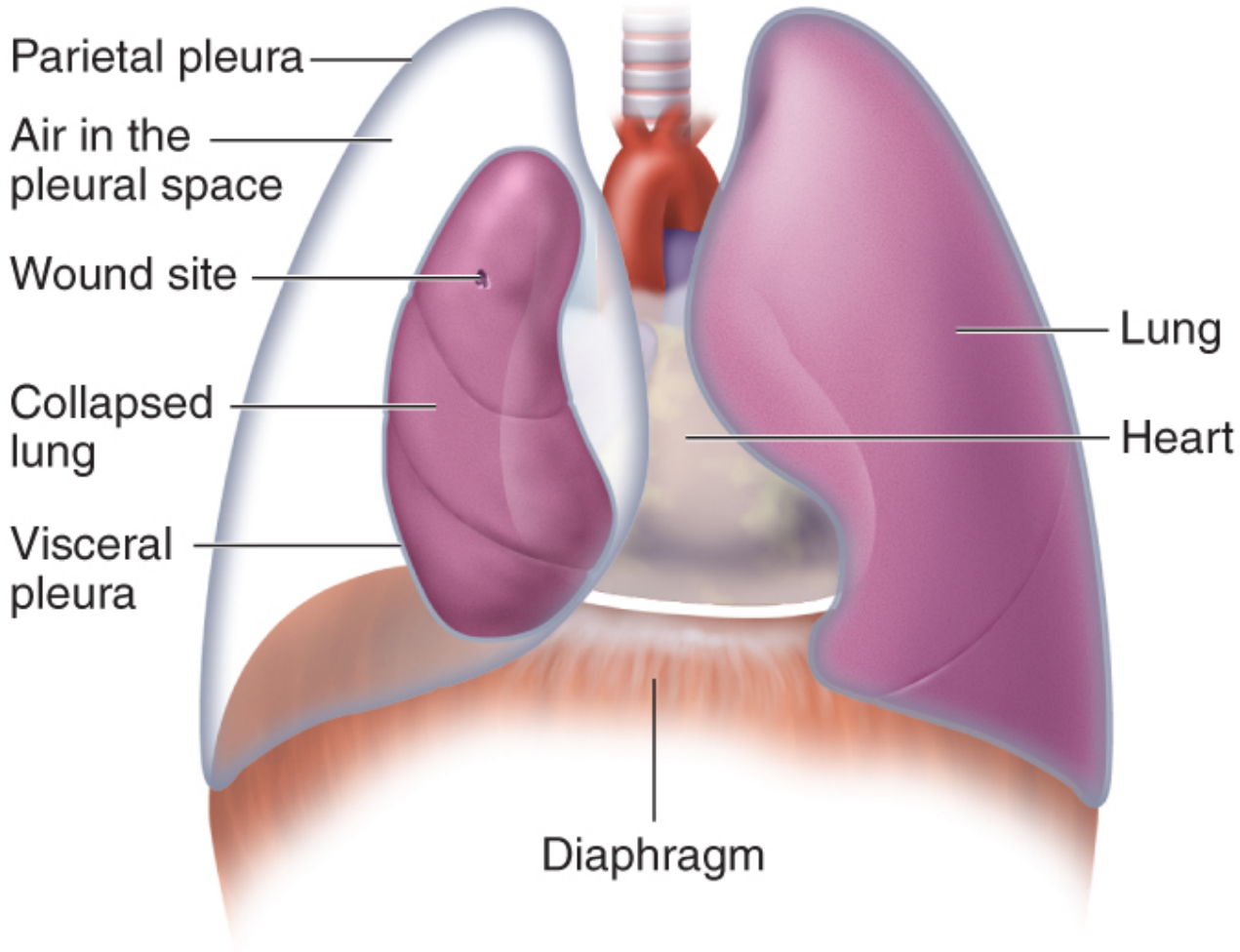
Hypovolemia



Hypoxia

- Pneumothorax
- Hemothorax
- Hemopneumothorax
- Pulmonary Contusion



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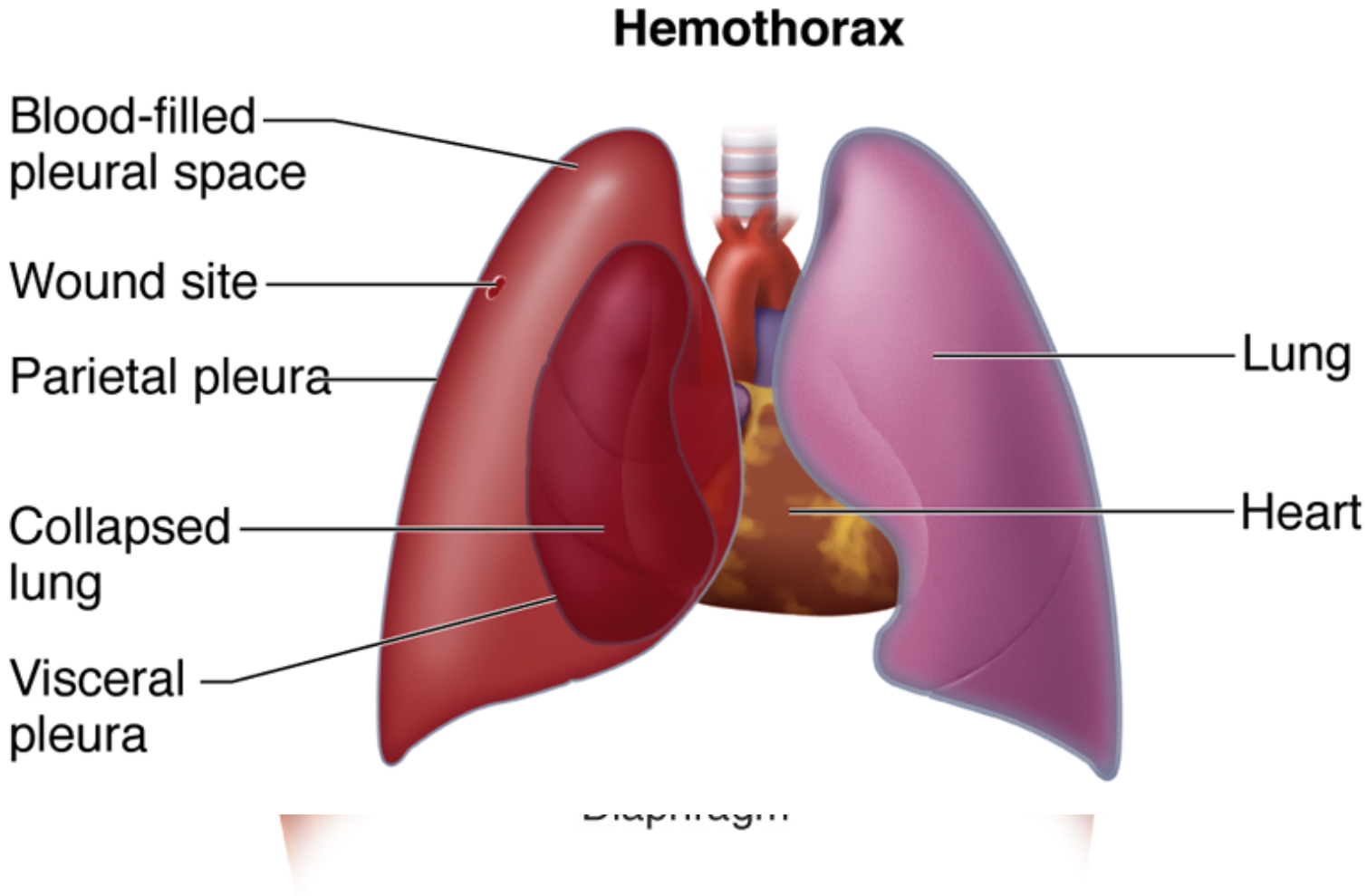
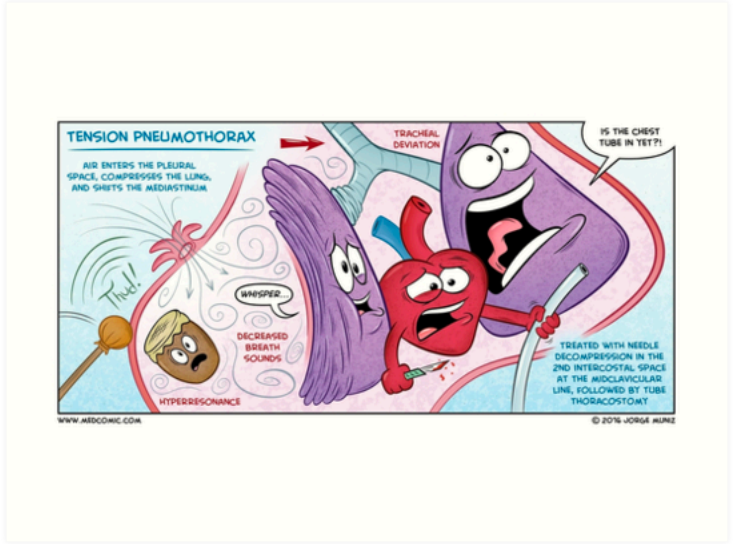
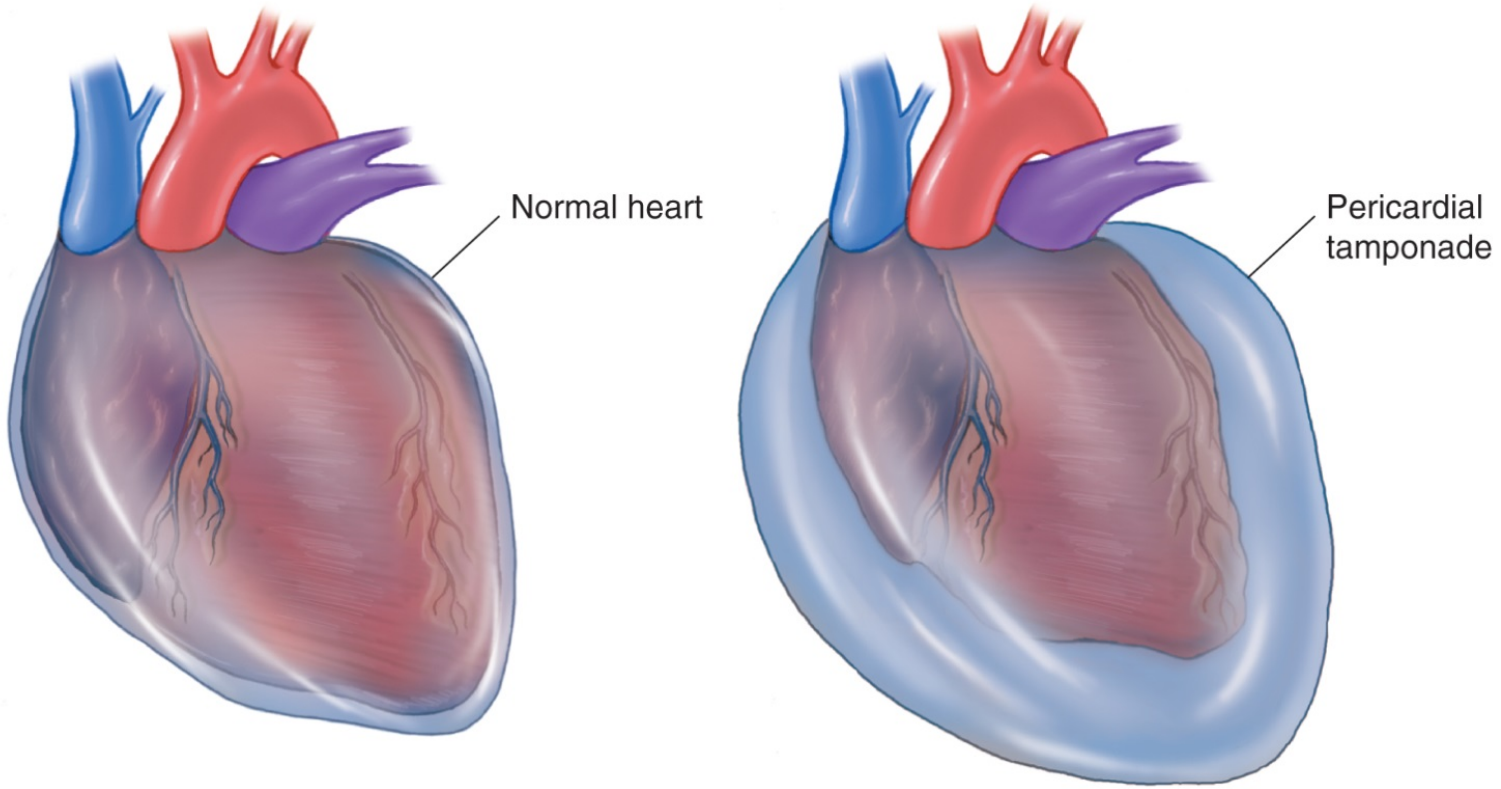


Hypothermia

Tension Pneumothorax



Cardiac Tamponade



Clinical considerations

- Hypovolemia
- Hypoxia
- Hydrogen Ion
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Clinical Controversies

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  - No ACLS mention for use in trauma in AHA guidelines

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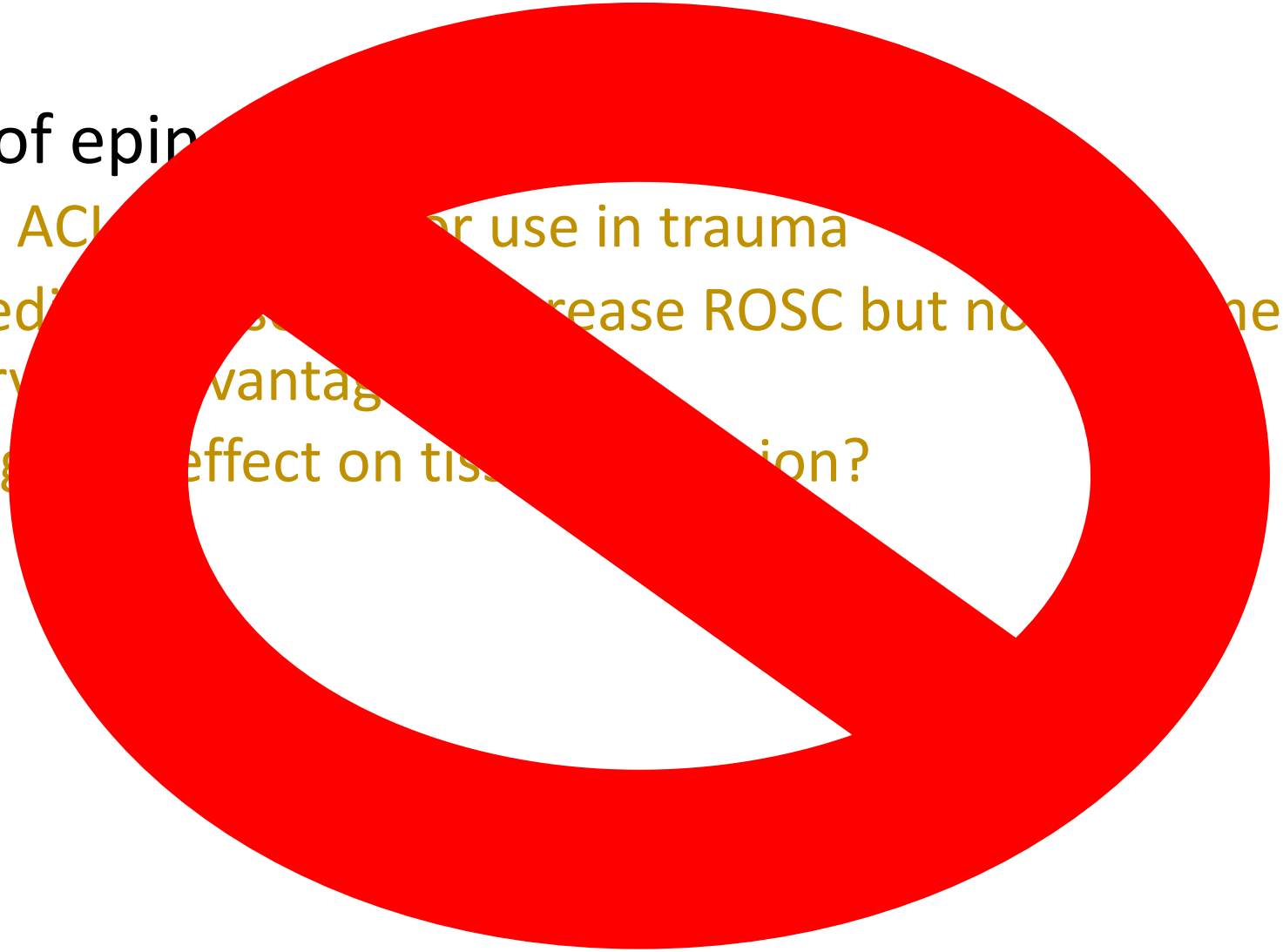
  - Medi ease ROSC but no ne or discharge surv vantag
  - Neg effect on tiss ion?



Clinical Controversies – Chest Compressions

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Clinical Controversies – Transport Guidelines

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  - Access to surgical interventions like thoracotomy or chest tube?

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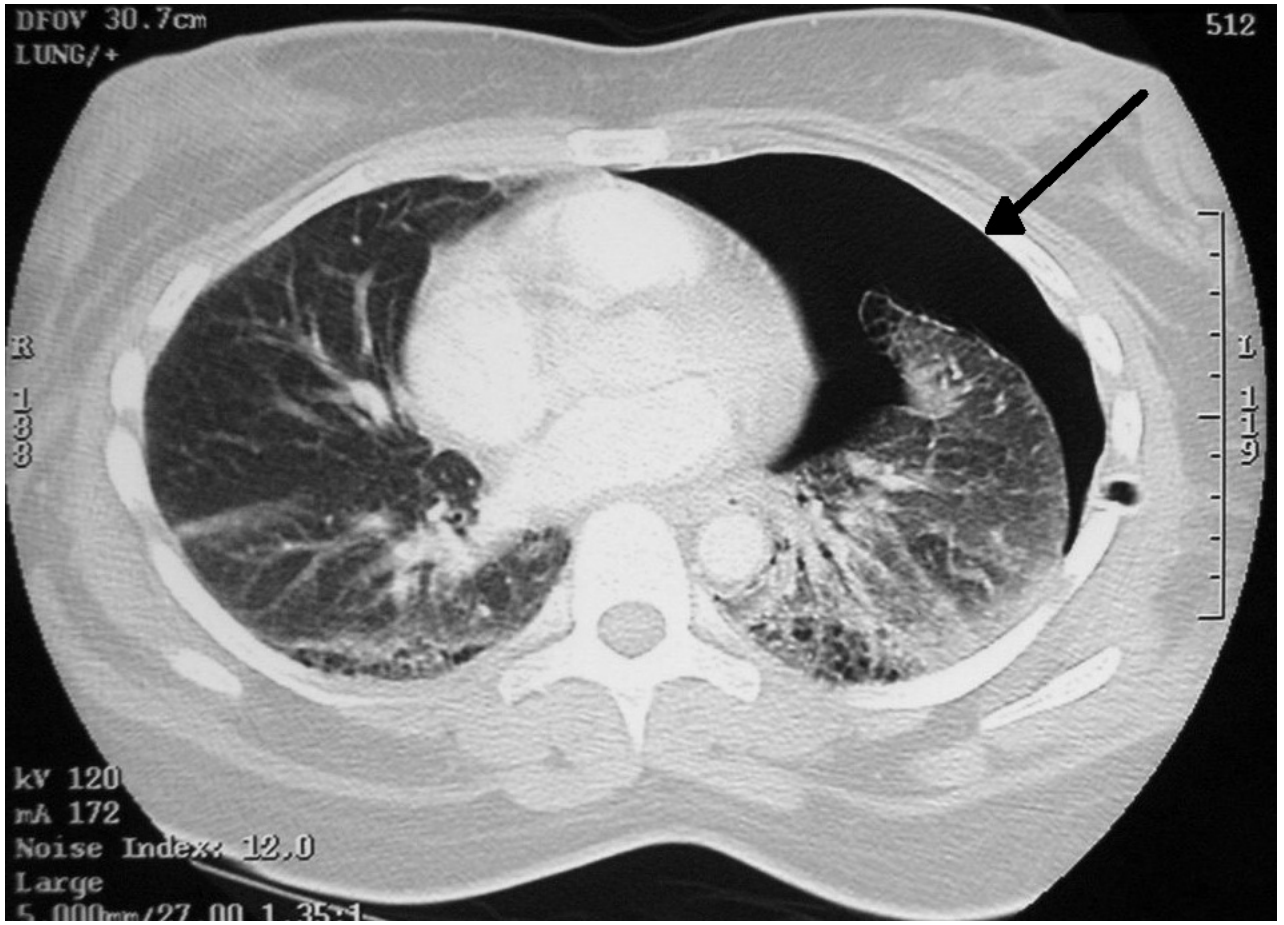
  - Who will likely benefit?
    - EMS Witnessed arrest
    - Isolated penetrating thoracic injuries
    - Within 10 to 15 mins of a trauma center

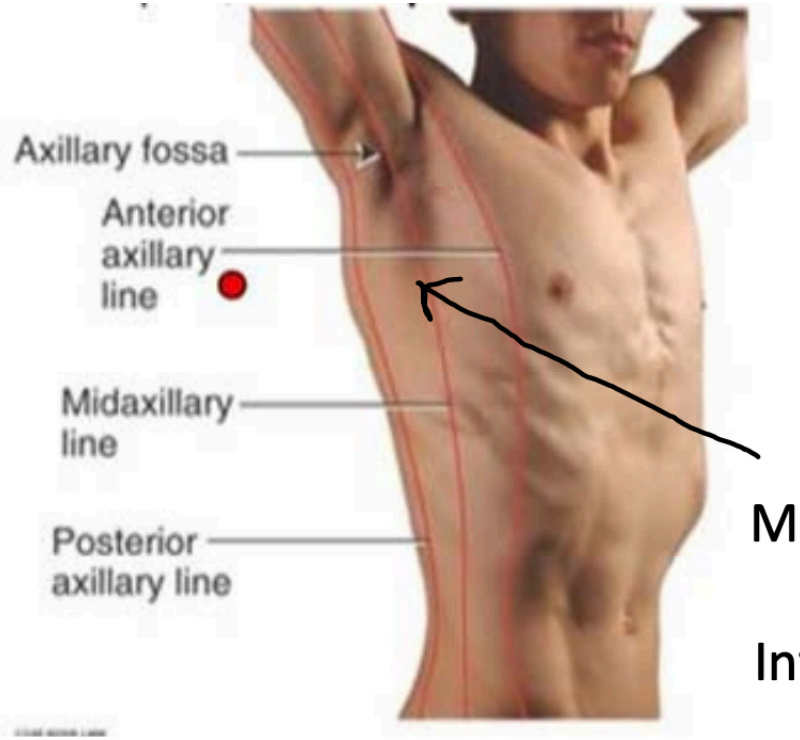
Clinical Controversies – Transport Guidelines

- Transport guidelines
  - Access to surgical interventions like thoracotomy or chest tube?
  - Who will likely benefit?
    - EMS witnessed arrest
    - Isolated penetrating thoracic injuries
    - Within 10 to 15 mins of a trauma center
  - Risk of transport to providers

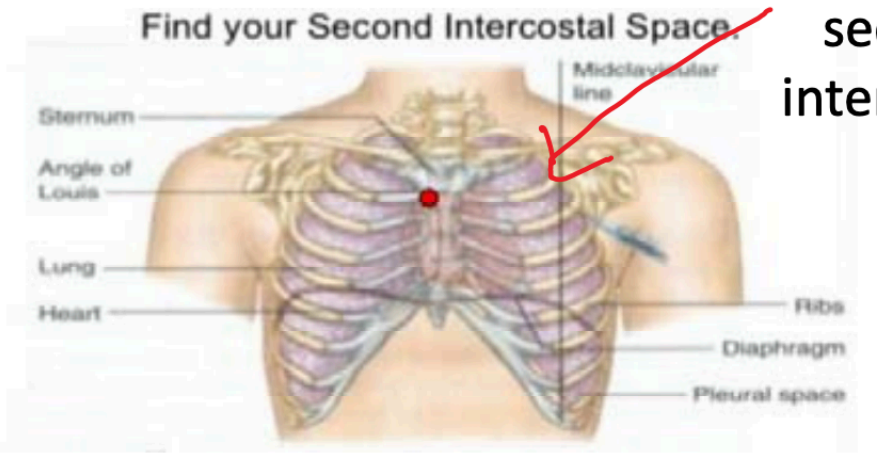
Procedural Interventions



Procedural Interventions – Needle Thoracostomy

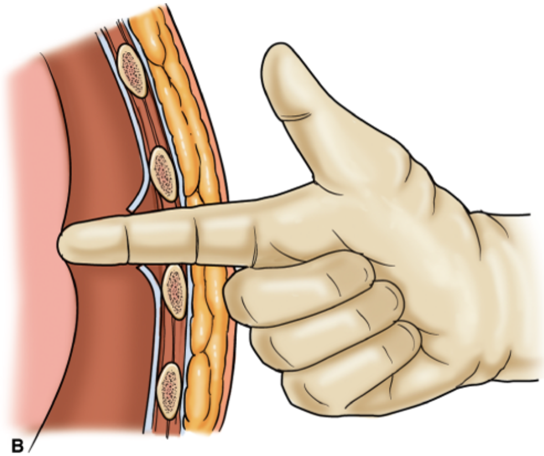


Midaxillary 5th Intercostal



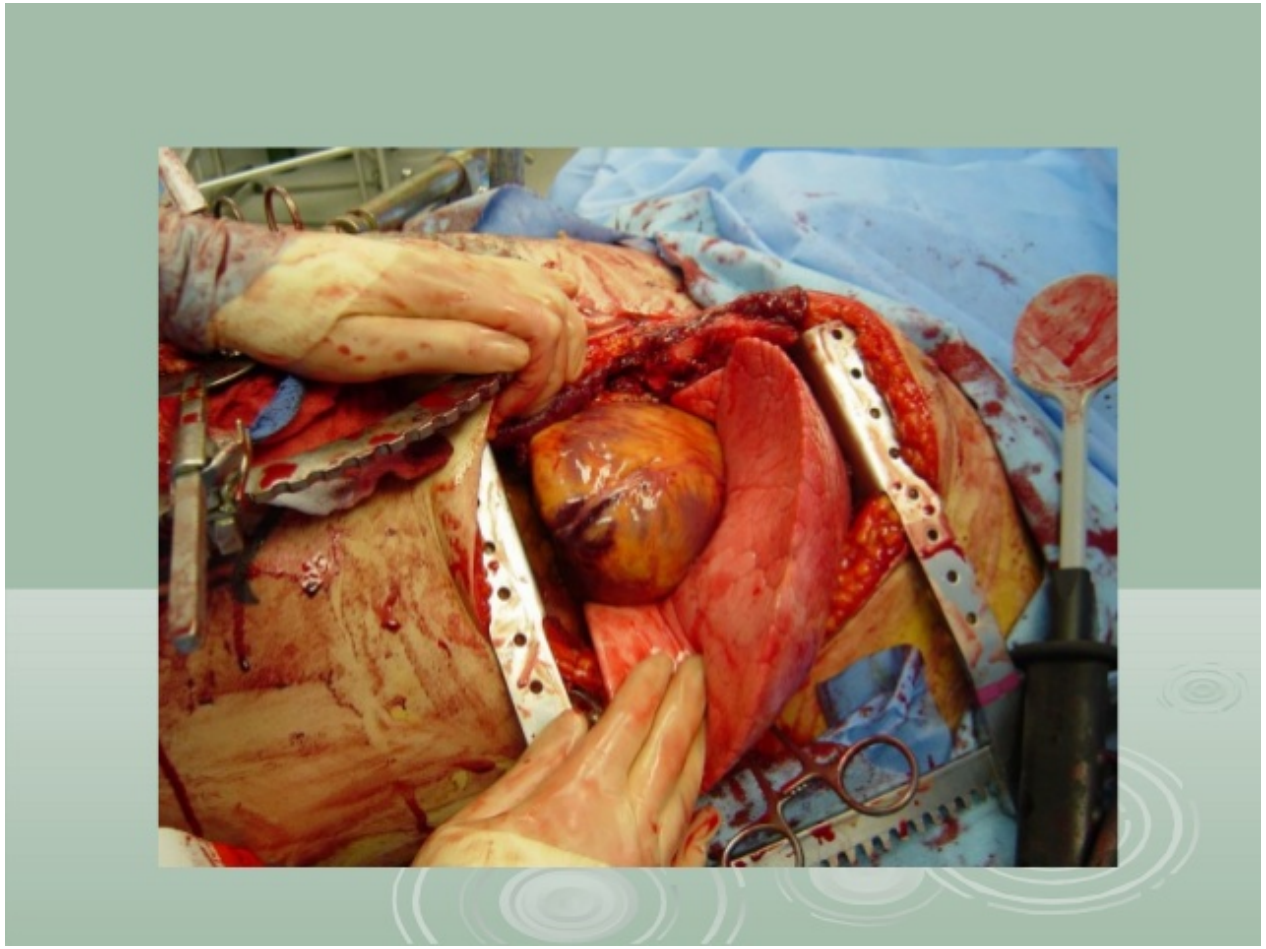
Midclavicular, second intercostal

Procedural Interventions – Finger Thoracostomy



Source: Mattox KL, Moore EE, Feliciano DV: *Trauma, 7th Edition:*
www.accesspharmacy.com

Procedural Interventions - Thoracotomy



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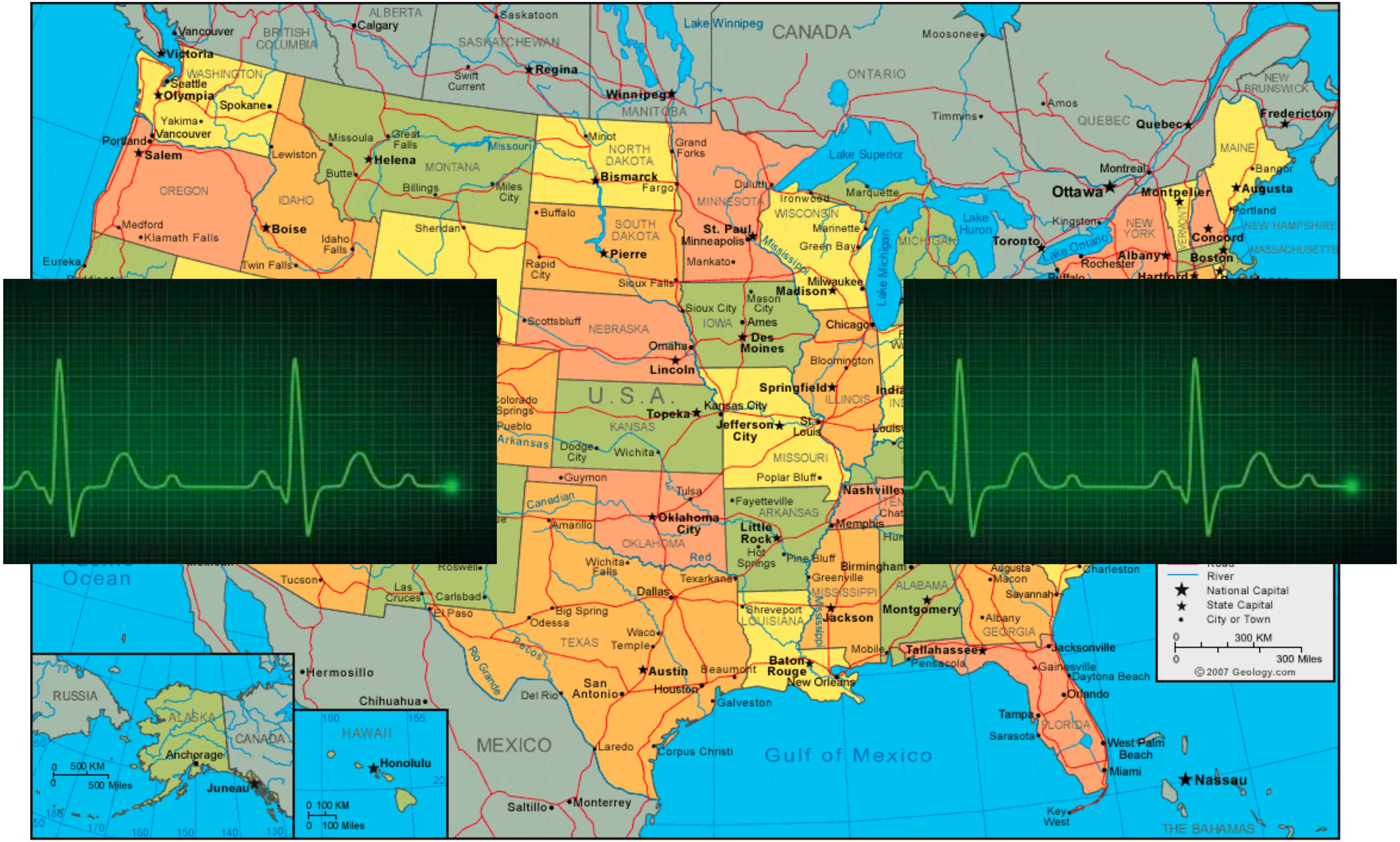
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Birmingham
ALABAMA
Montgomery
Mobile
Tallahassee
Pensacola
Augusta
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Savannah
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GEORGIA
Charleston
Jacksonville
Gainesville
Daytona Beach
Orlando
Tampa
Sarasota
FLORIDA
West Palm Beach
Miami
Key West
Nassau
THE BAHAMAS
Gulf of Mexico
MEXICO
Hermosillo
Chihuahua
Saltillo
Monterrey
RUSSIA
ALASKA
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Anchorage
Juneau
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HAWAII
Honolulu
0 100 KM
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River
National Capital
State Capital
City or Town
0 300 KM
0 300 Miles
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ALBERTA
BRITISH COLUMBIA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
NEW BRUNSWICK
MAINE
CANADA
Lake Winnipeg
Lake Superior
Lake Michigan
Lake Huron
Lake Ontario
Vancouver
Calgary
Saskatoon
Regina
Winnipeg
Moosonee
Timmins
Amos
Quebec
Fredericton
Bangor
Augusta
Portland
Montreal
Ottawa
Kingston
Toronto
Rochester
Albany
Montpelier
Concord
Boston
NEW HAMPSHIRE
MASSACHUSETTS
NEW YORK
VERMONT
Minot
Grand Forks
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Bismarck
Fargo
Duluth
Ironwood
Marquette
MINNESOTA
WISCONSIN
Buffalo
SOUTH DAKOTA
Pierre
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Mankato
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Milwaukee
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Chicago
MICHIGAN
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Mason City
IOWA
Ames
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Lincoln
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Springfield
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Topeka
Jefferson City
St. Louis
Fort Collins
Boulder
Denver
Grand Junction
Colorado Springs
Pueblo
COLORADO
KANSAS
Arkansas
Dodge City
Wichita
MISSOURI
Poplar Bluff
Durango
Guymon
Tulsa
Fayetteville
ARKANSAS
Memphis
Nashville
Santa Fe
Albuquerque
Canadian
Amarillo
Oklahoma City
Little Rock
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OKLAHOMA
Red
Hot Springs
Pine Bluff
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Houston
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Carson City
San Jose
Modesto
Ely
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Monterey
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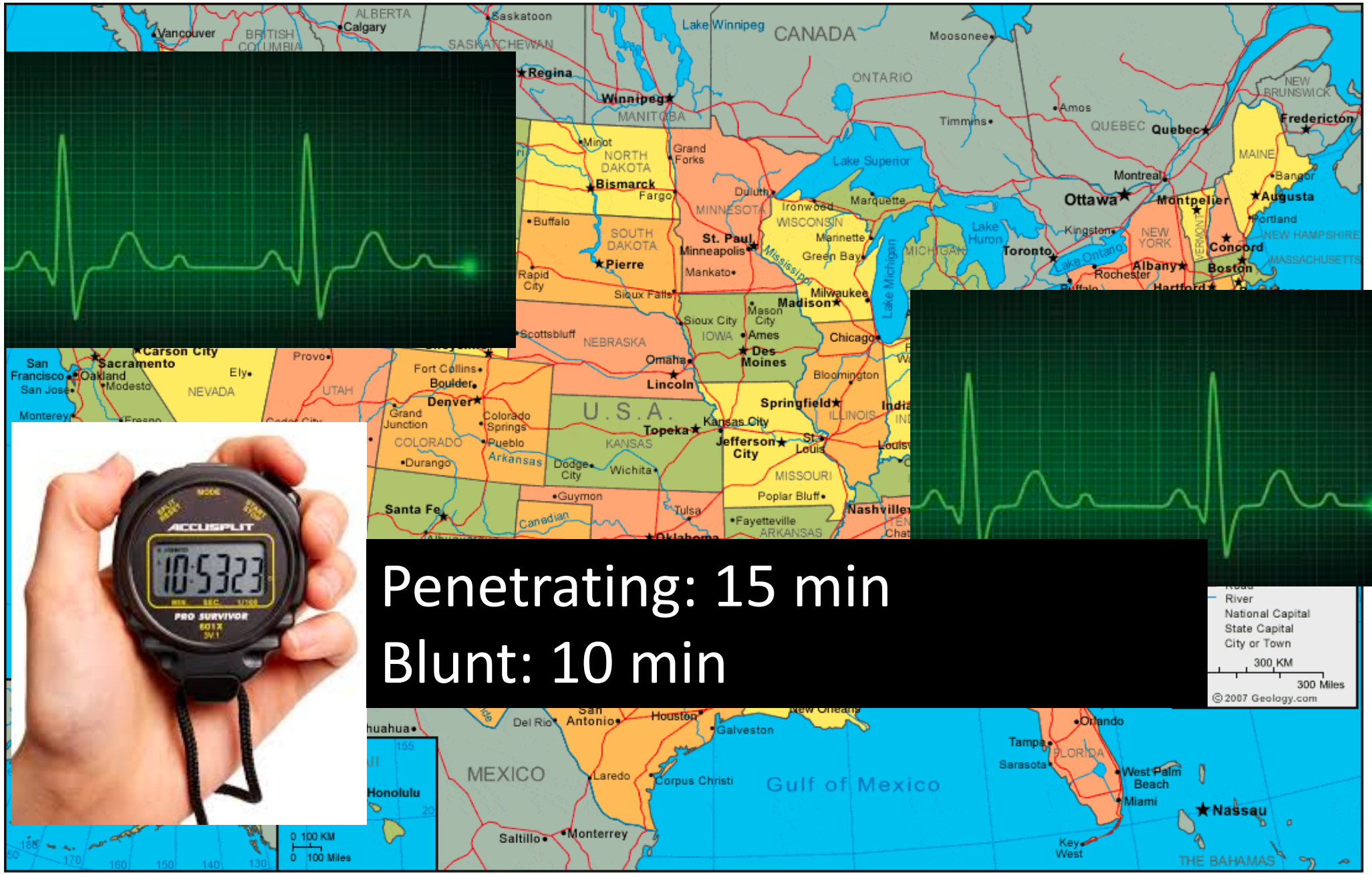
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Procedural Interventions

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- eFAST/RUSH Ultrasound
  - Tamponade
  - Blood in abdomen
  - Pneumo/hemothorax
  - IVC diameter
  - Aorta
  - Pregnancy

Procedural Interventions

- eFAST/RUSH Ultrasound
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- TOR decision support

Other interventions

Sample Protocol

- https://county.milwaukee.gov/files/county/emergency-management/EMS-/Standards-of-Care/TraumaticCardiacArrest2017.pdf

Summary

- Variability in survival from traumatic cardiac arrest
- Difficult to establish clear guidelines on management
- Consider emphasis on life saving interventions
- Unlike most medical cardiac arrest, potential interventions in TCA may not be available in the prehospital setting
- Work closely with local services, hospitals and regional trauma center to help guide transport and termination decisions

Thanks!

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