

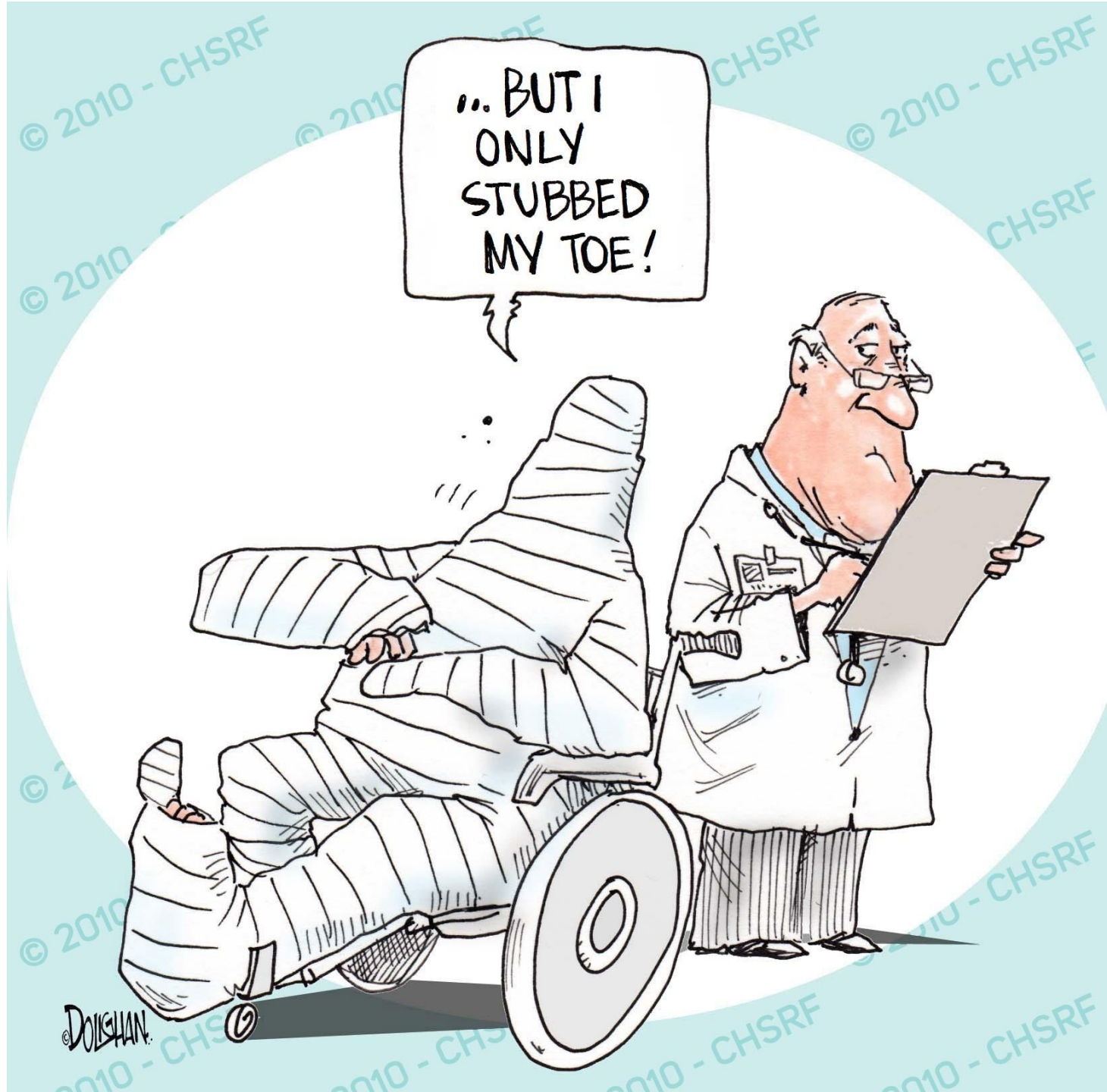


# **TRAUMA:** Back to the Basics

Sean Kivlehan, MD, MPH, NREMT-P

September 2016

**MORE**  
**is**  
**BETTER**



**LESS  
IS  
MORE**

**CPR is as easy as**

**C-A-B**



**C**ompressions

Push hard and fast  
on the center of  
the victim's chest



**A**irway

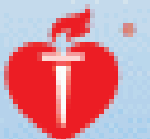
Tilt the victim's head  
back and lift the chin  
to open the airway



**B**reathing

Give mouth-to-mouth  
rescue breaths

American Heart  
Association



*Learn and Live*

Well,  
which is  
it?

*“Too Many cooks in the kitchen”*

*“Too many chiefs, not enough Indians”*

# RESEARCH

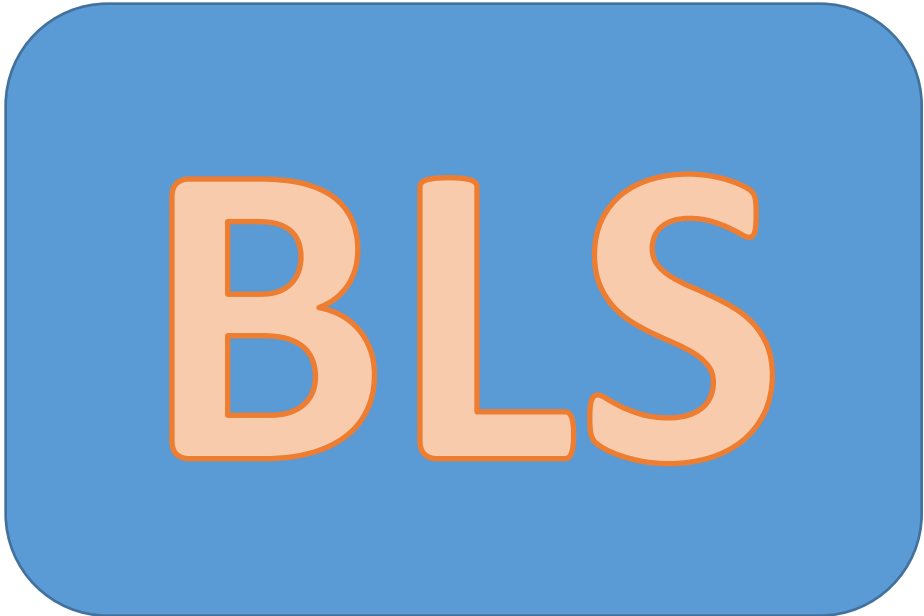
**The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity**

**ALS**

**BLS**

# RESEARCH

## The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity



**BLS**

GCS >9

No Difference

GCS <9

BLS had LOWER mortality  
than ALS  
(50% vs 60%)



On Scene Time: ~70 min

Transport Time: 25 min

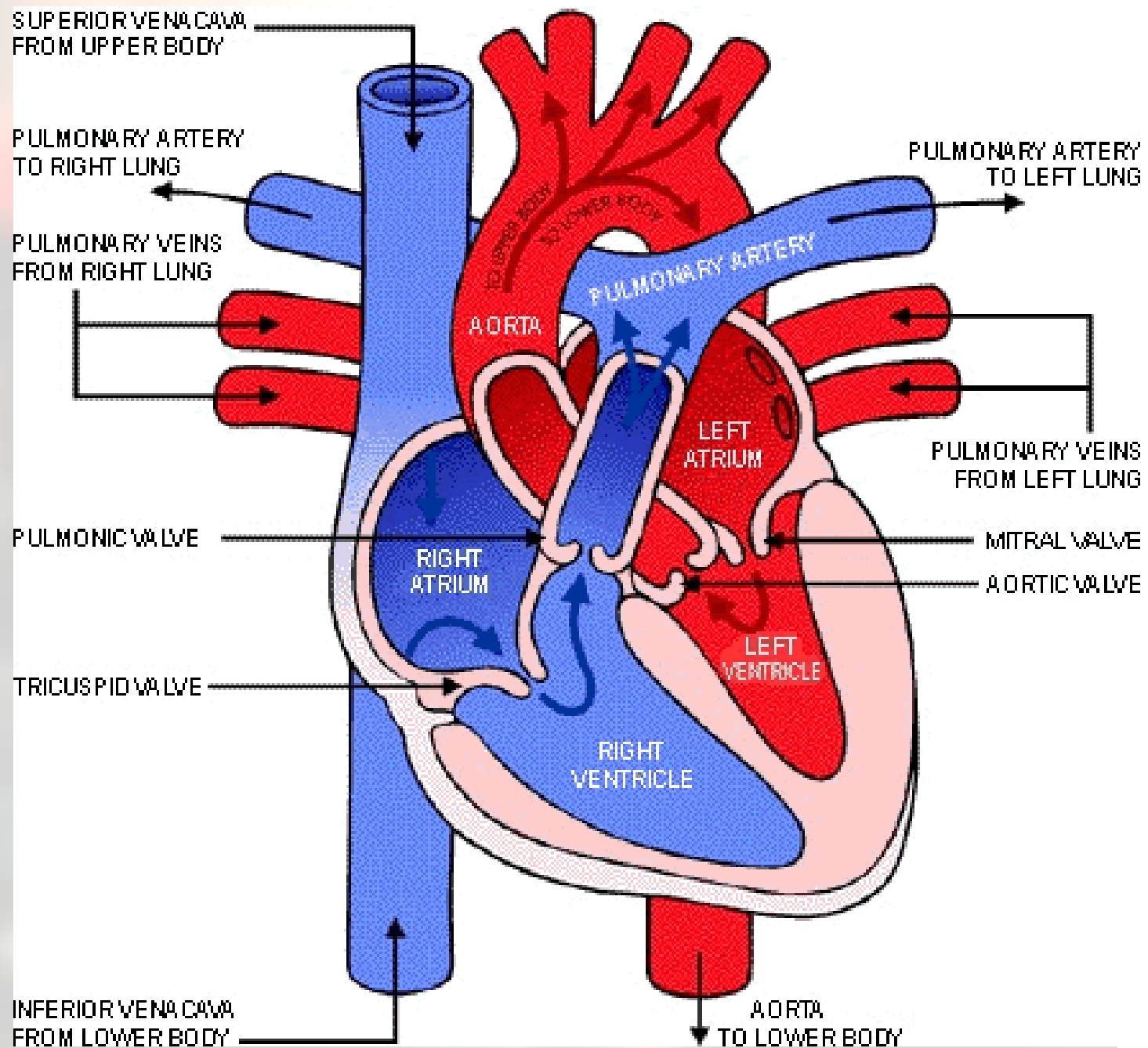
Nearest Trauma Hospital: 4 miles away

In ambulance time: 30 min



Injury:

Pulmonary Vein Tear



# STAY & PLAY



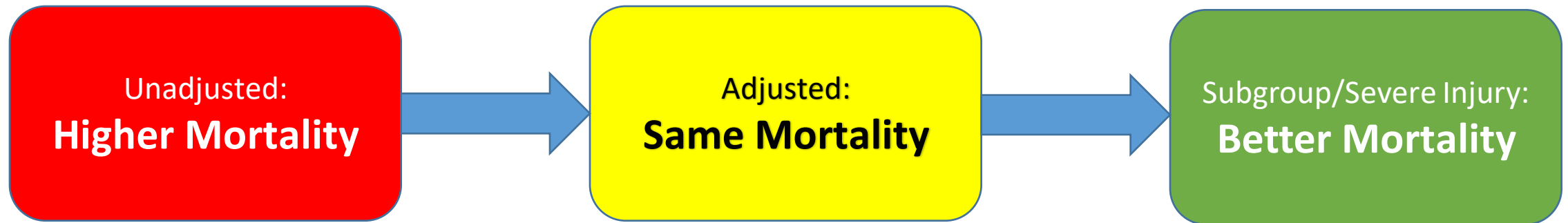
# LOAD & GO



# PLAY WITHOUT EXTENDING STAY

# Severity-Adjusted Mortality in Trauma Patients Transported by Police

Roger A. Band, MD\*; Rama A. Salhi, BS, MHS; Daniel N. Holena, MD; Elizabeth Powell, MD; Charles C. Branas, PhD; Brendan G. Carr, MD, MS



BACK TO THE  
BASICS



**C-A-B (Not A-B-C)**



**Chest  
Compressions**



**Airway**



**Breathing**

# CAB ??

CARDIAC ARREST

YES

TRAUMA

NO

# AIRWAY: BLS or ALS?

Positioning **BLS**

Supine **BLS**

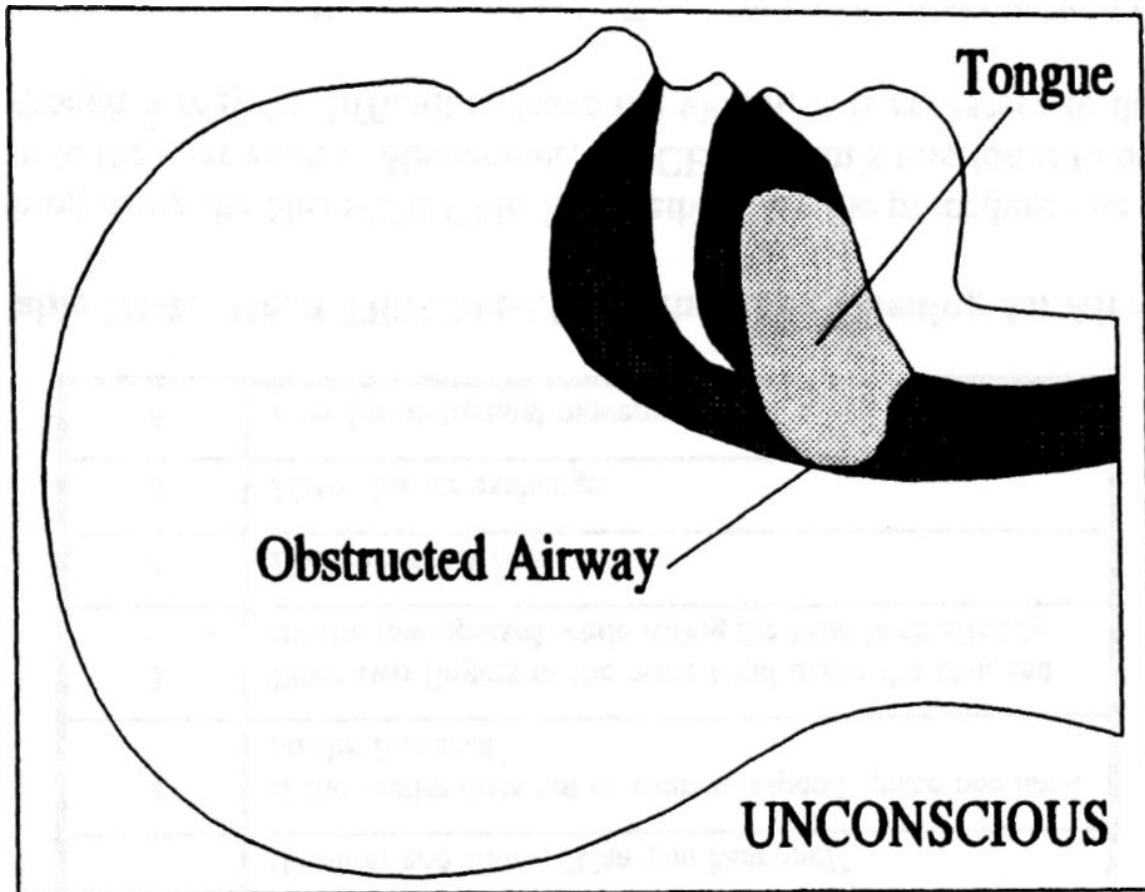
Head **BLS**

Head **BLS**

King Tube **BLS**

Intubation

# Positioning





# Suction



# OPA



# OPA

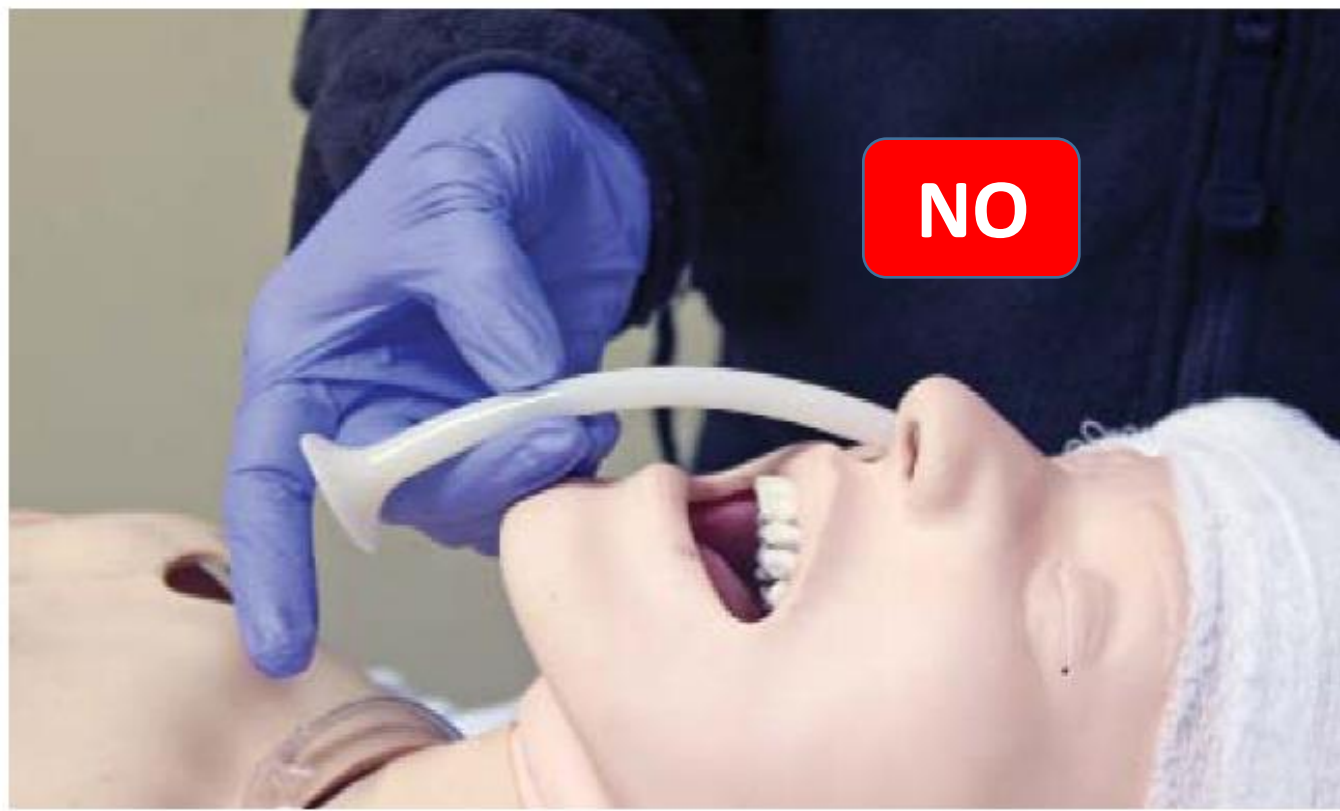
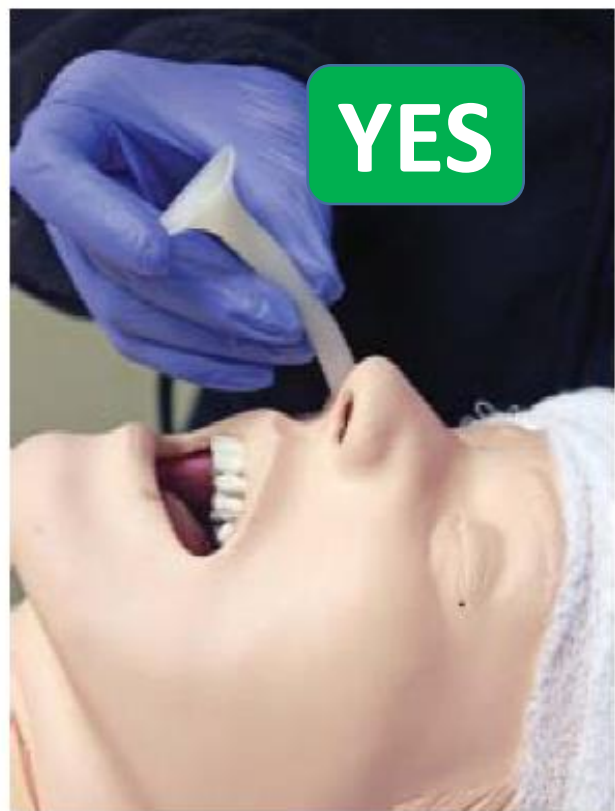
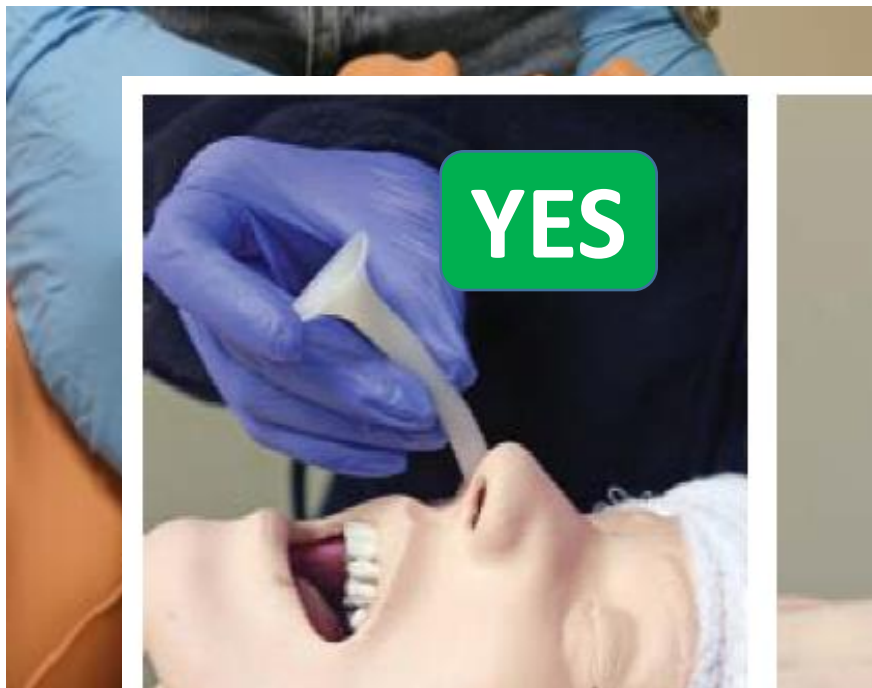


# OPA

## THEY WORK

In – Hospital Study in 2012 found a **3.52 Odds Ratio** favoring good neuro outcome if an adjunct was used with BVM ventilation!

# NPA



But I thought you can't use it in trauma?

### **The Bottom Line**

Nasopharyngeal airway placement can safely be performed in patients with head injury when airway management is needed. The benefit of establishing an airway outweighs the incredibly small risk of the NPA entering the brain.

# King Tube



## **The Guideline:**

Supraglottic Airway Devices show an acceptable success rate for primary use in trauma

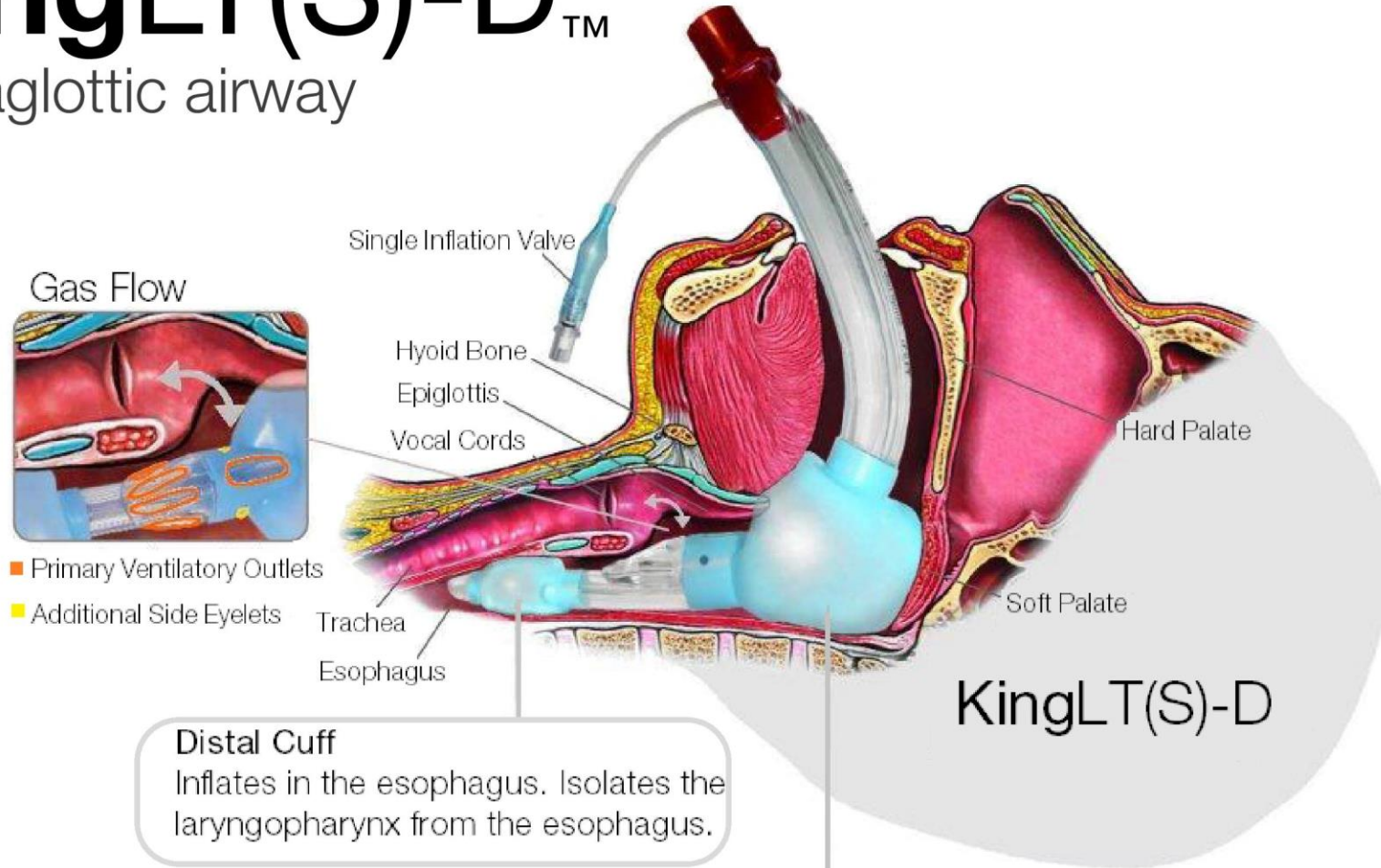
--Eastern Association for the Surgery of Trauma (EAST) Trauma Airway Guidelines

## **The Capability:**

Use of Supraglottic Airways by EMTs with only basic training appears safe and feasible.

# KingLT(S)-D™

supraglottic airway



- Primary Ventilatory Outlets
- Additional Side Eyelets

**Distal Cuff**  
Inflates in the esophagus. Isolates the laryngopharynx from the esophagus.

**Proximal Cuff**  
Inflates the base of the tongue. Isolates the laryngopharynx from the oropharynx and nasopharynx.



# Intubation

RESEARCH

Open Access

Prehospital intubation of the moderately injured patient: a cause of morbidity? A matched-pairs analysis of 1,200 patients in the Trauma Registry

Bjoern Hussmann<sup>1\*</sup>, Rolf Lefering<sup>2</sup>, Christian Waydhaas<sup>3</sup>,  
Max Daniel Kautner<sup>1</sup> and Sven Lendemans<sup>1</sup>

WORSE

Review article

Endotracheal intubation versus supraglottic airway placement in out-of-hospital cardiac arrest: A meta-analysis

Justin L. Benoit<sup>\*</sup>, Ryan B. Gerecht, Michael T. Steuerwald, Jason T. M...

BETTER

Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

SAME

Kohei Hasegawa, MD, MPH

**Importance** It is unclear whether advanced airway management such as endotra-

Benoit J, *Resuscitation* 2015  
Hasegawa K, *JAMA* 2013



your  cards  
someecards.com

memecenter.com 

# BREATHING: BLS or ALS?

**BLS**

Sucking Chest  
Wound

**BLS**

Flail Chest

**BLS**

Needle  
Decompression

# BVM

*“Bring the Face to the Mask”*







**Table 3. Identification of Risk Factors for Difficult Mask Ventilation with Multivariate Analysis (n = 1,502)**

Variables	Odds Ratio (95% CI)	P Value
Presence of beard	3.18 (1.39–7.27)	0.006
Body mass index > 26 kg/m <sup>2</sup>	2.75 (1.64–4.62)	<0.001
Lack of teeth	2.28 (1.26–4.10)	0.006
Age > 55 yr	2.26 (1.34–3.81)	0.002
History of snoring	1.84 (1.09–3.10)	0.02

**Table 3. Comparison by Technique**

	One-Hand	Two-Hand	Effect (95% CI)	P Value
$V_E$ , l/min average (SD)	6.32 (3.24)	7.95 (2.70)	1.63 (1.16, 2.10)	< 0.001
$V_t$ , ml/kg PBW average (SD)	6.80 (3.10)	8.60 (2.31)	1.80 (1.29, 2.32)	< 0.001
$MV_i$ or $V_{ds}$ , n (%)	8 (19.0)	0	—	0.013

CI = confidence interval;  $MV_i$  = inadequate mask ventilation (< 4 ml/kg predicted body weight); PBW = predicted body weight;  $V_{ds}$  = dead-space ventilation (< 150 ml, no clinical sign of ventilation);  $V_E$  = minute ventilation;  $V_t$  = tidal volume.



# Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

Kohei Hasegawa, MD, MPH

**Importance** It is unclear whether advanced airway management such as endotra-

5 year observational study

649,359 patients

43% with airway

## Good neuro outcome

Advanced Airway: 1.1%

BVM only: 2.9%

# Oxygen



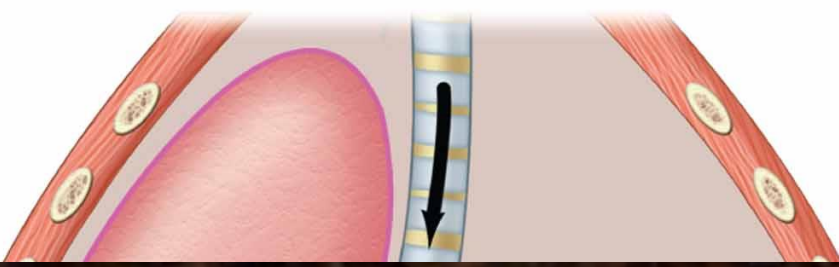
**Apneic  
Oxygenation**

**NC @ 15 lpm**

# Sucking Chest Wound



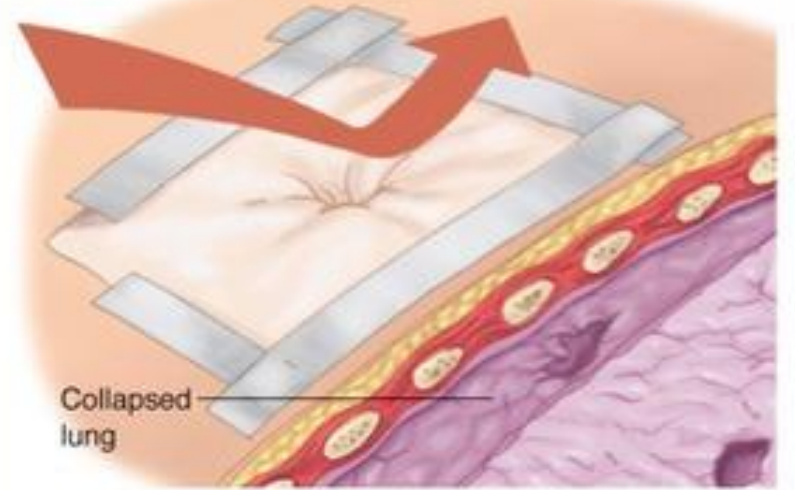




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ng

On inspiration, dressing seals wound, preventing air entry



Collapsed lung

Expiration allows trapped air to escape through untaped section of dressing





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**TACTICAL-LIFE**

# Flail Chest

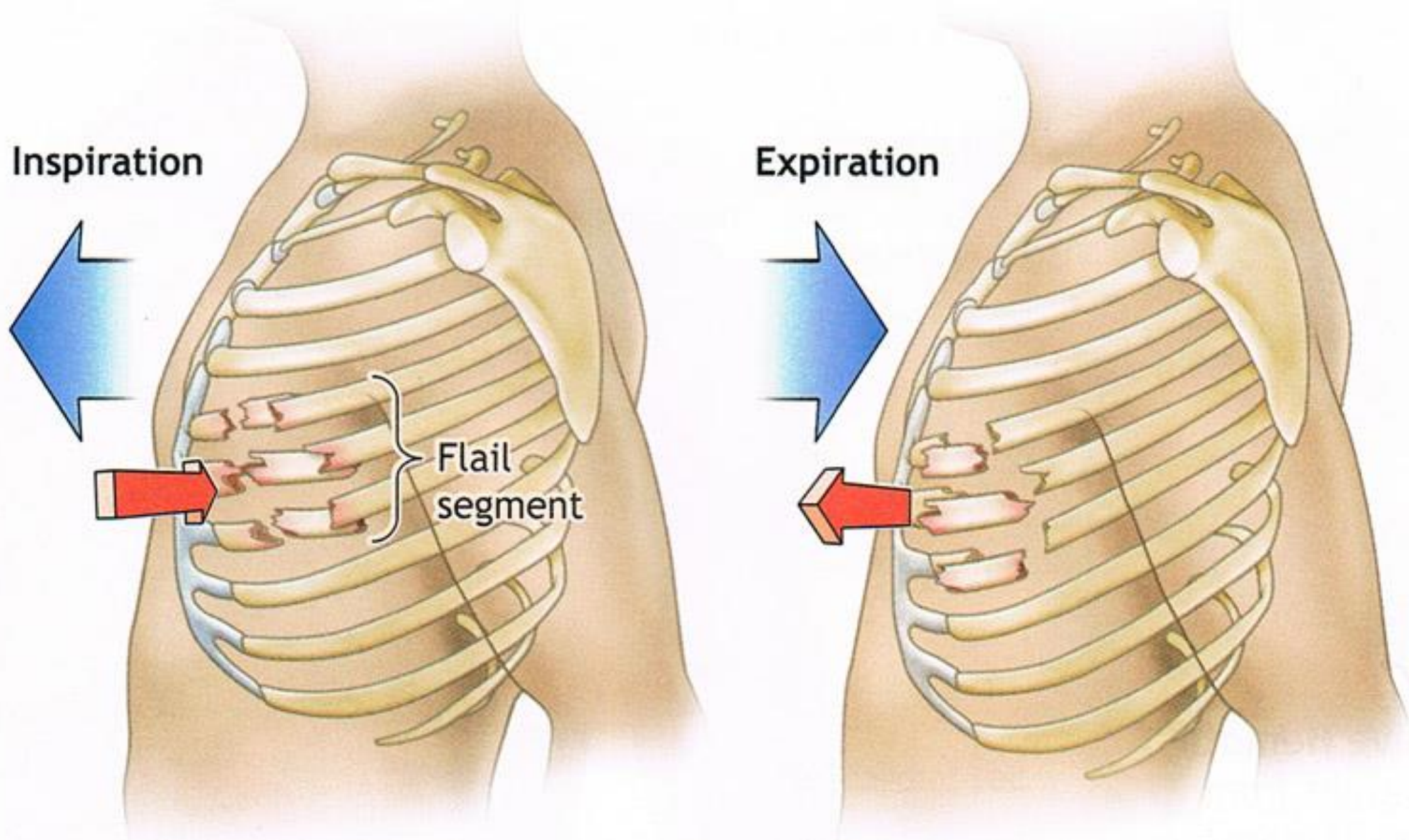


Inspiration



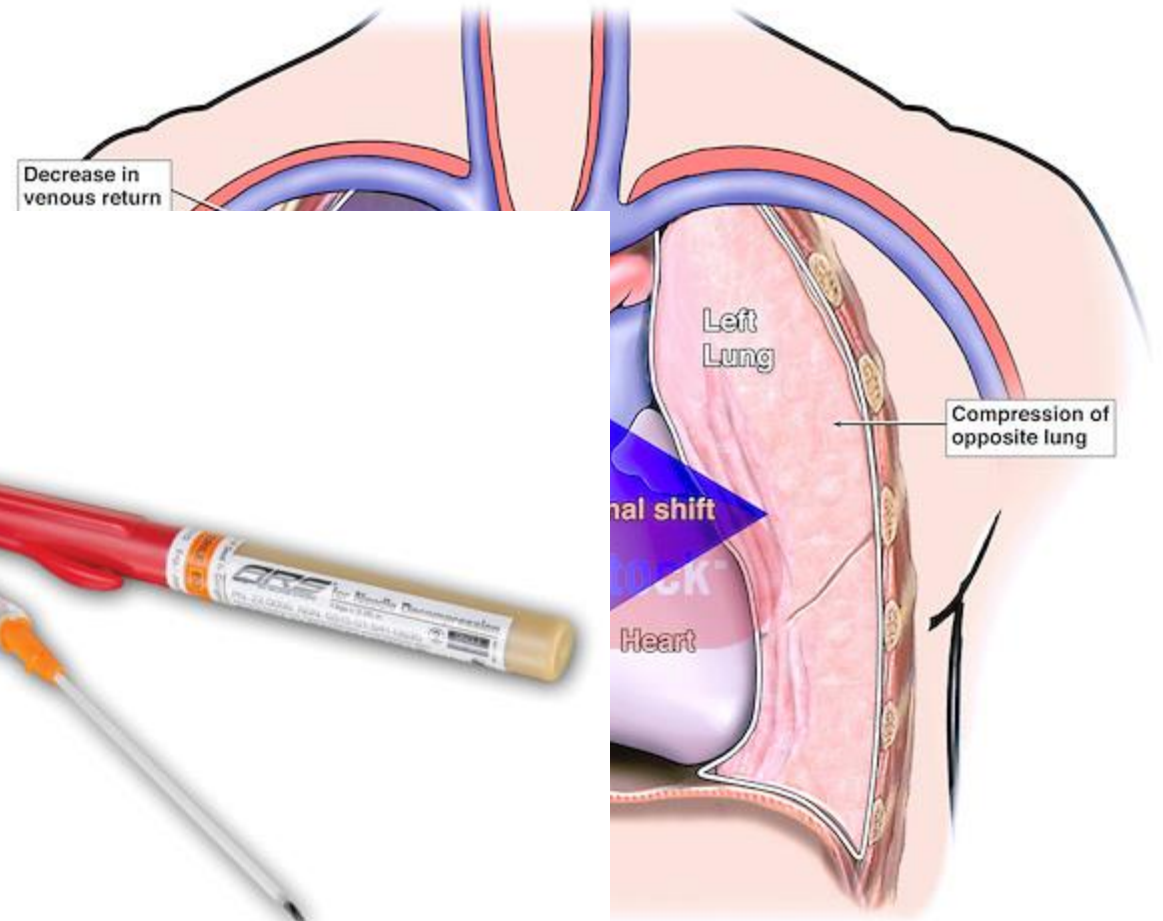
Flail segment

Expiration





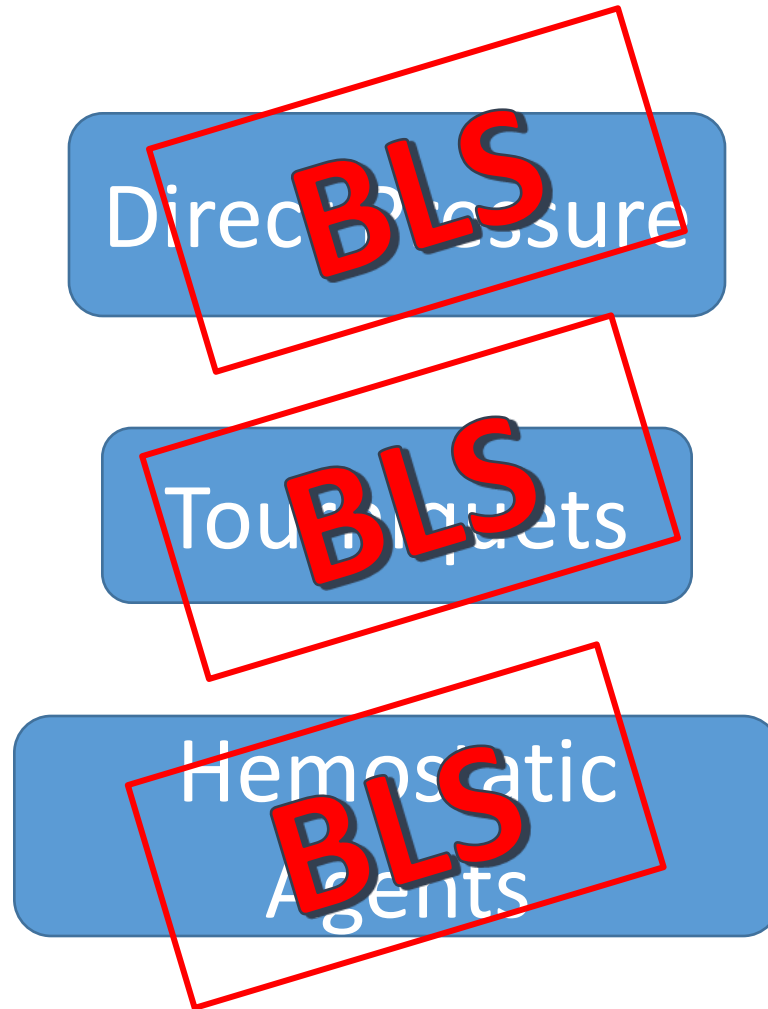
# Needle Decompression



ruptured lung enters the pleural air pressure builds up, the affected mediastinal tissues are displaced to



# CIRCULATION: BLS or ALS?



# Direct Pressure

**Myth #6: Never Remove a Dressing from a Bleeding Wound; When It Bleeds Through Just Add on More Dressings!**

# Bleeding Control, per the 2014 ACS Guideline

1. Direct Pressure
2. Tourniquet
3. Hemostatic Agent



# Tourniquets



# Standard equipment for Boston EMS

## Marathon bombing:

170 injured, 3 dead, 13 lost one or more limbs



# Tourniquet History

## *Vietnam War*

- Case report of limb loss secondary to tourniquet
- Fasciotomies sometimes needed when tourniquet times in excess of 2 hours
- Improvised with rubber tubing, rifle slings-too narrow and often placed too high above injury -> tissue loss

## *Iraq War*

- Recent studies show no limb loss, permanent disability
- Timely use can raise survival 90%
- Now routinely issued to soldiers



# Tourniquet Controversy

## Advantages:

- Immediate bleeding control in unsafe scene
- Control of severe hemorrhage when direct pressure not effective
- Time to address other life threats
- Save lives and have little associated morbidity

## Disadvantages:



- Transient nerve palsy (1.5-3%)
- Improvised tourniquets, prolonged application

# TQ Use

- Apply compressive pressure to a limb to occlude all distal arterial and venous flow with a 1.5-2 inch strap
- Mistakes? Not placed correctly, not tight enough, using when not needed



# Beware: Counterfeit tourniquets could cost lives

11 Comments / f Shares /  116 Tweets /  Stumble / @ Email

More +

**WASHINGTON** -- CBS News has learned of an alert from New Hampshire that has implications for first responders across the country and the military.

It concerns tourniquets, medical devices that can save lives by stopping blood loss. We've learned that counterfeit tourniquets that easily break are showing up around the country.

The bulletin went out to New Hampshire first responders after paramedics experienced a "catastrophic failure" with two counterfeit tourniquets at the scene of a motorcycle accident.

Sources say a rod snapped in half as the paramedics tried to stem a hemorrhage on

# Hemostatic Agents



---

# Comparison of Celox-A, ChitoFlex, WoundStat, and Combat Gauze Hemostatic Agents Versus Standard Gauze Dressing in Control of Hemorrhage in a Swine Model of Penetrating Trauma

Lanny F. Littlejohn, MD, John J. Devlin, MD, Sara S. Kircher, Robert Lueken, MD, Michael R. Melia, MD, and Andrew S. Johnson, MD

**Results:** Overall, no difference was found among the agents with respect to initial hemostasis, rebleeding, and survival. Localizing effects among the granular agents, with and without delivery mecha-

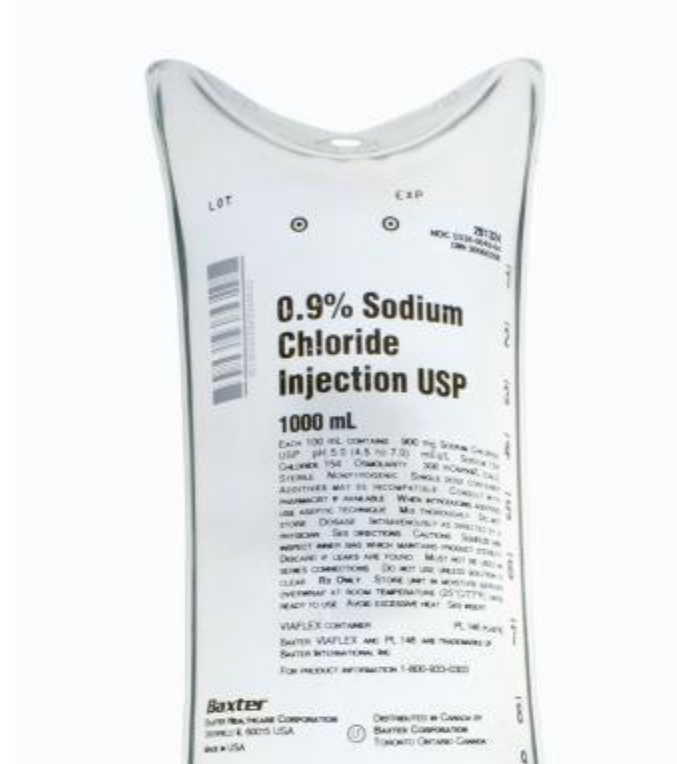
# What is the Evidence for ALS?

- In Canada, the OPALS study transported (90% blunt trauma)
- Philadelphia looked at 1,499
  - ALS: 45%
  - BLS: 15%
  - Police: 40%
- If ALS transport + treatment



# IV Fluids?

Permissive Hypotension  
No synthetic blood yet



**Blood Substitute**

# D The Neurologic Exam

1. Brain (GCS)
2. Eyes (pupils)
3. Wiggle x4
4. Feel x4



Glasgow Coma Score		
Eye Opening (E)	Verbal Response (V)	Motor Response (M)
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2= <u>Decerebrate</u> 1=None
		<b>Total = E+V+M</b>





# GCS?

- Opens eyes to pain
- Moans when stimulated
- Hands and feet posture inwards to core

$$2-2-3 = 7$$

# GCS Accuracy

2,084 observations of GCS scoring



**Total Accuracy was 33%**

*Verbal: 69%*

*Eye-opening: 61%*

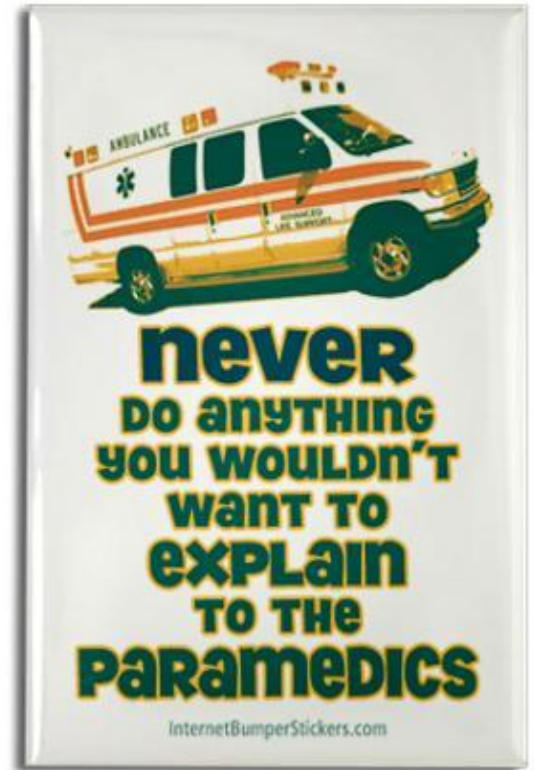
*Motor: 60%*

Glasgow Coma Score		
Eye Opening (E)	Verbal Response (V)	Motor Response (M)
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2= <u>Decerebrate</u> 1=None
		<b>Total = E+V+M</b>

Exposure



*Strip & Flip*



# *During Transport*

- Vital Sign Trending
- Anticipating Complications



*Don't Forget*

## The Sign Out

1. Key info to relay to the ER
2. Getting Follow Up

**DO YOU WANT  
TO TALK TO THE  
PARAMEDIC  
IN CHARGE  
OR THE  
EMT  
WHO KNOWS WHAT'S  
GOING ON?**

# Field Reports

- Normotensive patient in the ED with reported field hypotension
  - 37% had emergent surgery, 6% died
- If no report of hypotension
  - 11% had emergent surgery, 3% died

## So we talked about...

- ✓ BLS >> ALS for trauma patients
- ✓ ABC's not CAB's for trauma
- ✓ Always use an airway adjunct
- ✓ Masking tips for BVM: Position, 2 people, Vasoline, Dentures
- ✓ Apneic Oxygenation
- ✓ Don't pack dressings over dressings
- ✓ Gauze probably works just as good as hemostatics
- ✓ Get a baseline Neuro exam
- ✓ GCS needs to be accurate
- ✓ Always expose!



Thanks!

[Sean.Kivlehan@gmail.com](mailto:Sean.Kivlehan@gmail.com)