MORE IS BETTER

"...BUT I ONLY STUBBED MY TOE!"
CPR is as easy as C-A-B

- **Compressions**: Push hard and fast on the center of the victim’s chest
- **Airway**: Tilt the victim’s head back and lift the chin to open the airway
- **Breathing**: Give mouth-to-mouth rescue breaths

American Heart Association
Learn and Live

©2010 American Heart Association 10/10DS3849
Well, which is it?

“Too Many cooks in the kitchen”

“Too many chiefs, not enough Indians”
The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity
The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity

GCS >9  No Difference

GCS <9  BLS had LOWER mortality than ALS
         (50% vs 60%)

Stiell I, CMAJ 2009
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

Meizoso JP, J Acute Care Surg 2015
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

Unadjusted: Higher Mortality

Adjusted: Same Mortality

Subgroup/Severe Injury: Better Mortality

Band, RA, Ann Emerg Med 2014
BACK TO THE BASICS
C-A-B (Not A-B-C)

- **C** Chest Compressions
- **A** Airway
- **B** Breathing
CAB ??

- CARDIAC ARREST: YES
- TRAUMA: NO
AIRWAY: BLS or ALS?

Positioning
Suction
OPA
NPA
King Tube
Intubation
Positioning

- Obstructed Airway
- Tongue
Suction
OPA
In a study in 2012, a **3.52 Odds Ratio** was found favoring good neuro outcome if an adjunct was used with BVM ventilation.
NPA

YES

NO
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.

Mayglothling J, *J Trauma Acute Care Surg* 2012
Roth D, *AJEM* 2015
KingLT(S)-D™
Supraglottic Airway

Gas Flow
- 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

Review article

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

Justin L. Benoit*, Ryan B. Gerecht, Michael T. Steuerwald, Jason T. Moore

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

Kohei Hasegawa, MD, MPH

Importance It is unclear whether advanced airway management such as endotracheal intubation or supraglottic airway placement improves neurologic outcomes and survival in patients with out-of-hospital cardiac arrest.
BREATHTING: BLS or ALS?

- BVM
- Sucking Chest Wound
- Flail Chest
- Needle Decompression
“Bring the Face to the Mask”

http://www.airwaycam.com/rescue-ventilation.html
<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of beard</td>
<td>3.18 (1.39–7.27)</td>
<td>0.006</td>
</tr>
<tr>
<td>Body mass index &gt; 26 kg/m²</td>
<td>2.75 (1.64–4.62)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lack of teeth</td>
<td>2.28 (1.26–4.10)</td>
<td>0.006</td>
</tr>
<tr>
<td>Age &gt; 55 yr</td>
<td>2.26 (1.34–3.81)</td>
<td>0.002</td>
</tr>
<tr>
<td>History of snoring</td>
<td>1.84 (1.09–3.10)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Table 3. Comparison by Technique

<table>
<thead>
<tr>
<th></th>
<th>One-Hand</th>
<th>Two-Hand</th>
<th>Effect (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_E ), l/min average (SD)</td>
<td>6.32 (3.24)</td>
<td>7.95 (2.70)</td>
<td>1.63 (1.16, 2.10)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>( V_t ), ml/kg PBW average (SD)</td>
<td>6.80 (3.10)</td>
<td>8.60 (2.31)</td>
<td>1.80 (1.29, 2.32)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>MV(<em>i) or V(</em>{ds}), n (%)</td>
<td>8 (19.0)</td>
<td>0</td>
<td>—</td>
<td>0.013</td>
</tr>
</tbody>
</table>

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.
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

On inspiration, dressing seals wound, preventing air entry.

Collapsed lung

Expiration allows trapped air to escape through untaped section of dressing.
Flail Chest
Needle Decompression

ruptured lung enters the pleural
air pressure builds up, the affected
diastinal tissues are displaced to
CIRCULATION: BLS or ALS?

- Direct Pressure
- Tourniquets
- Hemostatic Agents
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

NEVER! - UNLESS ABSOLUTELY NECESSARY
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
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

- QuikClot Combat Gauze
- Celox
- WoundStat
- TraumaCure
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 showed 10% increase in mortality if ALS transported (90% blunt trauma).

• Philadelphia looked at 1,490 penetrating trauma patients:
  • ALS: 45%
  • BLS: 15%
  • Police: 40%

• If ALS transport + treatment done, mortality was 3.7 times more likely.

Rappold J, J Trauma Acute Care Surg 2015
IV Fluids?

Permissive Hypotension
No synthetic blood yet
The Neurologic Exam

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

<table>
<thead>
<tr>
<th>Eye Opening (E)</th>
<th>Verbal Response (V)</th>
<th>Motor Response (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4=Spontaneous</td>
<td>5=Normal conversation</td>
<td>6=Normal</td>
</tr>
<tr>
<td>3=To voice</td>
<td>4=Disoriented conversation</td>
<td>5=Localizes to pain</td>
</tr>
<tr>
<td>2=To pain</td>
<td>3=Words, but not coherent</td>
<td>4=Withdraws to pain</td>
</tr>
<tr>
<td>1=None</td>
<td>2=No words......only sounds</td>
<td>3=Decorticate posture</td>
</tr>
<tr>
<td></td>
<td>1=None</td>
<td>2=Decerebrate</td>
</tr>
</tbody>
</table>

Total = E+V+M

Bledsoe B, Prehosp Emerg Care 2015
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
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