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Associate Professor of Emergency Medicine
and
Co-Chair of the Section on
EMS, Disaster Medicine, and Homeland Security

Medical Director, DCFD and
Mid Georgia Ambulance Service

Chief of Operations
The Dallas Metropolitan BioTel System
WORLD
Bomb found on French rail line
Wednesday, March 24, 2004

WORLD
Basra bombs kill at least 68 Iraqis
18 schoolchildren among the dead, police say
Wednesday, April 21, 2004

WORLD
Report: 18,000 al Qaeda fighters
Tuesday, May 25, 2004

LONDON, England (AP) -- Despite losses around the world, al Qaeda has more than 18,000 potential terrorists, and its ranks are growing because of the conflict in Iraq, a leading think tank warned Tuesday.
Destroyed railway carriages sit in the Atocha railway station in Madrid, after 10 terrorist bombs ripped through commuter trains, killing more than 190 people and injuring 1,200 others. (Voice of Chris Wright, AFP-Madrid correspondent)
Madrid in chaos and terror

Denis Doyle, AP
Where DO we go from here?
The advance of technology is guiding our care as never before.
Saving lives
(and treating patients)
is getting more complicated
every day
What are the EMS Issues

“Who really are we”
We are no less than the keepers of the keys to excellence.
# The Now Issues

### Clinical
- Patient Assessment
- Airway
- ET Intubation
- The "Smart Bag"
- The "rescue airway"
- Capnography
- Avoiding overventilation
- CPAP
- ResQ Pod
- Intraosseous
- 12 Lead ECG
- ECG Transmission?
- Hypertonic Saline

### Administrative
- Finding Staff
- NEMSIS
- Credentialing Online
- ePCR
- Non-transport
- Statewide Protocol Set
- Standard Treatment List
- Holding the wall
- Diversion
- House call?
- Research
- Distributive learning
- Preparedness
Patient Assessment
The Primary Survey

Scene Survey/Mechanism/# pts.

LOC/Airway/Cspine

Respiratory Rate and Labor

Pulses R & Q, N & W
Skin CMT/CRT/External Bleeding

Neck appearance, JVD, Trachea

Chest appearance, BS, HT

Quick survey of abdomen, pelvis, extremities, and back

Abbreviations:

R & Q – Rate and Quality

N & W – Neck and Wrist

CMT – Color, Moisture, Temperature

CRT – Capillary Refill Time

JVD – Jugular Venous Distension

BS – Breath Sounds

HT – Heart Tones
Scene Survey/Mechanism/# pts.
LOC/Airway/Cspine
Respiratory Rate and Labor
Pulses R & Q, N & W
Skin CMT/CRT/External Bleeding
Neck appearance, JVD, Trachea
Chest appearance, BS, HT
Quick survey of abdomen, pelvis, and extremities

Reveals threats to Basic Physiology

...the vital elements of the Primary Survey
The Order of the Survey

1
2
3
4
5

...flows in an orderly way from head to toe
The Secondary Survey

Head

Neck

Upper Extremities

Chest

Abdomen

Pelvis

Lower Extremities
The Third Survey

- LOC
  - Airway
    - Breathing
      - Circulation
        - Any other pertinent positive or negative found in the primary or secondary surveys

For example, if wheezing was found and treated in the primary survey, is the wheezing still there?

If external bleeding was found and a dressing put on it, is the bleeding still stopped?
Airway Management
Airway

What we’ve done in the past does not appear to be good enough now
Airway

Manipulating the airway recklessly indeed appears to have negative physiological consequences

*Increased incidence of death with traumatic brain injury when endotracheal intubation is attempted by medics*
Out-of-hospital endotracheal intubation and outcome after traumatic brain injury

Henry E. Wang MD, MPH, , Andrew B. Peitzman MD, Laura D. Cassidy PhD, P. David Adelson MD and Donald M. Yealy MD

From the Department of Emergency Medicine (Wang, Yealy), Department of Surgery (Peitzman), and Department of Neurosurgery (Adelson), University of Pittsburgh School of Medicine; and the Department of Biostatistics, University of Pittsburgh (Cassidy), Pittsburgh, PA.

Out-of-hospital (vs emergency department) ET intubation was associated with increased adjusted odds of:

**Death**

(3.99; 95% CI 3.21 to 4.93)

**Poor neurologic outcome**

(1.61; 95% CI 1.15 to 2.26)

**Moderate or severe functional impairment**

(FIS 6 to 15; OR 1.92; 95% CI 1.40 to 2.64)

**Severe functional impairment**

(FIS 11 to 15; OR 1.80; 95% CI 1.29 to 2.52)
The Endotracheal Tube may well largely go the way of the PASG/MAST in most instances. Though some patients will still require intubation.
Airway

It may be appropriate that ET Intubation be de-emphasized in favor of a device that will provide ventilation following ease of insertion.

It is rather that “the appropriate airway management should be selected”
15. IF ETT Intubation is unsuccessful after **ONE** attempt, insert a Combitube.
ETT Intubations
July 2005 – December 2006

Intubation Success Rate Of Patients Intubated - % Intubated on First Attempt

- 84.18% to 77.83%
- 92.39% to 96.30%

ETT Intubations
July 2005 – December 2006
MedStar
ET Intubation Success Rates
2004 - 2006

Intubation Success Rate

% of Patients Successfully Inbutated

2 per. Mov. Avg. (% of Patients Successfully Inbutated)
Advanced Airway Attempts
July 2005 – December 2006

- Total Calls With Advanced Airway Attempted: 550 (7/05-3/06), 493 (4/06-12/06)
- Total ETT Attempts: 531 (7/05-3/06), 451 (4/06-12/06)
- Patients With Combitubes Attempted:
  - 7/05-3/06: 72
  - 4/06-12/06: 138
- Combitube Attempted First:
  - 7/05-3/06: 19
  - 4/06-12/06: 42
- Total Number of Patients w/o Definite Airway:
  - 7/05-3/06: 39
  - 4/06-12/06: 27

[Bar chart showing the data]
Of 61 factors potentially related to ETI failure, multivariate logistic regression revealed the following significant covariates associated with ETI failure (odds ratio; 95% confidence interval; likelihood ratio p-value):

**presence of clenched jaw/trismus**
(9.718; 95% CI = 4.594 to 20.558; p < 0.0001);

**inability to pass the endotracheal tube through the vocal cords**
(7.653; 95% CI = 3.561 to 16.447; p < 0.0001);

**inability to visualize the vocal cords**
(7.638; 95% CI = 3.966 to 14.707; p < 0.0001);

**intact gag reflex**
(7.060; 95% CI = 3.552 to 14.033; p < 0.0001);

**intravenous access established prior to ETI attempt**
(3.180; 95% CI = 1.640 to 6.164; p = 0.0005);

**increased weight (ordinal scale)**
(1.555; 95% CI = 1.242 to 1.947; p = 0.0001);

**electrocardiographic monitoring established prior to ETI attempt**
(0.199; 95% CI = 0.084 to 0.469; p = 0.0003).
Airway

The “Rescue Airway”??

Figure 1. Image of the Laryngeal Tube (VBM Medizintechnik GmbH, Sulz, Germany).

Figure 2. Placement of the Laryngeal Tube (VBM Medizintechnik GmbH, Sulz, Germany).
Airway

The King LT-D
Airway

The airway of the future will be what the patient needs, not just some standard approach to all problems.
Airway

Let’s intubate the trachea only when we **NEED** to intubate the trachea.
Complications associated with the Esophageal-Tracheal Combitube® in the pre-hospital setting

[Complications associées avec l'utilisation du Combitube dans la prise en charge des arrêts cardio-respiratoires en préhospitalier]

Marie-Claude Vézina MD, Claude A. Trépanier MD FRCPC, Pierre C. Nicole MD FRCPC, Martin R. Lessard MD FRCPC

**Purpose:** The Esophageal-Tracheal Combitube® (Combitube) is widely used for the management of the airway during cardiopulmonary resuscitation in the pre-hospital setting. Although serious complications have been reported with the Combitube, there is a paucity of data relative to the frequency and nature of such complications. The objective of this retrospective study was to determine the incidence and the nature of complications associated to the Combitube in the pre-hospital setting.

**Methods:** Since 1993, in the Quebec City Health Region, the basic life support treatment algorithm for emergency medical technicians has included the use of a Combitube as the primary airway device for management of all patients presenting with cardiac or respiratory arrest. The database of the emergency coordination services was searched for the period between 1993 and 2003 (2,981 patients). Only those patients who survived at least 12 hr were included. Medical records of these patients were reviewed to identify complications related to the use of the Combitube.

**Objectif:** Le Esophageal-Tracheal Combitube® (Combitube) est couramment utilisé pour assurer le contrôle des voies aériennes lors de situations d'arrêt cardio-respiratoire en préhospitalier. Bien que des complications graves relatives à l'utilisation du Combitube aient été rapportées, leur incidence réelle est mal connue. L'objectif de cette étude rétrospective était d'estimer l'incidence et la nature des complications associées à l'utilisation du Combitube en préhospitalier.

**Méthode:** Depuis 1993, le protocole de prise en charge préhospitalière de l'Agence régionale de santé de Québec inclut l'insertion d'un Combitube par les techniciens ambulanciers pour le contrôle initial des voies aériennes des patients en arrêt cardiaque ou respiratoire. Une recherche dans le registre de la centrale de coordination des urgences a été faite et a permis d'identifier 2,981 patients.
### TABLE I  Emergency airway – related complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration pneumonia</td>
<td>31</td>
</tr>
<tr>
<td>Pulmonary aspiration</td>
<td>16</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>6</td>
</tr>
<tr>
<td>Upper airway bleeding</td>
<td>4</td>
</tr>
<tr>
<td>Esophageal laceration</td>
<td>3</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>2</td>
</tr>
<tr>
<td>Esophageal perforation and mediastinitis</td>
<td>2</td>
</tr>
<tr>
<td>Tongue edema</td>
<td>2</td>
</tr>
<tr>
<td>Vocal cord injury</td>
<td>1</td>
</tr>
<tr>
<td>Tracheal injury</td>
<td>1</td>
</tr>
<tr>
<td>Pneumomediastinum</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>69</strong></td>
</tr>
</tbody>
</table>

A total of 69 airway-related complications were observed in 58 of 282 patients whose airways were managed by a Combitube® in the pre-hospital setting. The specific complications and their numbers are shown.

### TABLE II  Complications most likely related to Combitube® insertion

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper airway bleeding</td>
<td>4</td>
</tr>
<tr>
<td>Esophageal laceration</td>
<td>3</td>
</tr>
<tr>
<td>Esophageal perforation and mediastinitis</td>
<td>2</td>
</tr>
<tr>
<td>Tongue edema</td>
<td>2</td>
</tr>
<tr>
<td>Vocal cord injury</td>
<td>1</td>
</tr>
<tr>
<td>Tracheal injury</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

Thirteen complications presenting in 12 patients, considered as most likely resulting from Combitube® insertion.
Breathing

The Negative Space Concept

• Normal breathing sucks air into the chest
• Positive pressure ventilation decreases cardiac output
Circulation

Central Pumping Concept

- Bone protected
- Negative venous return: “Straw”
- Cardiac Output tied strictly to venous return
- Alterations in return affect output
The negative pressure inside the thorax “pulls” blood back from the positive pressure areas.
Maintaining the “negativity” of the pressure inside of the thorax is one of the most vital areas of understanding resuscitation.

Negative pressure
Positive Pressure in the Thorax decreases Venous Return!!
About Capnography
Oxygen → lungs → alveoli → blood

breath

CO₂

lungs

CO₂

blood

Oxygen

muscles + organs

Oxygen

cells

energy

Oxygen + Glucose

CO₂

Physiology
Capnography

Is the airway in, and does it stay in?

What is the shape of the curve?

What is the absolute height of the curve?
Capnography

Measuring CO2 to validate the airway is the standard of care

Educators understanding being able to explain capnography is the “educational standard of care”
Resuscitation Outcomes Consortium

Will utilize the “ResQ Pod” (impedance threshold device) to try to improve outcome from cardiac arrest
CAUTION
WATER ON ROAD
DURING
RAIN
Avoiding Overventilation
It turns out that the cerebral vasoconstrictive response to hyperventilation is lost in hemorrhagic shock anyway!
So, why would we bag the patient any faster if no more oxygen is needed than a “one hand squeeze every eight seconds”??
...which is what you are breathing right now as you are sitting there listening to this stuff...
Breathing the patient too fast INCREASES pressure inside the chest!
Do NOT use Two-handed Squeezes on the bags!
...as you see here...

don’t do this!!!
Generally speaking:

The patient in circulatory collapse suffers greatly from positive pressure ventilation used by rescuers.
We must judge our ventilation rates and tidal volumes...it is now the standard
Otherwise we’ll eat your liver with fava beans and a nice chianti.
INTERESTING THOUGHT!

Medics (any rescuer) seem to take a “cue” for WHEN to bag again by the recoil of the bag touching the rescuer’s hand.
Decreasing peak flow rate with a new bag-valve-mask device: effects on respiratory mechanics, and gas distribution in a bench model of an unprotected airway

Horst G. Wagner-Berger, Volker Wenzel, Angelika Stallinger, Wolfgang G. Voelckel, Klaus Rheinberger, Karl H. Stadlbauer, Sven Augenstein, Volker Dörges, Karl H. Lindner, Christoph Hörmann

a Department of Anaesthesiology and Critical Care Medicine, Leopold Franzens-University, Anichstrasse 35, 6020 Innsbruck, Austria
b Department of Anaesthesiology, University of Kiel, Kiel, Germany

Received 4 October 2002; received in revised form 21 October 2002; accepted 16 January 2003
Effectiveness of Prehospital CPAP in Managing Acute Pulmonary Edema

By Keith Wesley

Editor's Note: CPAP in pulmonary edema will be the clinical focus of November JEMS.

Continuous Positive Airway Pressure
Continuous Positive Airway Pressure

Boussignac CPAP works the same way as the turbines of a jet engine.

- **Oxygen supply**: $O_2$ molecules enter the chamber.
- **Oxygen acceleration**: The $O_2$ molecules are accelerated at the speed of sound as they pass through micro channels.
- **Oxygen breaking**: The $O_2$ molecules strike a deflector, which sends them back to the central (mixing) zone.
- **Establishment of a virtual valve**: The collision of molecules generates turbulence, which transforms speed into pressure.
TACO BELL

DRIVE THRU

NOW HIRING
ALL SHITS
Intraosseous Infusion

One of the most important advances in the history of EMS
Intraosseous Infusion
Intraosseous Infusion

Central Line Alternative

Currently, when IV insertion is challenging in the emergency room or hospital setting, a physician's first instinct is to place a central line. However, new American Heart Association ACLS guidelines as well as numerous studies suggest that adult IO infusion provides venous access similar to that achieved by central lines faster, with less expense and lower complication rates. Additionally, throughout the ACLS protocols and algorithms, IO is paired with IV access and is recommended over central lines and ET tube drug administration for cases of cardiac arrest.
Potential access sites:

Proximal tibia
Humeral head
Distal tibia
Shock

Cardiogenic
- Rapid pulse
- Distended neck veins
- Cyanosis

Volume Loss
- Rapid pulse
- Flat neck veins
- Pale

Vasodilatory
- Variable pulse
- Flat neck veins
- Pale or pink
Hemorrhagic Shock

- A flat neck vein, tachycardia shock
- Signs of poor perfusion, pale, diaphoretic
- REDUCED End-tidal CO\textsubscript{2} in the setting of normal PO\textsubscript{2}
- Decreased urinary output (normally 30 cc/hr or more, especially with IV fluids)
Rationale for Fluid Resuscitation

Series of Canine Experiments in 1950s and 1960s...

Shed 60 -70% blood volume = 80% Mortality Rate
If you wait too long, irreversible shock occurs because of arteriole and heart damage.
Adding Lactated Ringer’s?
We Shift Fluid from the Extracellular Spaces...

... that Bathe the Cells in Oxygen
ASSUMPTION

Elevating Blood Pressure is Always a Good Thing
Maybe Not...
Bill Bickell and Paul Pepe
More On-Scene Time...

...and Increased BP
1990’s -- New Series of Animal Experiments
(uncontrolled hemorrhage in rats, dogs, pigs, sheep)

BP < 40 mmHg
May Be a
Hypotension Threshold
Hemoglobin-based Oxygen Carriers (HBOC)
<table>
<thead>
<tr>
<th>HBOC</th>
<th>Poly-SFH-P</th>
<th>HBOC 201</th>
<th>o-rafimner cross-linked hgb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tradename</td>
<td>Polheme</td>
<td>Hemopure</td>
<td>Hemolink</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Northfield Laboratories Inc.</td>
<td>Biopure Inc.</td>
<td>Hemosol Inc</td>
</tr>
<tr>
<td>Hemoglobin Source</td>
<td>Human</td>
<td>Bovine</td>
<td>Human</td>
</tr>
<tr>
<td>Polymerizer</td>
<td>glutraldehyde</td>
<td>glutraldehyde</td>
<td>o-rafimnose</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>10</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Unit Volume (mL)</td>
<td>500</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Hemoglobin (g) per Unit</td>
<td>50</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>$P_{50}$ (mmHg)</td>
<td>28-32</td>
<td>38</td>
<td>39+/-12</td>
</tr>
<tr>
<td>Colloid Osmotic Pressure (mm Hg)</td>
<td>20-25</td>
<td>17</td>
<td>31+/-6</td>
</tr>
<tr>
<td>Osmolarity(mOsm)</td>
<td>290-310</td>
<td></td>
<td>26 +/-4</td>
</tr>
<tr>
<td>Viscosity (cp)</td>
<td>1.9-2.2</td>
<td>1.3</td>
<td>1 -2</td>
</tr>
<tr>
<td>Tetramer % (&lt; 64 kD)</td>
<td>&lt;1</td>
<td>&lt;5</td>
<td>&lt;66</td>
</tr>
<tr>
<td>Methemoglobin %</td>
<td>&lt;8%</td>
<td>&lt;10%</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Shelf Life</td>
<td>&gt;6 weeks</td>
<td>&gt;3 years</td>
<td>&gt;1 year</td>
</tr>
<tr>
<td>4°C</td>
<td>&gt;1.5 years</td>
<td>&gt;2 years</td>
<td>-</td>
</tr>
</tbody>
</table>
Recent HBOC-201 Data

- Pigs Bled to > 40% Blood Volume
- LR vs Hgb to MAP = 60 mm Hg
- Survival = 1 of 10 vs 7 of 7
- Hct < 1% = 9 of 10 & 6 of 7
EMS Needs:

Portable
Temperature stable
Ideally NOT requiring refrigeration
Cheap!
The Use of Low Volume Resuscitation in the Treatment of Hemorrhagic Shock

Shocking Revelations!!
We have over ten quarts of fluid in the body that can be pulled into the blood system.
Some More Basics......

......ZZZZZZZZ......
Giving a concentrated solution of salt water (hypertonic saline) can pull this fluid back into the blood vessels.

<table>
<thead>
<tr>
<th>Body Fluid Compartments</th>
<th>Total Body Water</th>
<th>Body Weight (%)</th>
<th>Total Body Water (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Intracellular</td>
<td></td>
<td>40</td>
<td>67</td>
</tr>
<tr>
<td>Extracellular</td>
<td></td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>Intravascular</td>
<td></td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Interstitial</td>
<td></td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>
Let’s look at some of these figures again.

<table>
<thead>
<tr>
<th>Body Fluid Compartments</th>
<th>Body Weight (%)</th>
<th>Total Body Water (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravascular</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Interstitial</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

15% x 70KG = 10KG (about 10 liters)!!!
An average adult has ten liters of free fluid (over two gallons) bathing the cells and potentially available to be pulled back into the blood vessels to maintain blood pressure.
Fluid that is sterile, that has normal electrolytes, and has MUCH less effect on diluting clotting factors, and is not “pro-inflammatory”
You might say, every patient has the ability to act as a reservoir of “internal IV fluids”
Hypertonic saline has been shown to be safe and effective and to have beneficial effects during resuscitation.
Hypertonic Saline


Hypertonic Saline

- Already recommended therapy in 2004 Emergency War Surgery
- Uses the body’s 10 liters of interstitial fluid to maintain perfusion
- Help prevent brain edema
- Anti-inflammatory
We will give either 250 cc (about a cup) of Hypertonic Saline OR Standard IV Fluids.
Initially we poured in fluid...

Then is was “permissive hypoperfusion”...

Now we’ll be using the body’s own “internal IV fluids”
An Algorithm for Shock Management and Consideration of Hypertonic Saline Administration in Shock
Shock Management with Hypertonic Saline (Proposed)

- Perform a Primary Survey
- What is the patient’s circulatory status

Determine Circulatory Status
- LOC
- Airway
- Resp Rate
- Pulse
- Color
- Chest/Abd
- Bleeding
- BP
- Pulse Ox
- ET CO₂
Choose the Method for Bleeding Control

Horizontal Position

Direct Pressure

?? Tourniquets ??

?? MAST ??
Establish IV Access

Based on Need for Fluid Administration or IV Drugs

NOT NECESSARILY ROUTINE!!
Based on Need to maintain hemodynamic status

NORMALIZE BP ONLY IN PATIENTS WITH CONTROLLED HEMORRHAGE

Compute IV Fluid Rate
Administer IV Fluids

250 cc 7.5% Hypertonic Saline
- **Controlled External Hemorrhage**
  - 20 cc/kg until normalized

- **Uncontrolled External Hemorrhage**
  - 250 cc HS

- **Uncontrolled Internal Hemorrhage**
  - 250 cc HS

- **Head-injured trauma with circulatory compromise**
  - 250 cc HS

---

**Additional IV Fluid Rate After HS?**
Keep NPO

IV Fluids, if any

Note amount of Urine Output
(0.5 – 1 cc/min in adults;
adjust down by weight for kiddies)

NG or PEG output

Vomitus or Diarrhea

Don’t forget diaphoresis and burns!!

Begin Intake and Output Recording
Hemothorax may develop after a tension

Bleeding from the abdomen may occur later without warning

Volume expansion may blow off a clot

Your selected ventilation rate might drop venous return and cause impaired circulation

Be AWARE that the Patient’s Condition may CHANGE

“Third Survey” every five minutes
Decreasing CO$_2$ especially in setting of Hypotension
Pale Patient
Altered Mental Status
Any severe hemorrhage
Arrhythmia development
“PROTECTION FROM ANOXIC DAMAGE”

Determine need for Transfusion
The Now Issues

**Clinical**
- Patient Assessment
- Airway
- ET Intubation
- The "Smart Bag"
- The "rescue airway"
- Cannography
- Avoiding overventilation
- CPAP
- ResQ Pod
- Intraosseous
- 12 Lead ECG
- ECG Transmission?
- Hypertonic Saline

**Administrative**
- Finding Staff
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- Statewide Protocol Set
- Standard Treatment List
- Holding the wall
- Diversion
- House call?
- Research
- Distributive learning
- Preparedness
PATIENT CARE PROTOCOLS
Patient Care Protocols
SECTION 3: Medical Direction for Drugs and Procedures (continued)

SECTION 3.2 MEDICAL DIRECTION HOSPITALS
Medical direction must be provided by a medical direction hospital. Medical direction hospitals are defined as those hospitals that provide OLMD by physicians with current medical control physician certification and medical control physician identification number. Hospitals that do not provide OLMD are referred to as non-medical direction hospitals. Medical direction hospitals shall provide OLMD for all patients being transported to their facility. All medical direction for patients transported to non-medical direction hospitals must come from a medical direction hospital as outlined in the Regional Medical Control Plan.

SECTION 3.3 PHYSICIAN MEDICAL DIRECTION
Medical direction for drugs and patient care procedures is provided under physician oversight. To provide on-line medical direction a physician must have taken the medical control course and hold a current medical control physician identification number. There are a few special situations where medications can be given and/or procedures performed without direct physician contact as long as the patient is stable. Examples are oxygen therapy, precautionary IVs, and administration of D50W for hypoglycemia. In such cases only a report to a nurse at the receiving hospital is necessary. Most drugs and procedures, however, require contact with a physician either prior to, or after, administration.

SECTION 3.4 DRUG AND PROCEDURE CATEGORIES

Category A (CAT A): A drug or procedure that requires the EMT to contact OLMD after administration.

Category B (CAT B): A drug or procedure that requires the EMT to contact OLMD PRIOR TO administration.

Category C: Drugs or procedures which may be used by the EMT in accordance with the protocols with contact to the medical direction physician after the drug/procedure is used as directed by the protocols.

<table>
<thead>
<tr>
<th>DRUG/PROCEDURE</th>
<th>PROTOCOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol</td>
<td>Respiratory Distress</td>
</tr>
<tr>
<td>Albuterol</td>
<td>Allergic Reaction</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>Adult Vf/Pulseless Vtch</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Chest Pain</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Stroke</td>
</tr>
<tr>
<td>Atropine Sulfate</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Atropine Sulfate</td>
<td>Symptomatic Bradycardia</td>
</tr>
<tr>
<td>D50</td>
<td>Altered Mental Status</td>
</tr>
<tr>
<td>D50</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>D50</td>
<td>Coma</td>
</tr>
<tr>
<td>D50</td>
<td>Seizures</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Seizures (Adult)</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>Allergic Reaction</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Allergic Reaction</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Cardiac Arrest</td>
</tr>
</tbody>
</table>
### Patient Care Protocols

**SECTION 3: Medical Direction for Drugs and Procedures (continued)**

#### Category A (continued)

<table>
<thead>
<tr>
<th>DRUG/PROCEDURE</th>
<th>PROTOCOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorazepam</td>
<td>Seizures</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Altered Mental Status</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Coma</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Naloxone</td>
<td>Seizures</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Cardiac Chest Pain</td>
</tr>
<tr>
<td>Normal Saline (IV Solution)</td>
<td>All Protocols as indicated</td>
</tr>
<tr>
<td>Oral intubation</td>
<td>All Protocols as indicated</td>
</tr>
<tr>
<td>Thiamine</td>
<td>All Protocols as indicated</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>Adult VFib/Pulseless Vtach</td>
</tr>
</tbody>
</table>

#### Category B: Drugs or procedures which may be used by the EMT in accordance with the protocols with contact to the medical direction physician PRIOR TO the drug/procedure being used as directed by the protocols.

<table>
<thead>
<tr>
<th>DRUG/PROCEDURE</th>
<th>PROTOCOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Charcoal</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Adenosine</td>
<td>Cardiac Dysrhythmias</td>
</tr>
<tr>
<td>Albuterol</td>
<td>Congestive Heart Failure</td>
</tr>
<tr>
<td>Albuterol</td>
<td>Burns with wheezing</td>
</tr>
<tr>
<td>Atropine Sulfate</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Calcium Gluconate</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Calcium Gluconate</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Dextrose</td>
<td>Hyperthermia</td>
</tr>
<tr>
<td>Dextrose</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Seizures (Pediatrics)</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Seizures (Rectal Administration)</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Shock</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Respiratory Distress</td>
</tr>
<tr>
<td>Furosemide</td>
<td>Respiratory Distress</td>
</tr>
<tr>
<td>Gluconon</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>Gluconon</td>
<td>Poisons &amp; Overdoses</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Cardiac Chest Pain</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Cardiac Dysrhythmias</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>Seizures (Pediatrics)</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>Preeclampsia/Eclampsia</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>Cardiac Dysrhythmias (Torsades de Pointes)</td>
</tr>
<tr>
<td>Morphine Sulfate</td>
<td>All Protocols as indicated</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Congestive Heart Failure</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Hypertensive Emergencies</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Respiratory Distress</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Amputation, Burns, Cardiac Chest Pain, Fractures and Dislocations</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>Poisons &amp; Overdoses</td>
</tr>
</tbody>
</table>
### Patient Care Protocols

#### SECTION 3: Medical Direction for Drugs and Procedures (continued)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>When to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraosseous Infusion</td>
<td>Cardiac Arrest</td>
</tr>
<tr>
<td>Rectal Administration Diazepam (Pediatric)</td>
<td>Seizures</td>
</tr>
<tr>
<td>External Pacing</td>
<td>Cardiac Dysrhythmias</td>
</tr>
<tr>
<td>Intubation (Nasal) (Pediatric)</td>
<td>All Protocols</td>
</tr>
<tr>
<td>Naso-Gastric Tube Placement</td>
<td>All Protocols</td>
</tr>
<tr>
<td>Needle Decompression</td>
<td>Tension Pneumothorax</td>
</tr>
</tbody>
</table>

### SECTION 3.5 OPTIONAL DRUGS AND PROCEDURES

Licensed services are required to carry and provide most of the drugs and equipment necessary to perform patient care procedures as directed by the protocols. However, optional drugs and procedures are NOT required and medical directors have the option to make all, some, or none required for his/her particular service.

The Optional drugs are listed below and are considered either Category A or Category B as directed by the protocols and listed in the Category A and Category B tables.

#### DRUGS

<table>
<thead>
<tr>
<th>DRUGS</th>
<th>WHEN TO USE</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone</td>
<td>Adult/Pediatric VFib/Pulseless VTach</td>
<td></td>
</tr>
<tr>
<td>Glucagon</td>
<td>Hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>Glucagon</td>
<td>Poisons and Overdoses</td>
<td></td>
</tr>
<tr>
<td>Lorazepam</td>
<td>Seizures</td>
<td></td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Amputation</td>
<td></td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Burns</td>
<td></td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Cardiac Chest Pain</td>
<td></td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>Fractures &amp; Dislocations</td>
<td></td>
</tr>
<tr>
<td>Morphine Sulfate</td>
<td>All Protocols as indicated</td>
<td></td>
</tr>
<tr>
<td>Vasoressin</td>
<td>Adult VFib/Pulseless VTach</td>
<td></td>
</tr>
</tbody>
</table>

#### PROCEDURES

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>WHEN TO USE</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Lead EKG</td>
<td>Chest Pain and/or Chest Trauma</td>
<td></td>
</tr>
<tr>
<td>End-Tidal <strong>Electronic CO₂</strong> monitoring</td>
<td>Intubated patient, respiratory problem, trauma patient</td>
<td></td>
</tr>
<tr>
<td>Portable ventilator</td>
<td>Intubated patient and/or when following manufacturer's recommendations</td>
<td></td>
</tr>
</tbody>
</table>

May replace colormetric CO₂ detector in monitoring ET tube placement (use of one or the other is mandatory)
ABDOMINAL PAIN

SPECIFIC INFORMATION NEEDED:
A. Pain: PQRST – Place, Quality, Radiation, Severity, Time began.
B. Associated symptoms: Nausea, vomiting (bloody or coffee-ground) diarrhea, constipation, melena, urinary difficulties, menstrual history, fever.
C. History: Previous trauma, abnormal ingestion, medications, known disease, surgery, pregnant or missed periods.

PHYSICAL ASSESSMENT:
A. Vital signs.
B. Abdomen: Tenderness, rebound tenderness, guarding, rigidity, bowel sounds, distention, pulsating mass.
C. Emetics: Type, amount. (save and transport with patient if possible).
D. Note any evidence of blood in emesis or of rectal blood.

TREATMENT:
A. Airway - ensure patency (vomiting precautions).
B. Breathing - Oxygen to maintain saturation (pulse oximeter) of ≥95%.
C. Circulation - obtain vital signs frequently, (monitor for shock)
   * Consider IV, Saline lock or large bore, normal saline, TKO.
   * If shock syndrome present, proceed to Shock Protocol.
D. Position of comfort.
E. Give nothing by mouth.
F. Reassess patient and obtain vital signs frequently
G. Consider Morphine Sulfate for patients with severe pain as seen with kidney stones.
   Adult (CAT B): 2-5 mg IV
   Pediatric (CAT B): 0.1 mg/kg not to exceed 5 mg

SPECIFIC PRECAUTIONS:
A. Abdominal pain may be the first warning of catastrophic internal bleeding (ruptured aneurysm, liver, spleen, ectopic pregnancy, perforated viscous, etc.). Since the bleeding is not apparent, you must think of volume depletion and monitor patient closely to recognize shock.
B. Use caution with fluid administration in patients with suspected dissecting aortic or abdominal aneurysm. Do not try to exceed systolic BP of 90 torr.
C. Nitrous Oxide causes bowel distention and is contraindicated in abdominal pain.
PHARMACOLOGY AND ACTIONS:
A. Depresses automaticity of Purkinje fibers; therefore, raises stimulation threshold in the ventricular muscle fibers (makes ventricles less likely to fibrillate).
B. CNS stimulation: tremor, restlessness and clonic convulsions followed by depression and respiratory failure at higher doses.
C. Cardiovascular effect: decreased conduction rate and force of contraction, mainly at toxic levels.
D. The effect of a single bolus on the heart disappears in 10-20 minutes due to redistribution in the body. Metabolic half-life is about 2 hours and, therefore, toxicity develops with repeated doses.

INDICATIONS:
A. PVCs in a suspected ischemic event.
B. Stable ventricular tachycardia or recurrent ventricular tachycardia if clinical condition is not rapidly deteriorating.
C. Ventricular fibrillation or pulseless ventricular tachycardia that persists after defibrillation.
D. Following successful defibrillation or cardioversion from ventricular tachycardia.

CONTRAINDICATIONS:
Heart rate less than 60.

PRECAUTIONS:
A. Advanced AV block unless artificial pacemaker is in place.
B. In atrial fibrillation or flutter, quinidine like effect may cause alarming ventricular acceleration.
C. Diazepam should be available to treat convulsions if they occur.
D. Lidocaine should NOT be given, except in cardiac arrest, without direct physician orders if
   1. Heart rate is less than 60/min. OR
   2. Periods or sinus arrest of any A-V block are present.
E. Drug is metabolized in the liver and, therefore, patients with hepatic disease, shock or congestive heart failure will have impaired metabolism. All Lidocaine doses (excluding loading doses) should be reduced by 50% in presence of decreased cardiac output (congestive heart failure, hypotension), hepatic dysfunction, or age more than 70. This rule does not apply to patients in cardiac arrest.

ADMINISTRATION (CAT A for cardiac arrest, CAT B all other administrations):
Adult Cardiac Arrest (VFib or Pulseless VTch):
Lidocaine bolus: 1.5 mg/kg initial dose, may repeat with 0.75mg/kg every 5 minutes to total dose of 3mg/kg. Only bolus therapy should be used in the cardiac arrest setting (should the arrest be followed by successful resuscitation, a continuous infusion should be initiated at 2-4mg/min).

Pediatric Cardiac Arrest (VFib or Pulseless VTch):
1.0 mg/kg, IVP/IO
**Fulton County Emergency Medical Services**

**Clinical Care Guideline – A10**

**Prehospital Acuity Classification (PAC)**

1. The PAC System is designed to aid prehospital providers in classifying patients for referral of care, destination and hospital diversion decisions. Prehospital providers should use these guidelines and their clinical judgment to place patients into one of three categories. The categorization boxes contain specific examples of conditions or presentations that typically place a patient in a particular category, but should not be considered an inclusive list that takes into account every patient presentation or prehospital situation:
   a. **Immediate Threat to Life – PAC Level One**
   b. **Time Dependent Emergency – PAC Level Two**
   c. **Potential Emergency / Urgency – PAC Level Three**

2. Patients that have vitality outside of the normal range, but have no other evidence of a life threatening or time dependent emergency may be categorized as PAC Level 2 or Level 3 based on the clinical judgment of the on-scene provider.

### Immediate Threat to Life
- Active airway management required (ETT, NVAD, CP Airway, IV, IO)
- Severe respiratory distress with SpO2 < 90%
- Pulseless
- Systolic BP < 90 mmHg
- Acute change in mental status
  - GCS ≤ 14
  - P or U on the AVPU Scale

### Time Dependent Emergency
- New onset CVA
- Chest pain with EKG or history consistent with MI
- New onset cardiovascular or respiratory failure
- Sustained pulse transfusion or prehospital intervention
- Patient condition not improving to decreasing despite prehospital intervention
- Respiratory distress
- Anaphylactic reaction
- Hypoglycemia
- Chest pain

### Vital Signs Outside of Normal Range

<table>
<thead>
<tr>
<th>Age</th>
<th>RR</th>
<th>HR</th>
<th>SpO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 mo</td>
<td>&gt; 100</td>
<td>&gt; 160</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>3 mo to 1 y</td>
<td>&gt; 100</td>
<td>&gt; 140</td>
<td>&gt; 95%</td>
</tr>
<tr>
<td>1 y to 5 y</td>
<td>&gt; 90</td>
<td>&gt; 140</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>&gt; 5 y</td>
<td>&gt; 80</td>
<td>&gt; 100</td>
<td>&gt; 90%</td>
</tr>
</tbody>
</table>

### Potential Emergency / Urgency
- A threat to life or time dependent emergency is not identified

---

**PAC Level One**

**PAC Level Two**

**PAC Level Three**
A Moment’s Reprise...
We have opportunities now as never before

State Leadership must focus on these and other vital issues to help guide the next generation of EMS Technicians
The Medics of the Near Future will be “Out of Hospital Intensivists”
EMS
MUST
LEAD
THE
WAY!
Questions or Comments??