The Emperor's New Clothes

A Humble Attempt to Offer Some Eclectic EMS Insights

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Bomb found on French rail line

Wednesday, March 24, 2004 Poste

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Basra bombs kill at least 68 Iraqis

18 schoolchildren among the dead, police say

Wednesday, April 21, 2004 Posted: 11:43 AM EDT (1543 GMT)

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WORLD

Report: 18,000 al Qaeda fighters

Tuesday, May 25, 2004 Posted: 9:20 AM EDT (1320 GMT)

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.

USA TODAY | Madrid in chaos and terror

CLOSE
SEND TO A FRIEND

5:30 p.m., 03/11/04

1 2 3 4 5 6 AD 7 8

Sergio Barrenechea, AP

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)

Jose Huesca, AP

USA TODAY | Madrid in chaos and terror

5:30 p.m., 03/11/04 1 2 3 4

Denis Doyle, AP

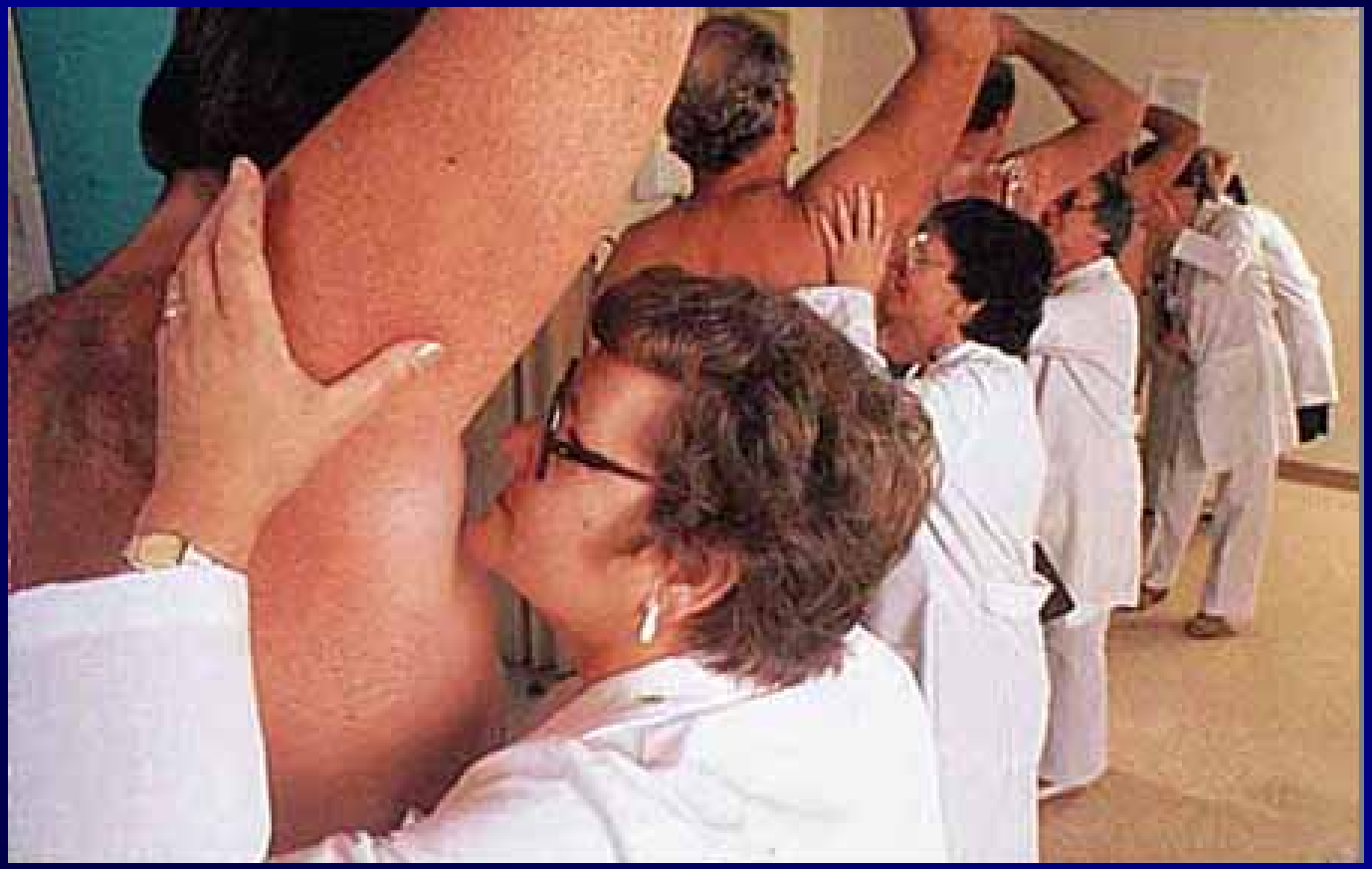
Where DO we go from here?

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

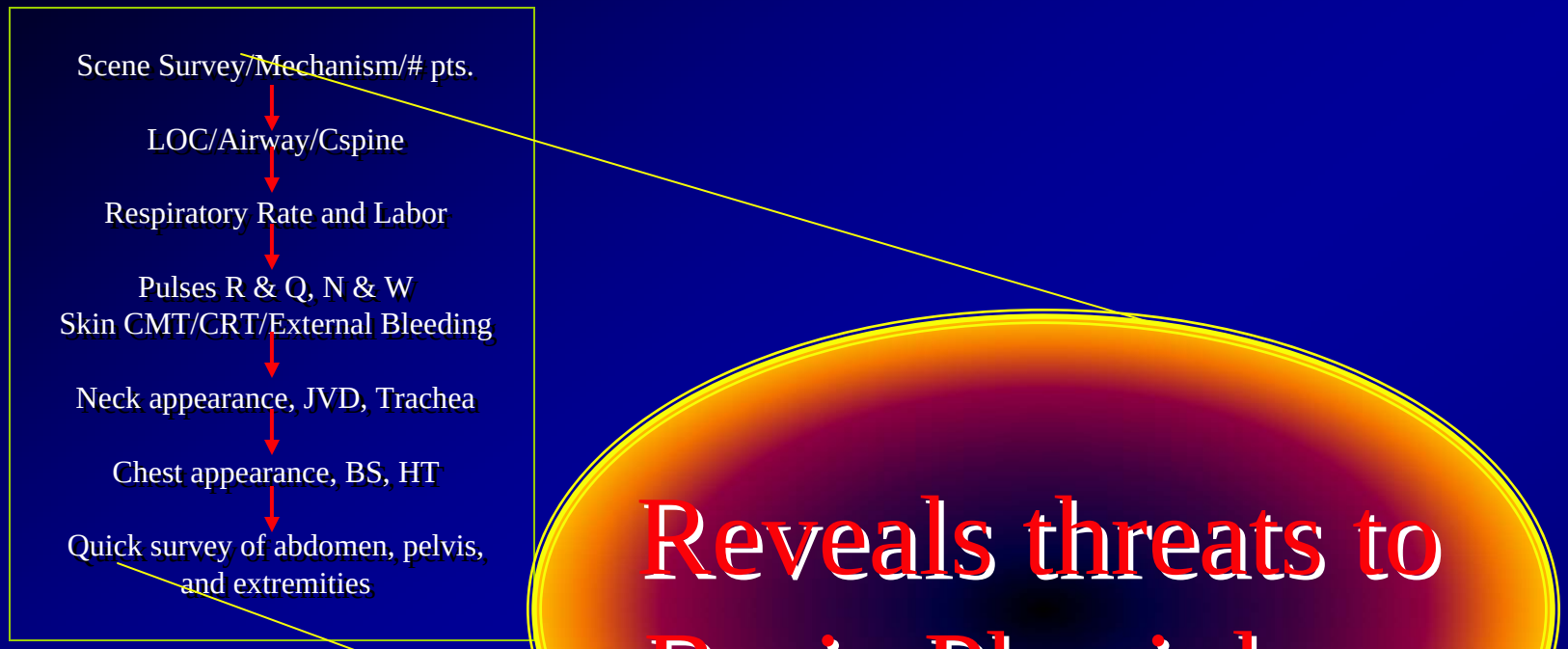
CMT – Color, Moisture, Temperature

CRT – Capillary Refill Time

JVD – Jugular Venous Distension

BS – Breath Sounds

HT – Heart Tones



. . .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

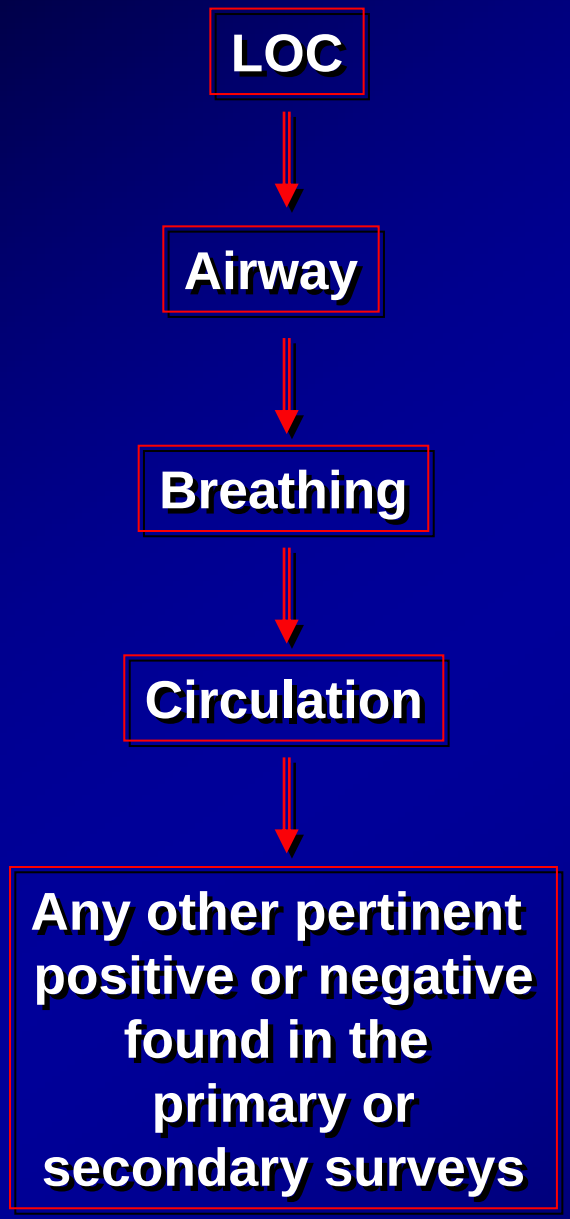
↓

Pelvis

↓

Lower Extremities

The Third Survey



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.

Annals of Emergency Medicine Volume 44, Issue 5 , November 2004, Pages 439-450

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)

Airway

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"

ORAL ENDOTRACHEAL INTUBATION

Indications:

1. Respiratory or cardiac arrest
2. Unconsciousness without a gag reflex
3. Decreased minute volume, due to decreased respiratory rate or volume
4. Possible airway obstruction
5. GCS ≤ 8

Contraindications:

1. None in the presence of hypoxia, unresponsive to ventilation, need for advanced airway or cardiopulmonary arrest

Procedure:

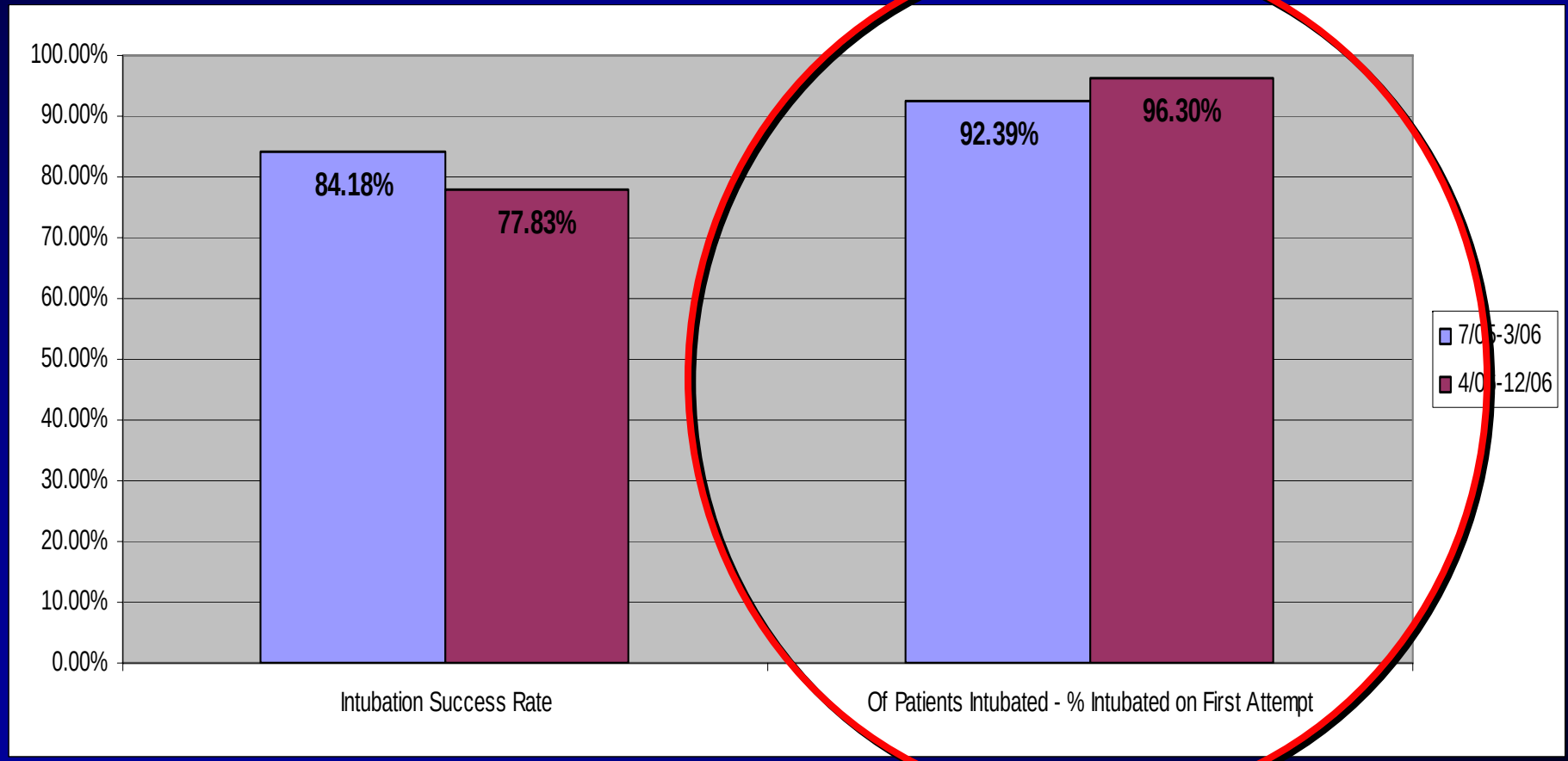
1. Preoxygenate the patient, if possible
2. Assemble and check equipment

15. IF ETT Intubation is unsuccessful after ONE attempt, insert a Combitube.

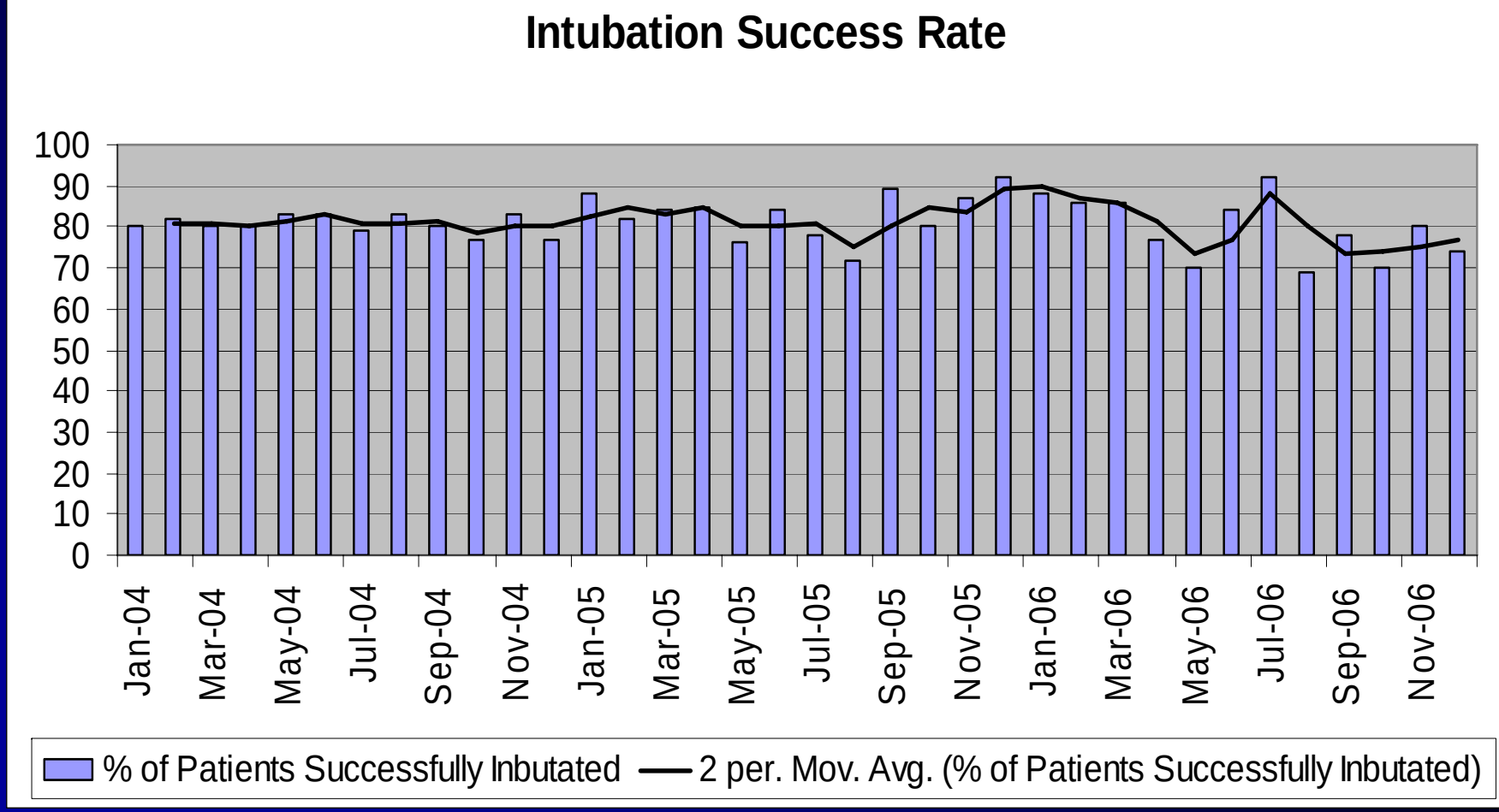
tongue

6. The tip of curved blades should be placed in the vallecula while the tip of straight blades should be extended beyond the epiglottis.
7. Lift the epiglottis either directly or indirectly, visualizing the vocal cords.
8. Slip the endotracheal tube and stylet past the vocal cords about ½ to 1 inch. Gentle, downward pressure on the cricoid cartilage (Sellick's maneuver) may assist.
9. While holding onto the tube, attempt and assess ventilations
10. If the chest rises and breath sounds are present, inflate the distal cuff with 5 to 10 ml of air
11. Confirm proper airway placement and assesses the quality of ventilations
12. Record capnographic change, breath sound locations and chest rise and fall
13. Secure tube with an endolock device
14. Continuously reassess breath sounds
15. If ETT intubation is unsuccessful after **one** attempt, insert a Combitube.

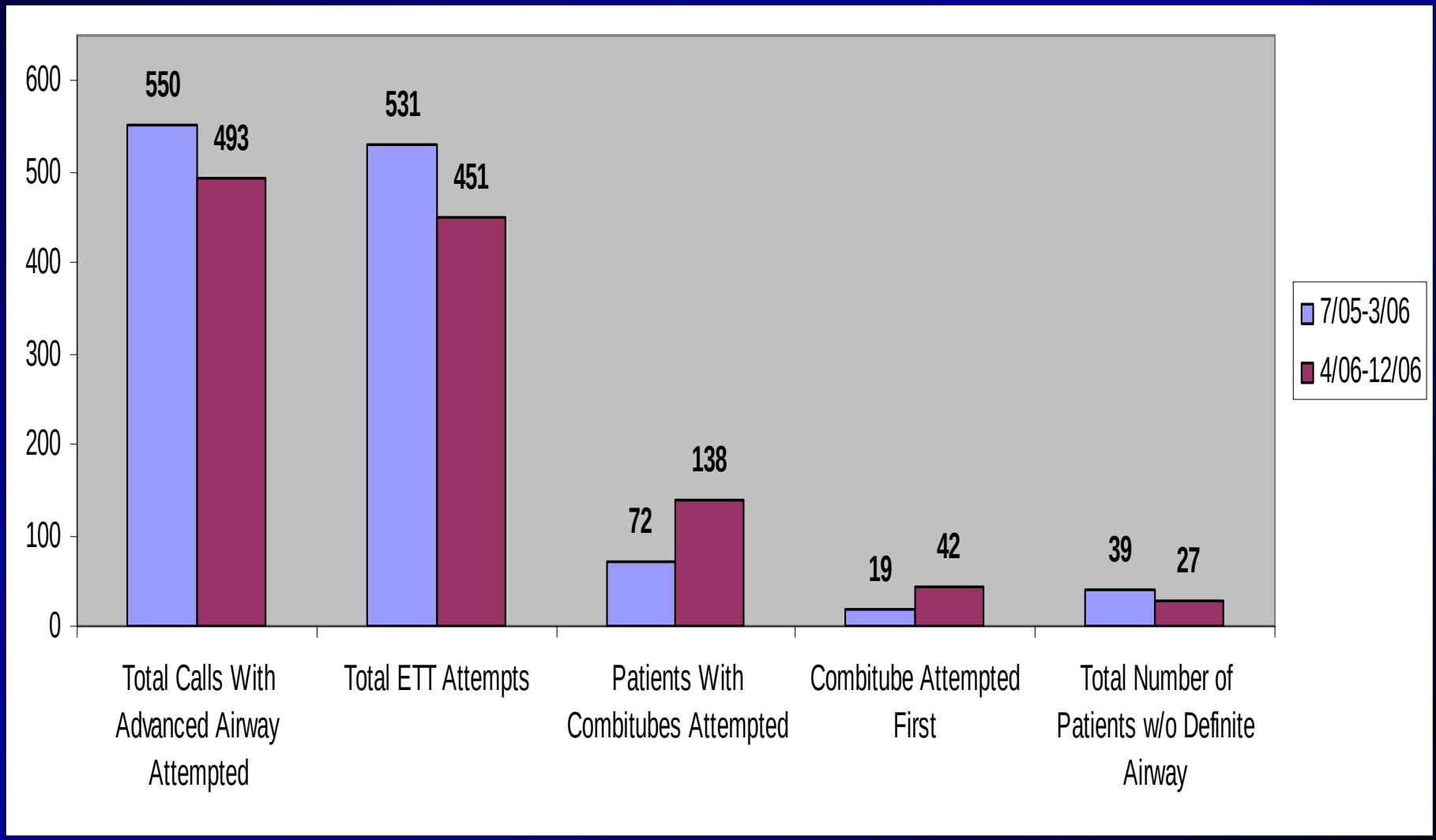
ETT Intubations
July 2005 – December 2006



MedStar
ET Intubation Success Rates
2004 - 2006



Advanced Airway Attempts July 2005 – December 2006



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"??

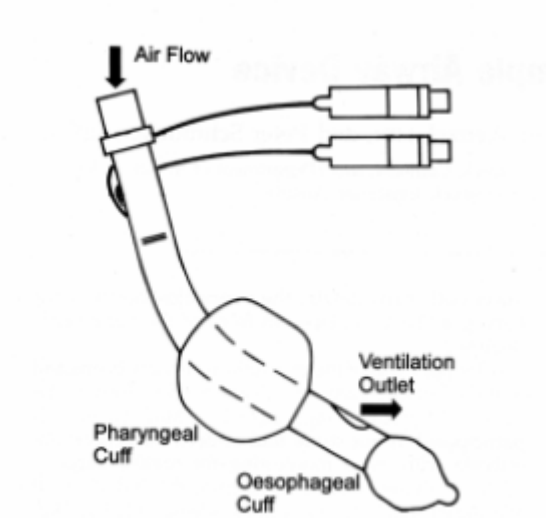


Figure 1. Image of the Laryngeal Tube (VBM Medizintechnik GmbH, Sulz, Germany).

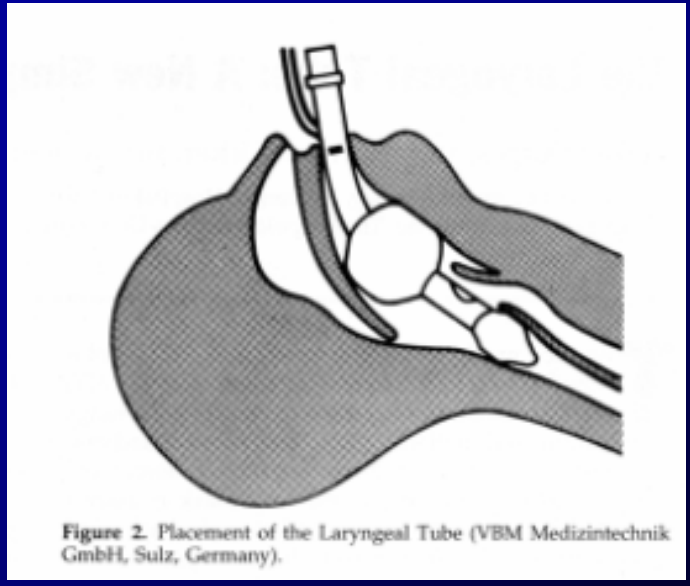


Figure 2. Placement of the Laryngeal Tube (VBM Medizintechnik GmbH, Sulz, Germany).

Airway

The Easy Tube

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

CAN J ANESTH 2007 / 54: 2 / pp 124–128

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 reliées 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 pour*

TABLE I Emergency airway – related complications

	Number
Aspiration pneumonia	31
Pulmonary aspiration	16
Pneumothorax	6
Upper airway bleeding	4
Esophageal laceration	3
Subcutaneous emphysema	2
Esophageal perforation and mediastinitis	2
Tongue edema	2
Vocal cord injury	1
Tracheal injury	1
Pneumomediastinum	1
TOTAL	69

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

	Number
Upper airway bleeding	4
Esophageal laceration	3
Esophageal perforation and mediastinitis	2
Tongue edema	2
Vocal cord injury	1
Tracheal injury	1
TOTAL	13

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.

Positive pressure

Negative pressure

Positive pressure

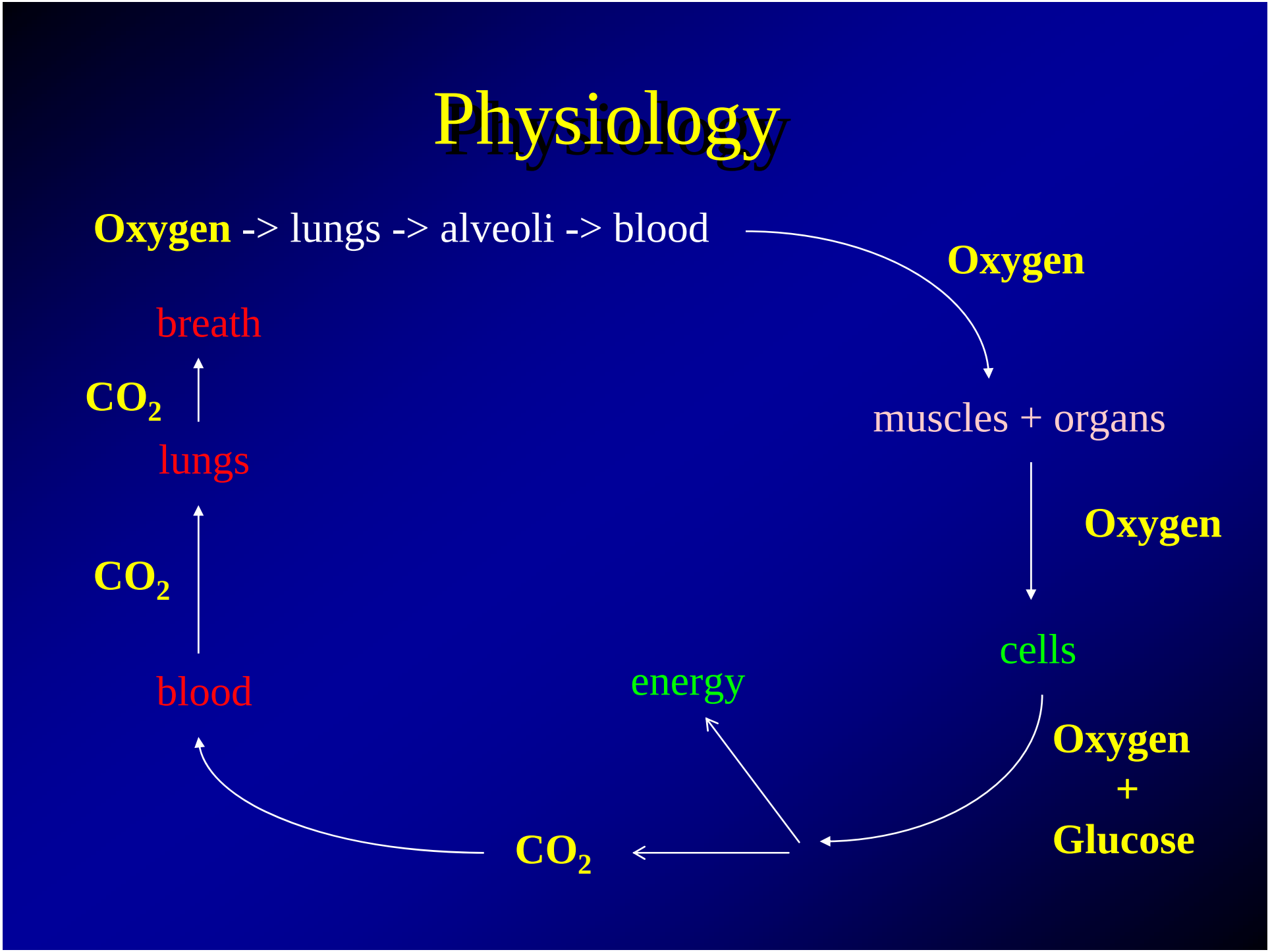
Maintaining the “negativity” of the pressure inside of the thorax is one of the most vital areas of understanding resuscitation

Negative pressure

Positive Pressure in the Thorax decreases Venous Return!!

About Capnography

Physiology


Oxygen -> lungs -> alveoli -> blood
Oxygen
breath
CO_2
muscles + organs
lungs
Oxygen
CO_2
cells
energy
blood
Oxygen
+
Glucose
CO_2

Capnography

Is the airway in, and does it stay in?

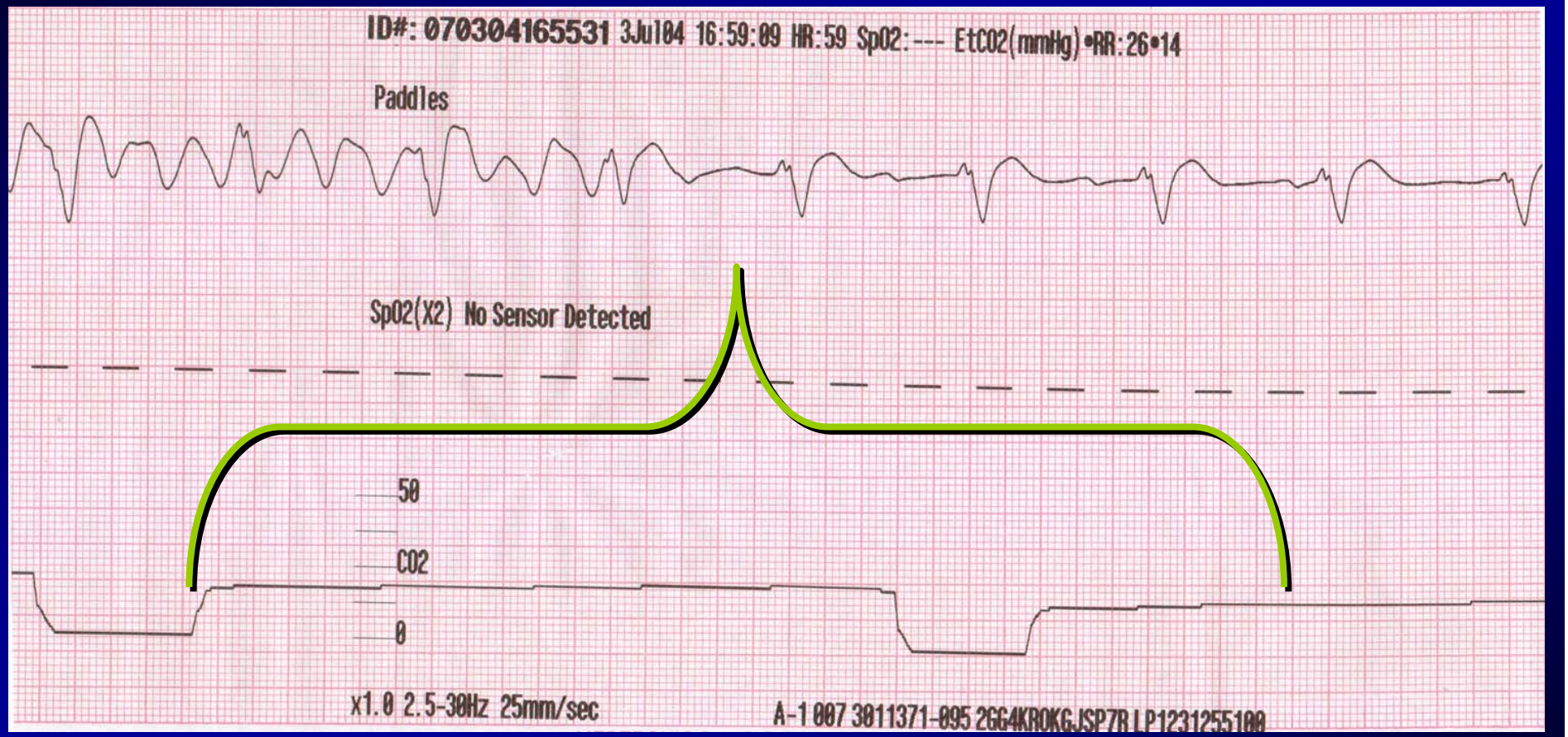
What is the shape of the curve?

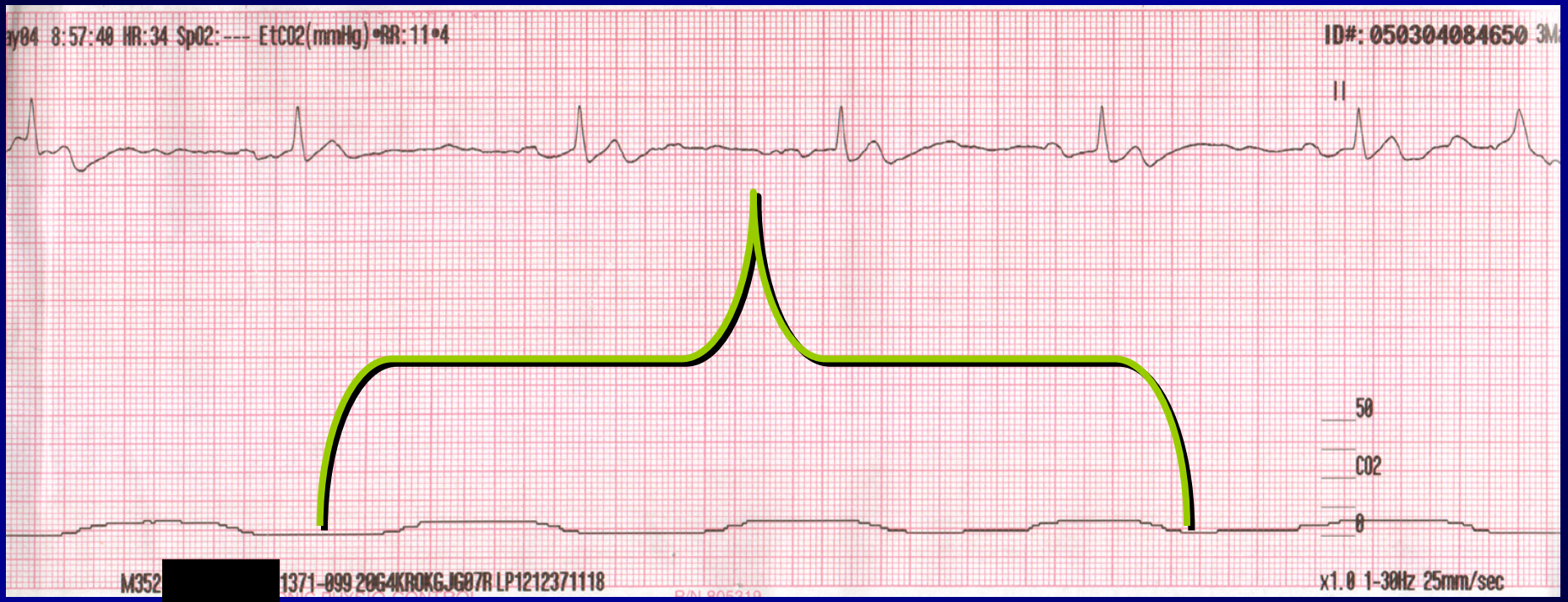
What is the absolute height of the curve?

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"

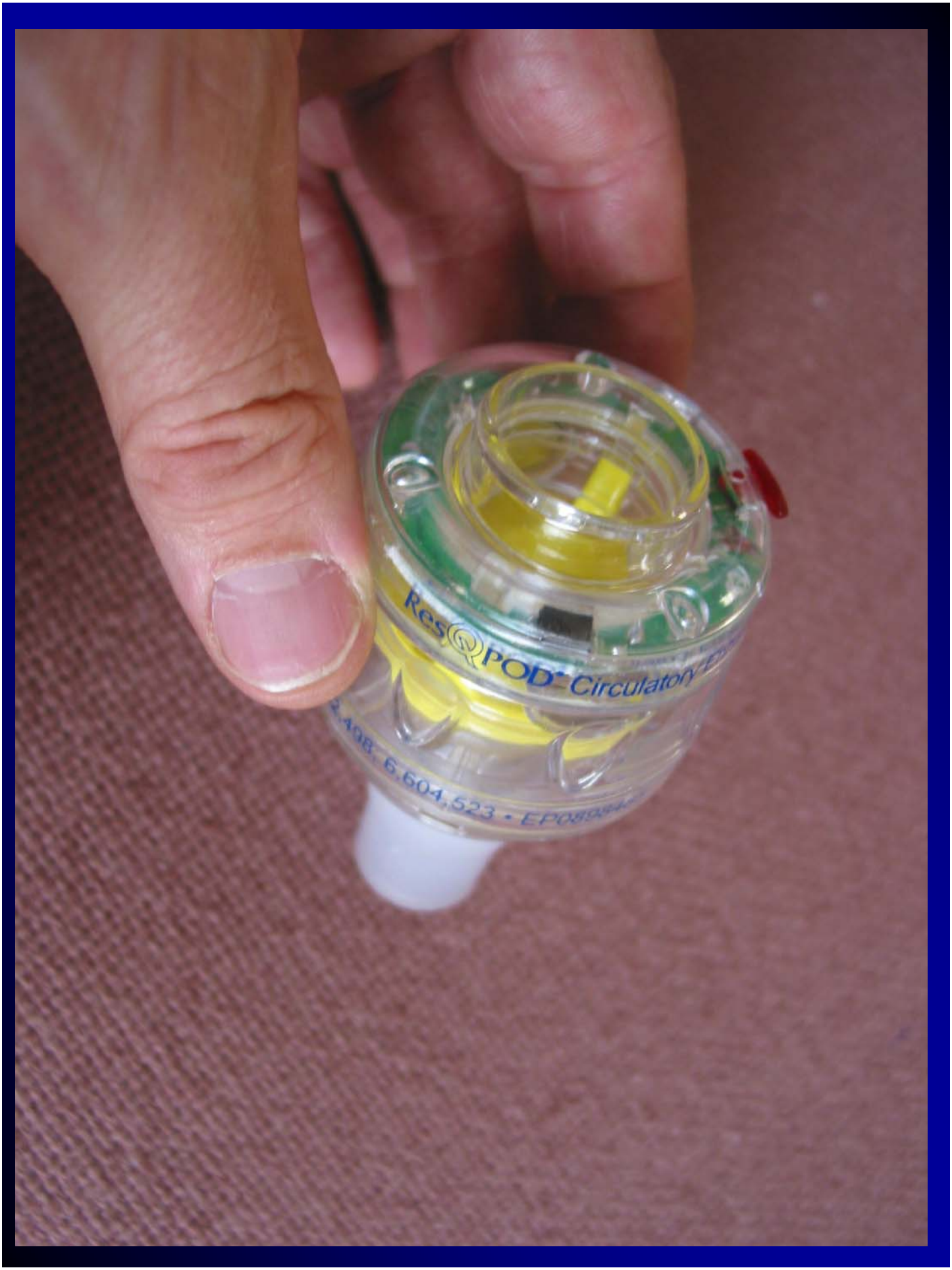

ID#: 070304165531 3Jul04 16:59:09 HR:59 SpO2:--- EtCO2(mmHg) •RR:26•14
Paddles
SpO2(X2) No Sensor Detected
50
CO2
0
x1.0 2.5-30Hz 25mm/sec
A-1 007 3011371-095 2GG4KROKGJSP7R LP1231255100


8:57:48 HR:34 SpO2:--- EtCO2(mmHg) RR:11
ID#: 050304084650
II
50
CO2
0
x1.0 1-30Hz 25mm/sec


POD' Circulatory
6,604,523 • EP0898485

Resuscitation Outcomes Consortium

Will utilize the "ResQ Pod" (impedance threshold device) to try to improve outcome from cardiac arrest

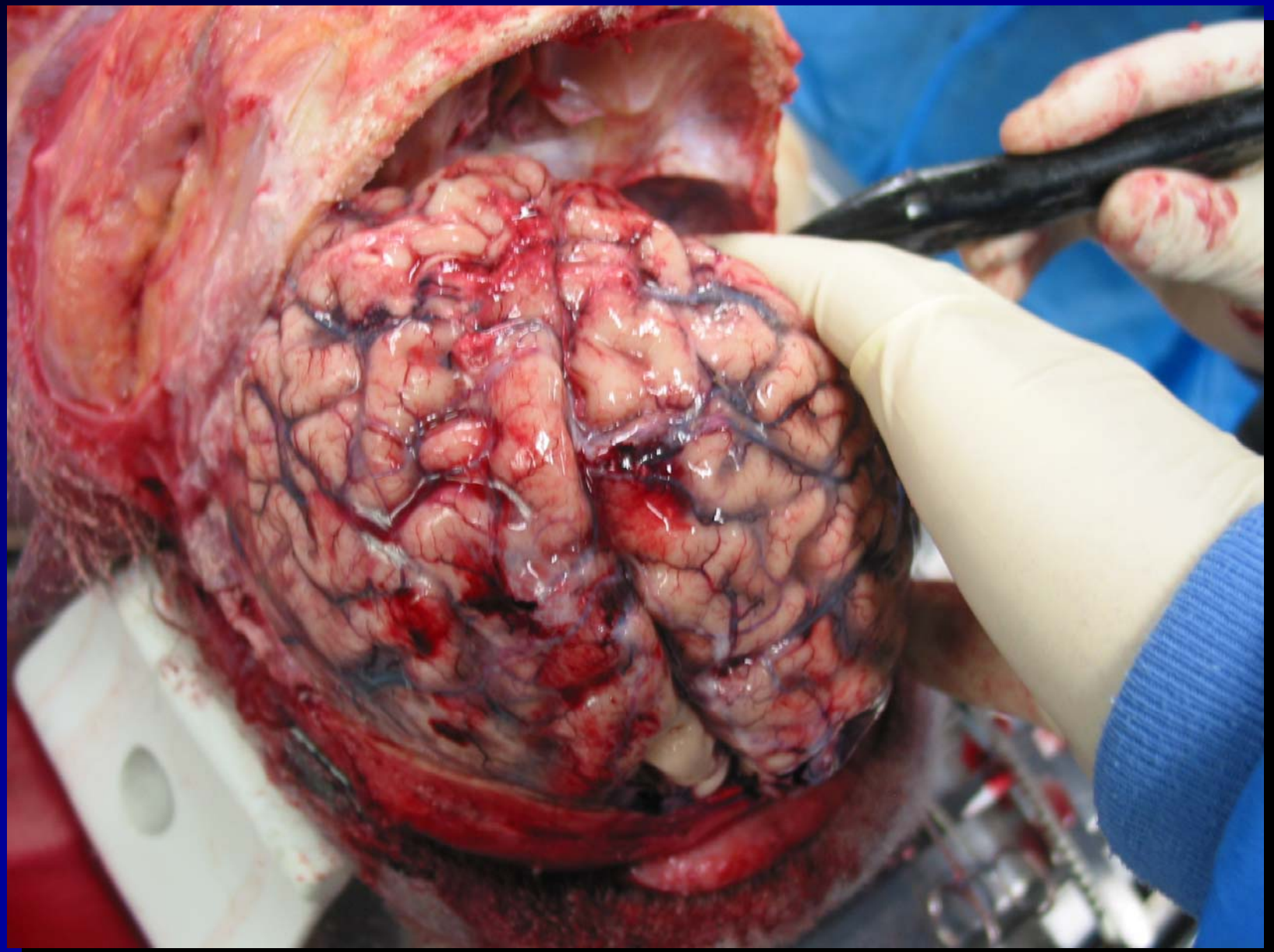

ResQPOD Circulatory
6,604,523


www.StrangeCosmos.com


CAUTION
WATER ON ROAD
DURING
RAIN

Avoiding Overventilation


19.0
10
22.0cm
I
1.5
21:44



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

ELSEVIER

Resuscitation 57 (2003) 193–199

RESUSCITATION

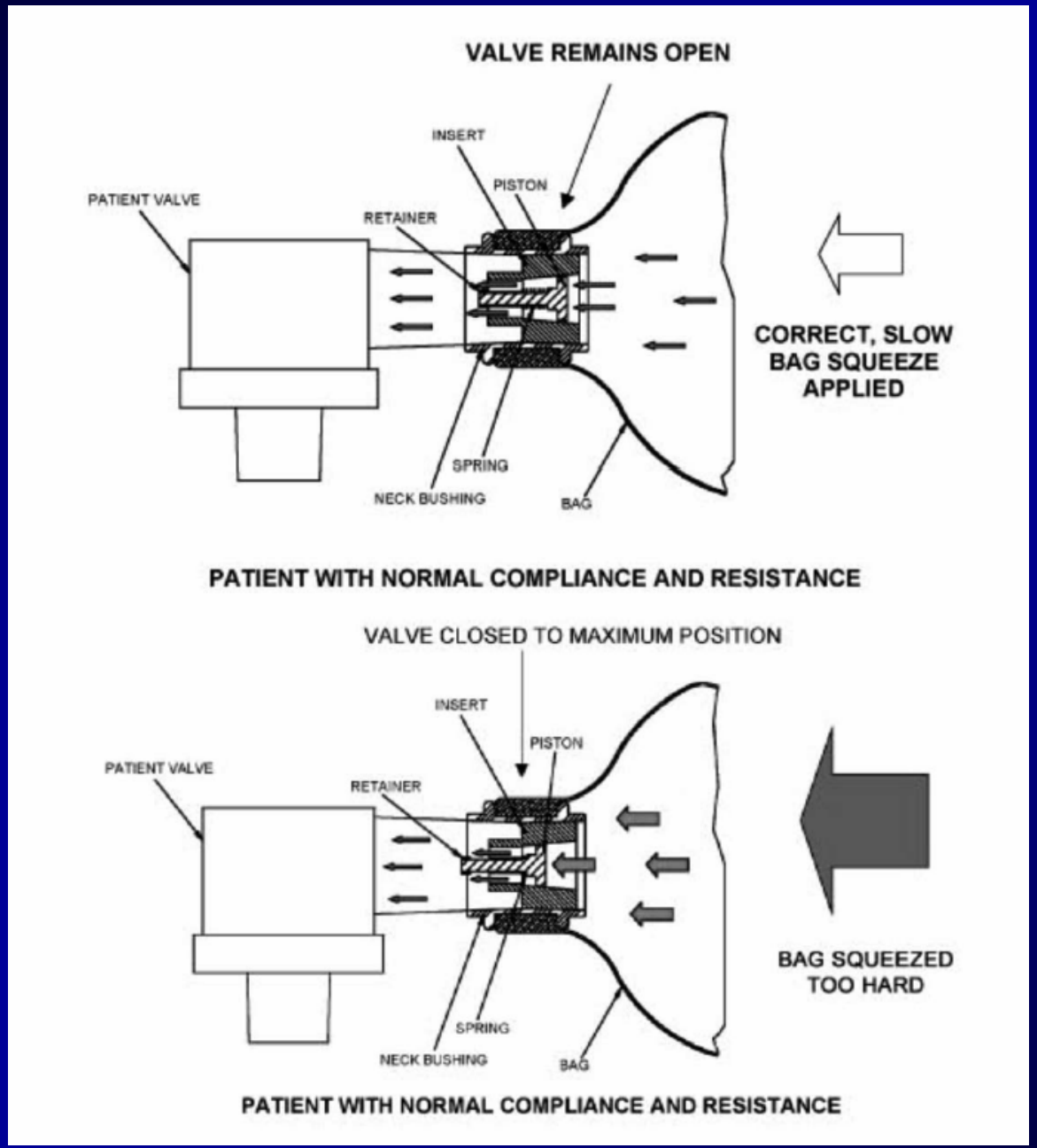
www.elsevier.com/locate/resuscitation

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 [a,*], Volker Wenzel [a], Angelika Stallinger [a], Wolfgang G. Voelckel [a], Klaus Rheinberger [a], Karl H. Stadlbauer [a], Sven Augenstein [a], Volker Dörges [b], Karl H. Lindner [a], Christoph Hörmann [a]

[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


VALVE REMAINS OPEN
INSERT
PISTON
PATIENT VALVE
RETAINER
CORRECT, SLOW BAG SQUEEZE APPLIED
SPRING
NECK BUSHING
BAG
PATIENT WITH NORMAL COMPLIANCE AND RESISTANCE
VALVE CLOSED TO MAXIMUM POSITION
INSERT
PISTON
PATIENT VALVE
RETAINER
BAG SQUEEZED TOO HARD
SPRING
NECK BUSHING
BAG
PATIENT WITH NORMAL COMPLIANCE AND RESISTANCE


ENTRANCE
ONLY
DO NOT
ENTER

Respiratory Distress and Failure

Date last updated: Wednesday, November 08, 2006 03:42 PM Pacific

Street Science
by Keith Wesley

10/17/2006 | Print Article | EMail Article to a friend |

Effectiveness of Prehospital CPAP in Managing Acute Pulmonary Edema

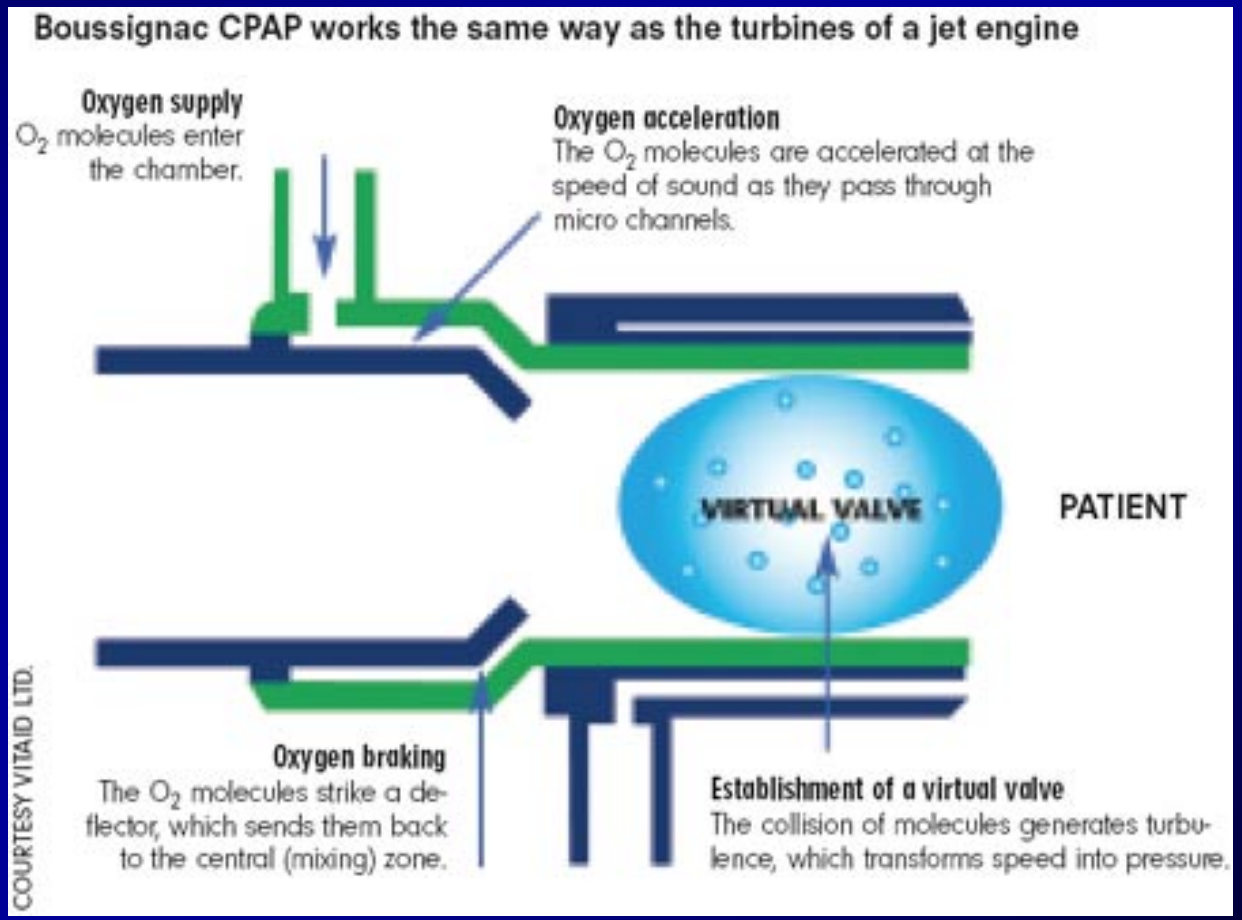
By Keith Wesley

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

Michael H, Michael R, Roger J, et al: "Effectiveness of prehospital continuous positive airway pressure in the management of acute pulmonary edema." *Prehospital Emergency Care*. 10(4):430-439, 2006

Continuous Positive Airway Pressure

Continuous Positive Airway Pressure

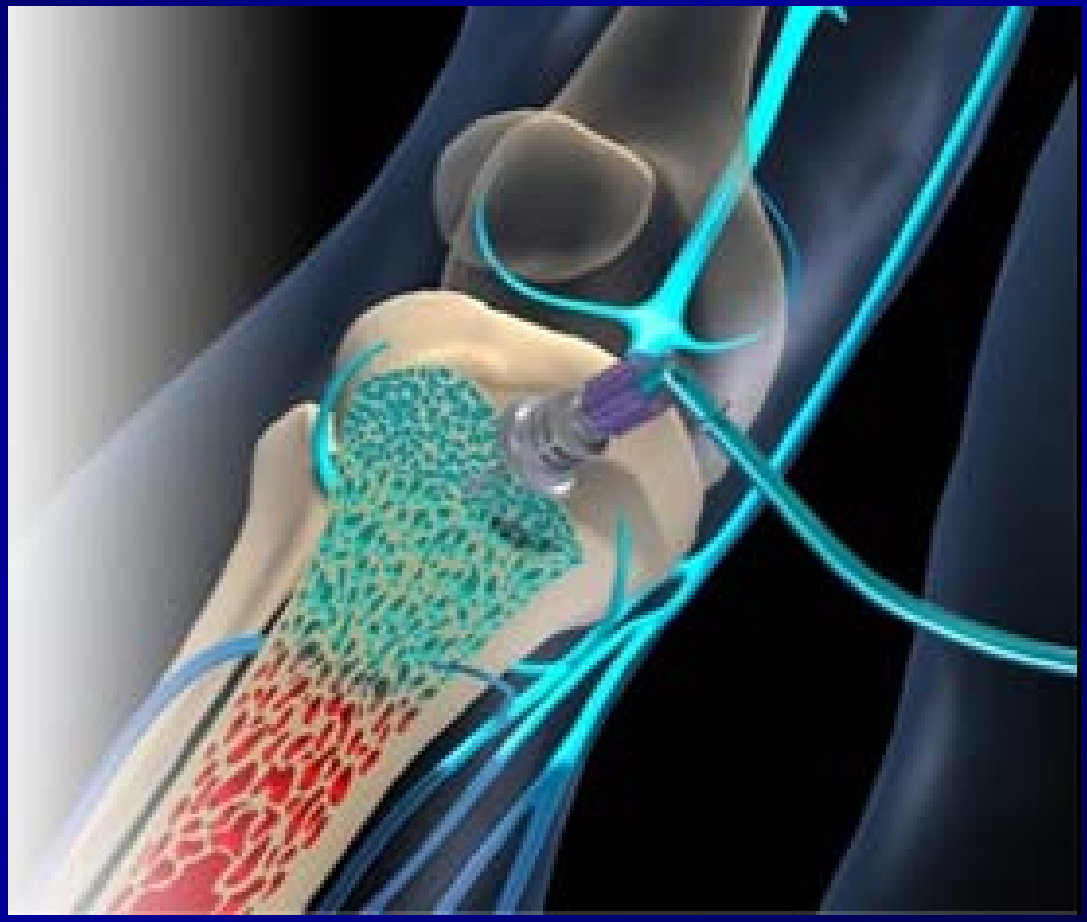



TACO
BELL
DRIVE THRU
NOW
HIRING
ALL SHITS

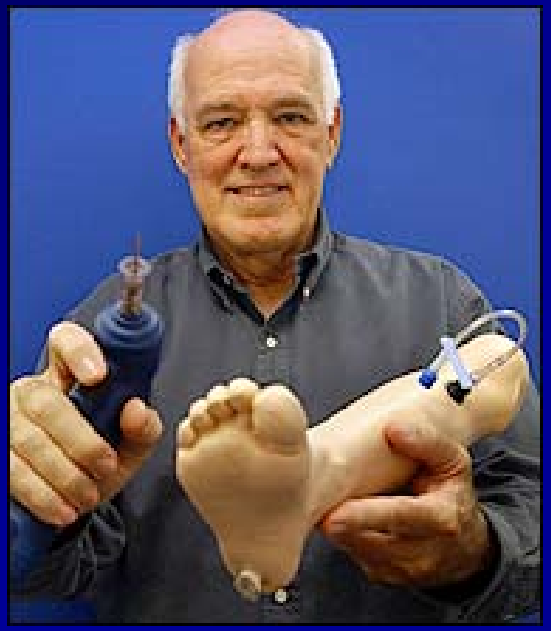
Intraosseous Infusion

On of the most important advances in the history of EMS

Intraosseous Infusion

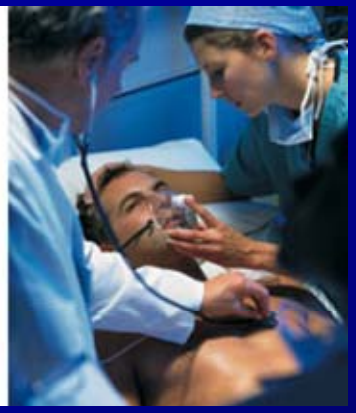


Intraosseous Infusion



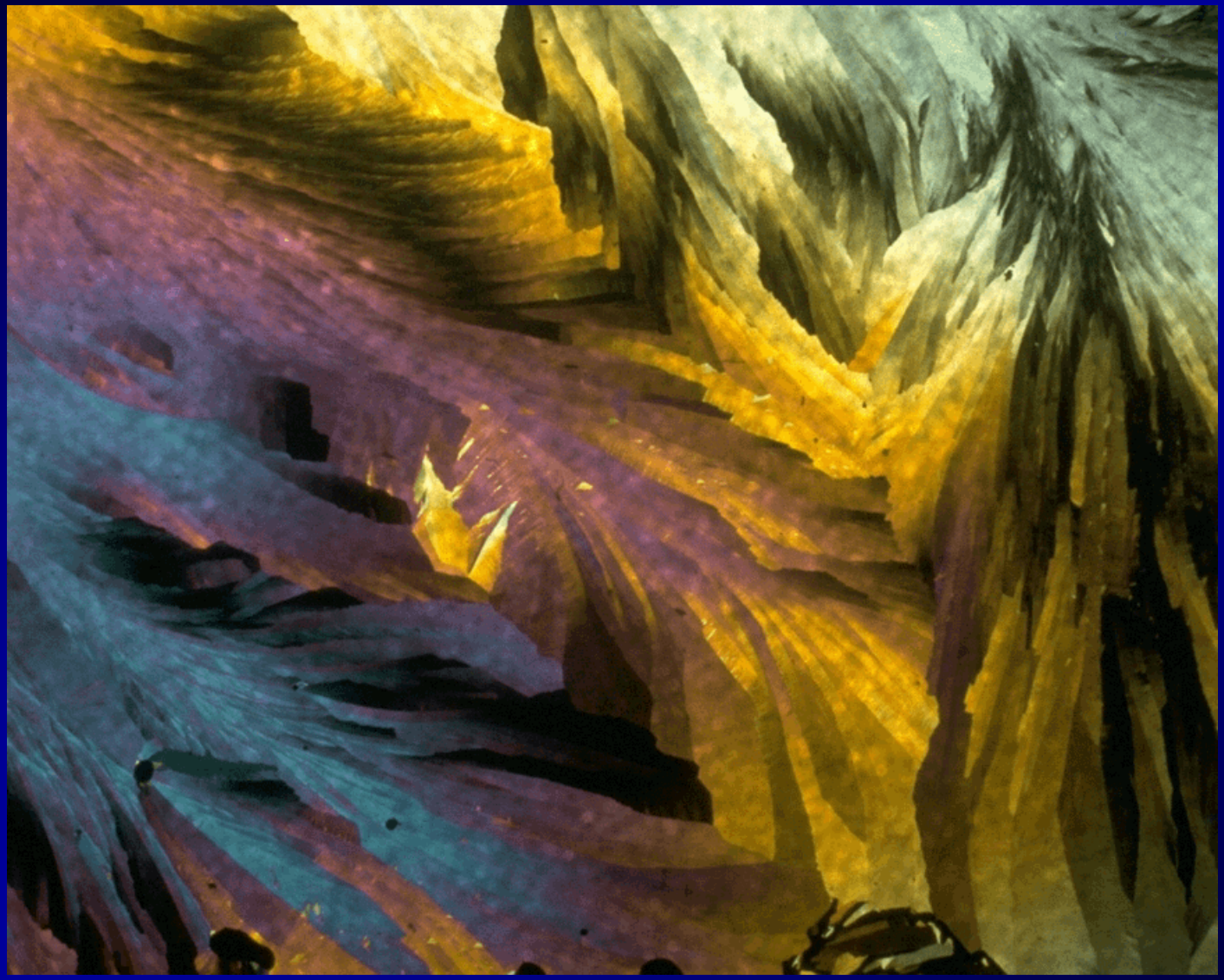
Central Line Alternative

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.

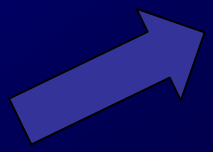


Potential access sites:

Proximal tibia
Humeral head
Distal tibia



Shock

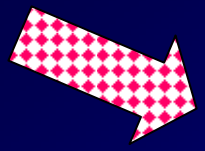


Cardiogenic

- 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

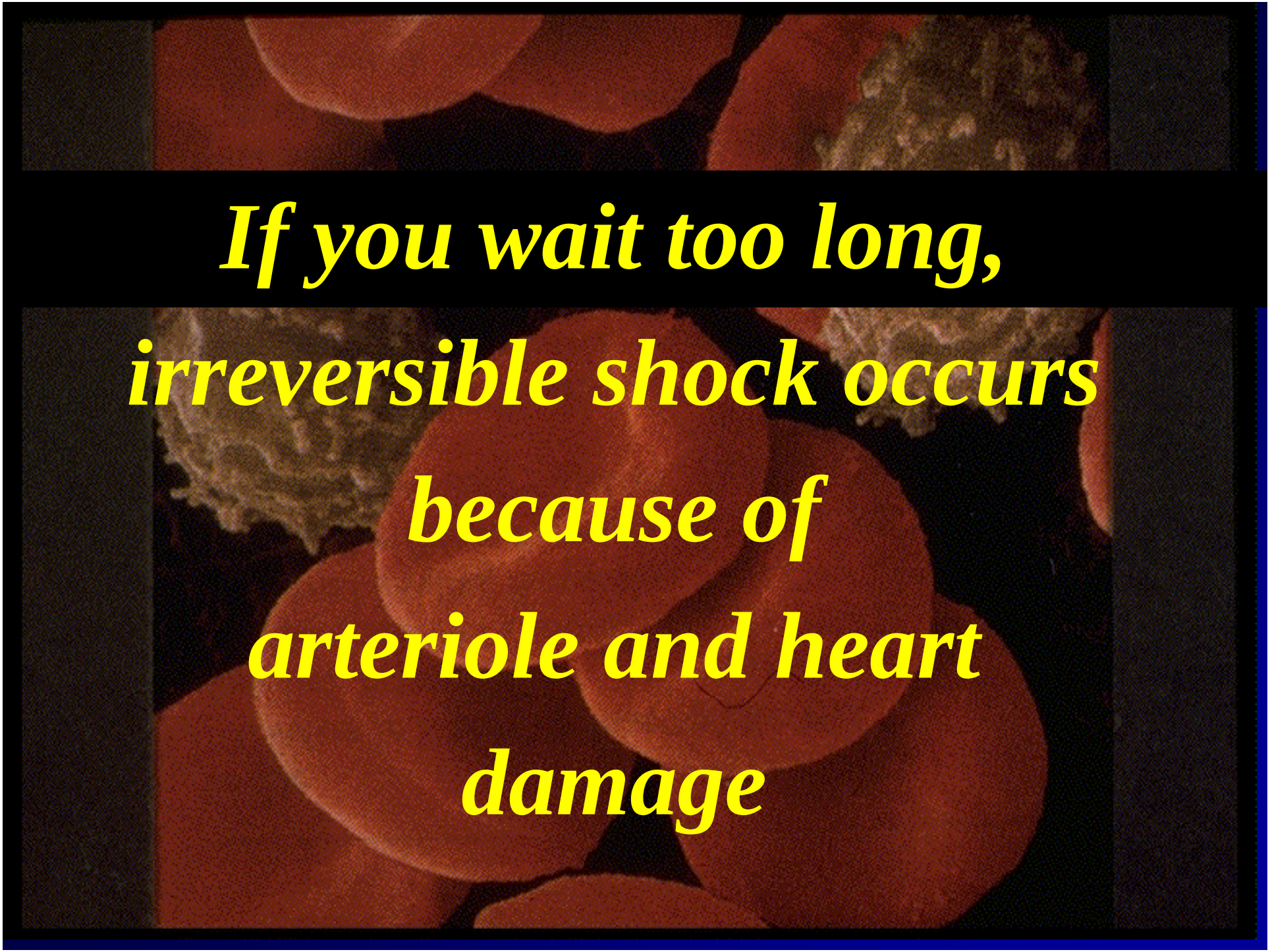
- A flat neck vein, tachycardia shock
- Signs of poor perfusion, pale, diaphoretic
- REDUCED End-tidal CO_2 in the setting of normal PO_2
- Decreased urinary output (normally 30 cc/hr or more, especially with IV fluids)

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)

HBOC

Table 1
HBOC Physical Properties (adapted from ref. 28)

HBOC	Poly-SFH-P	HBOC 201	o-raffimer cross-linked hgb
Tradename	**Polyheme**	**Hemopure**	**Hemolink**
Manufacturer	Northfield Laboratories Inc.	Biopure Inc.	Hemosol Inc
Hemoglobin Source	Human	Bovine	Human
Polymerizer	gluteraldehyde	gluteraldehyde	o-raffinose
Hemoglobin (g/dL)	10	13	10
Unit Volume (mL)	500	250	250
Hemoglobin (g) per Unit	50	30	25
P_{50} (mmHg)	28-32	38	39+/-12 31+/-6
Collioid Osmotic Pressure (mm Hg)	20-25	17	26 +/-4
Osmolarity(mOsm)		290-310	
Viscosity (cp)	1.9-2.2	1.3	1 –2
Tetramer % (< 64 kD)	<1	<5	<66
Methemoglobin %	<8%	<10%	<15
Shelf Life 4°C 21°C	 >6 weeks >1.5 years	 > 3years >2 years	 >1 year -

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!

Shocking Revelations!!

The Use of Low Volume Resuscitation in the Treatment of Hemorrhagic Shock

We have over ten quarts of fluid in the body that can be pulled into the blood system


Some More Basics.....
.....zzzzzz.....

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

Body Fluid Compartments		
Total Body Water	Body Weight (%)	Total Body Water (%)
Total	60	100
Intracellular	40	67
Extracellular	20	33
Intravascular	5	8
Interstitial	15	25

Let's look at some of these figures again

Body Fluid Compartments		
Total Body Water	Body Weight (%)	Total Body Water (%)
Intravascular	5	8
Interstitial	15	25

15% x 70KG = 10KG (about 10 liters)!!!

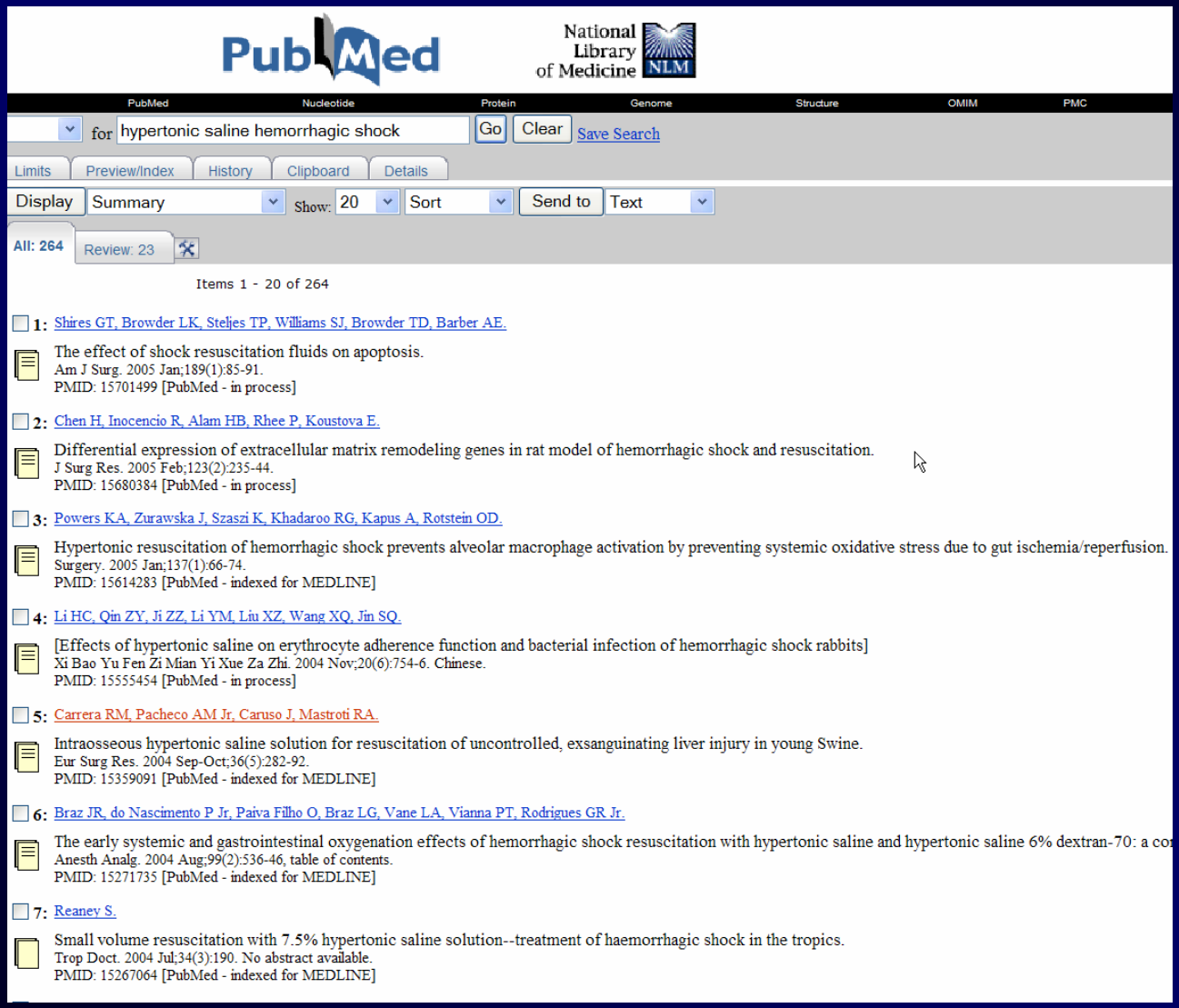
An average adult has
ten liters of free fluid
(over two gallons)
bathing the cells and
potentially available
to be pulled back
into the blood vessels
to maintain blood pressure

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



PubMed

National Library of Medicine

PubMed | Nucleotide | Protein | Genome | Structure | OMIM | PMC

for hypertonic saline hemorrhagic shock | Go | Clear | Save Search

Limits | Preview/Index | History | Clipboard | Details

Display Summary | Show: 20 | Sort | Send to | Text

All: 264 | Review: 23

Items 1 - 20 of 264

1: Shires GT, Browder LK, Steljes TP, Williams SJ, Browder TD, Barber AE.

The effect of shock resuscitation fluids on apoptosis.
Am J Surg. 2005 Jan;189(1):85-91.
PMID: 15701499 [PubMed - in process]

2: Chen H, Inocencio R, Alam HB, Rhee P, Koustova E.

Differential expression of extracellular matrix remodeling genes in rat model of hemorrhagic shock and resuscitation.
J Surg Res. 2005 Feb;123(2):235-44.
PMID: 15680384 [PubMed - in process]

3: Powers KA, Zurawska J, Szaszi K, Khadaroo RG, Kapus A, Rotstein OD.

Hypertonic resuscitation of hemorrhagic shock prevents alveolar macrophage activation by preventing systemic oxidative stress due to gut ischemia/reperfusion.
Surgery. 2005 Jan;137(1):66-74.
PMID: 15614283 [PubMed - indexed for MEDLINE]

4: Li HC, Qin ZY, Ji ZZ, Li YM, Liu XZ, Wang XQ, Jin SQ.

[Effects of hypertonic saline on erythrocyte adherence function and bacterial infection of hemorrhagic shock rabbits]
Xi Bao Yu Fen Zi Mian Yi Xue Za Zhi. 2004 Nov;20(6):754-6. Chinese.
PMID: 15555454 [PubMed - in process]

5: Carrera RM, Pacheco AM Jr, Caruso J, Mastroti RA.

Intraosseous hypertonic saline solution for resuscitation of uncontrolled, exsanguinating liver injury in young Swine.
Eur Surg Res. 2004 Sep-Oct;36(5):282-92.
PMID: 15359091 [PubMed - indexed for MEDLINE]

6: Braz JR, do Nascimento P Jr, Paiva Filho O, Braz LG, Vane LA, Vianna PT, Rodrigues GR Jr.

The early systemic and gastrointestinal oxygenation effects of hemorrhagic shock resuscitation with hypertonic saline and hypertonic saline 6% dextran-70: a co
Anesth Analg. 2004 Aug;99(2):536-46, table of contents.
PMID: 15271735 [PubMed - indexed for MEDLINE]

7: Reaney S.

Small volume resuscitation with 7.5% hypertonic saline solution--treatment of haemorrhagic shock in the tropics.
Trop Doct. 2004 Jul;34(3):190. No abstract available.
PMID: 15267064 [PubMed - indexed for MEDLINE]

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**

National Institutes of Health

Resuscitation Outcomes Consortium

We will give either 250 cc (about a cup) of Hypertonic Saline

OR

Standard IV Fluids

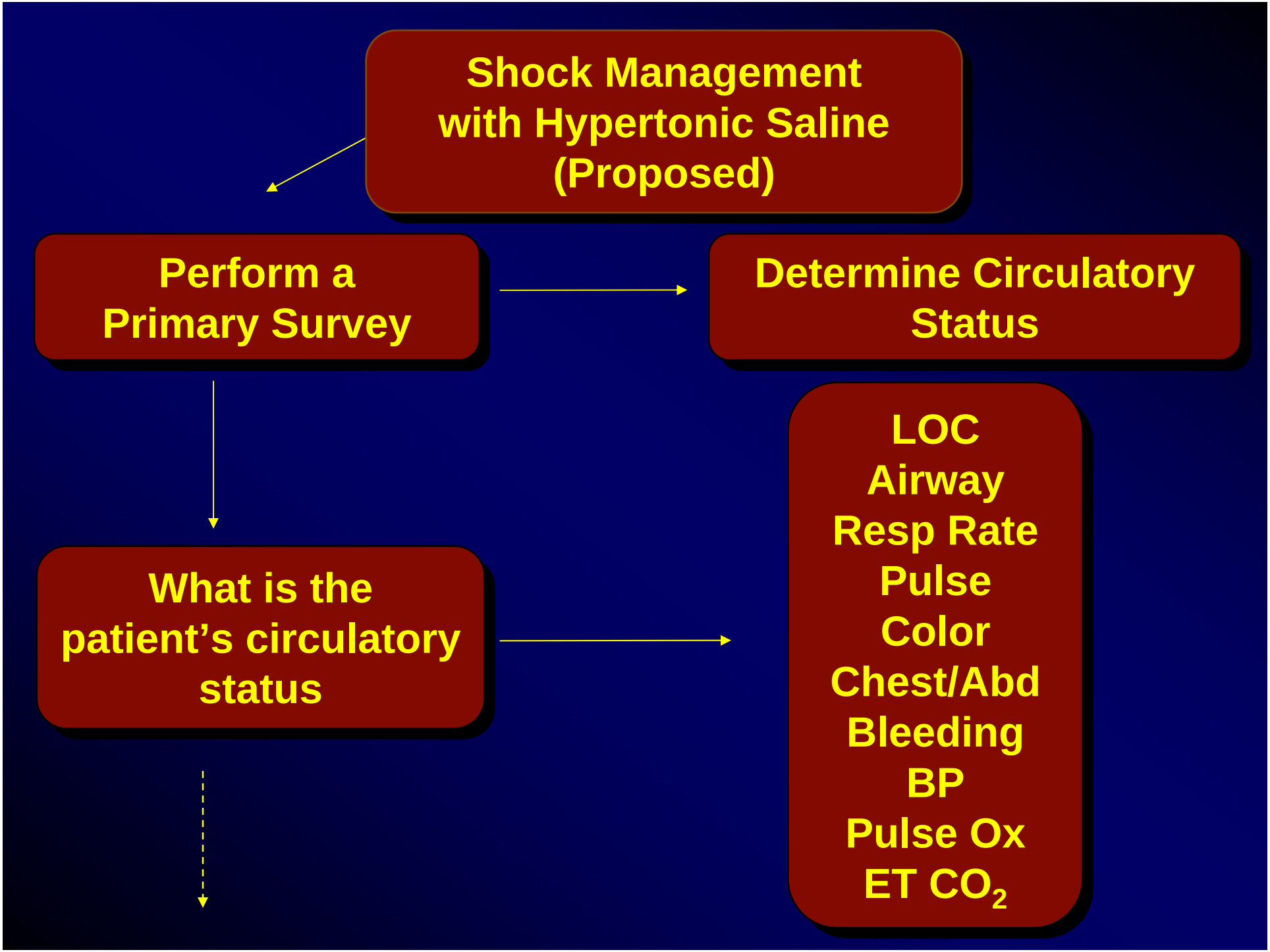
Initially we poured in fluid…

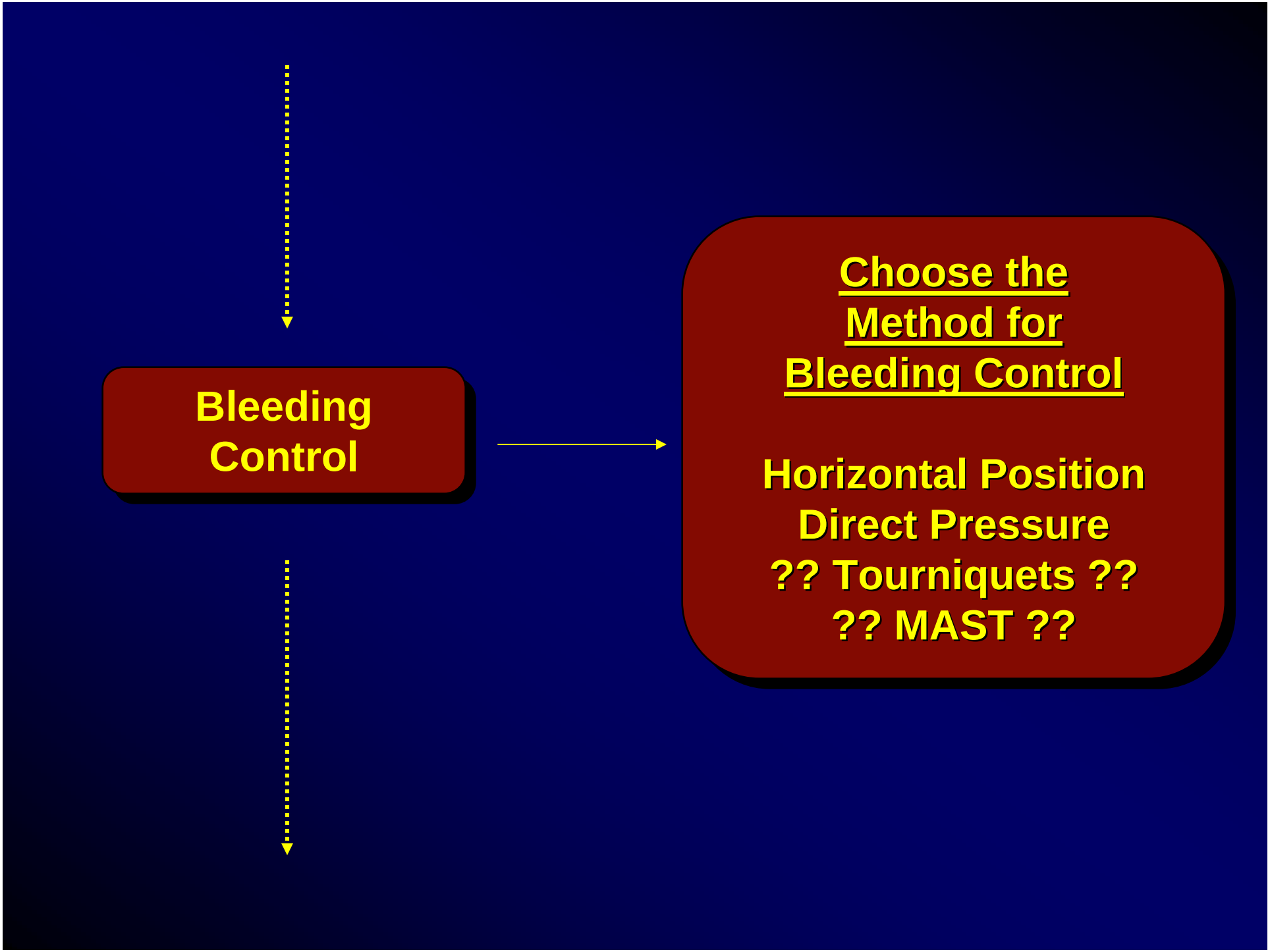
Then is was

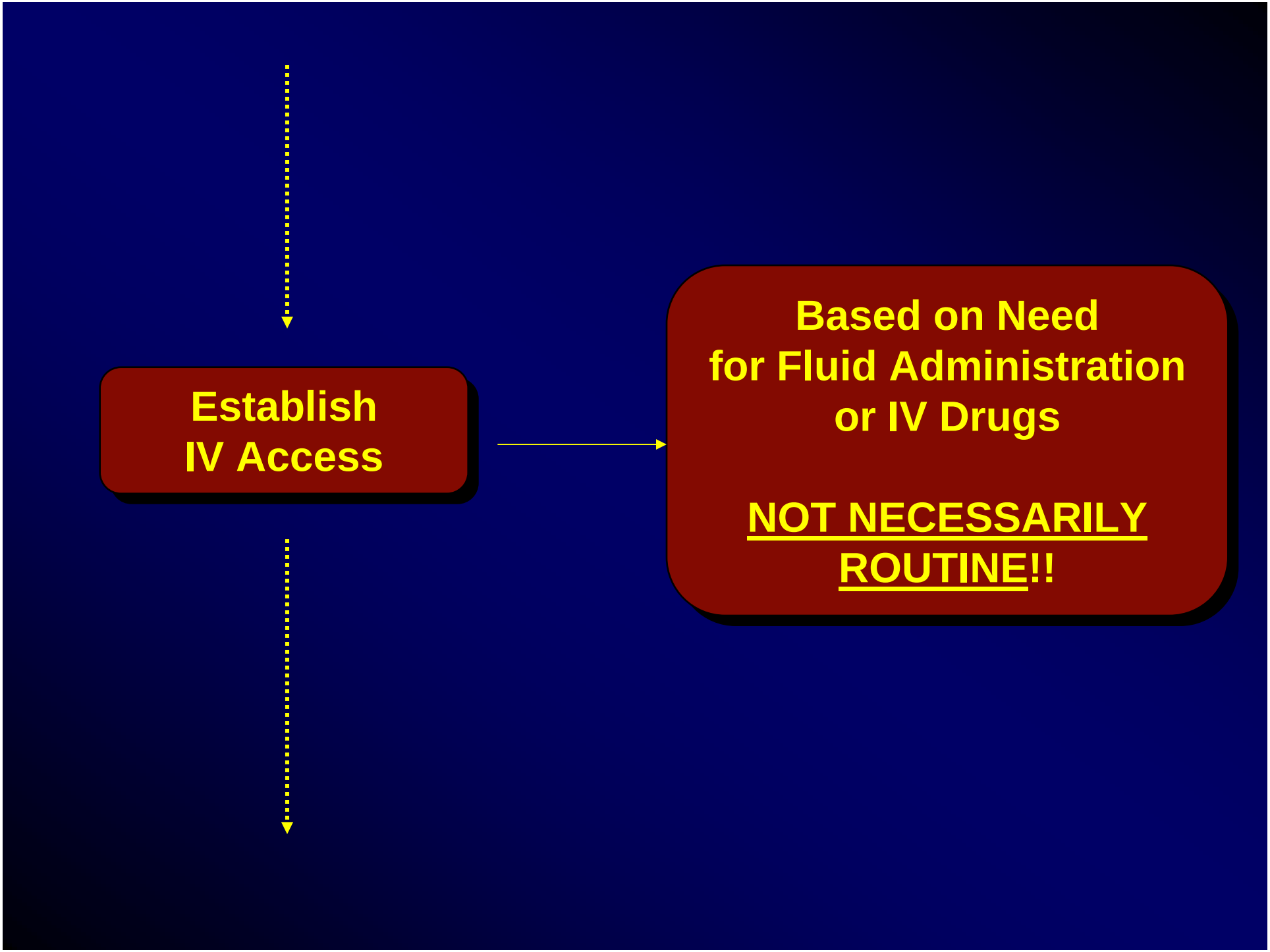
“permissive hypoperfusion”…

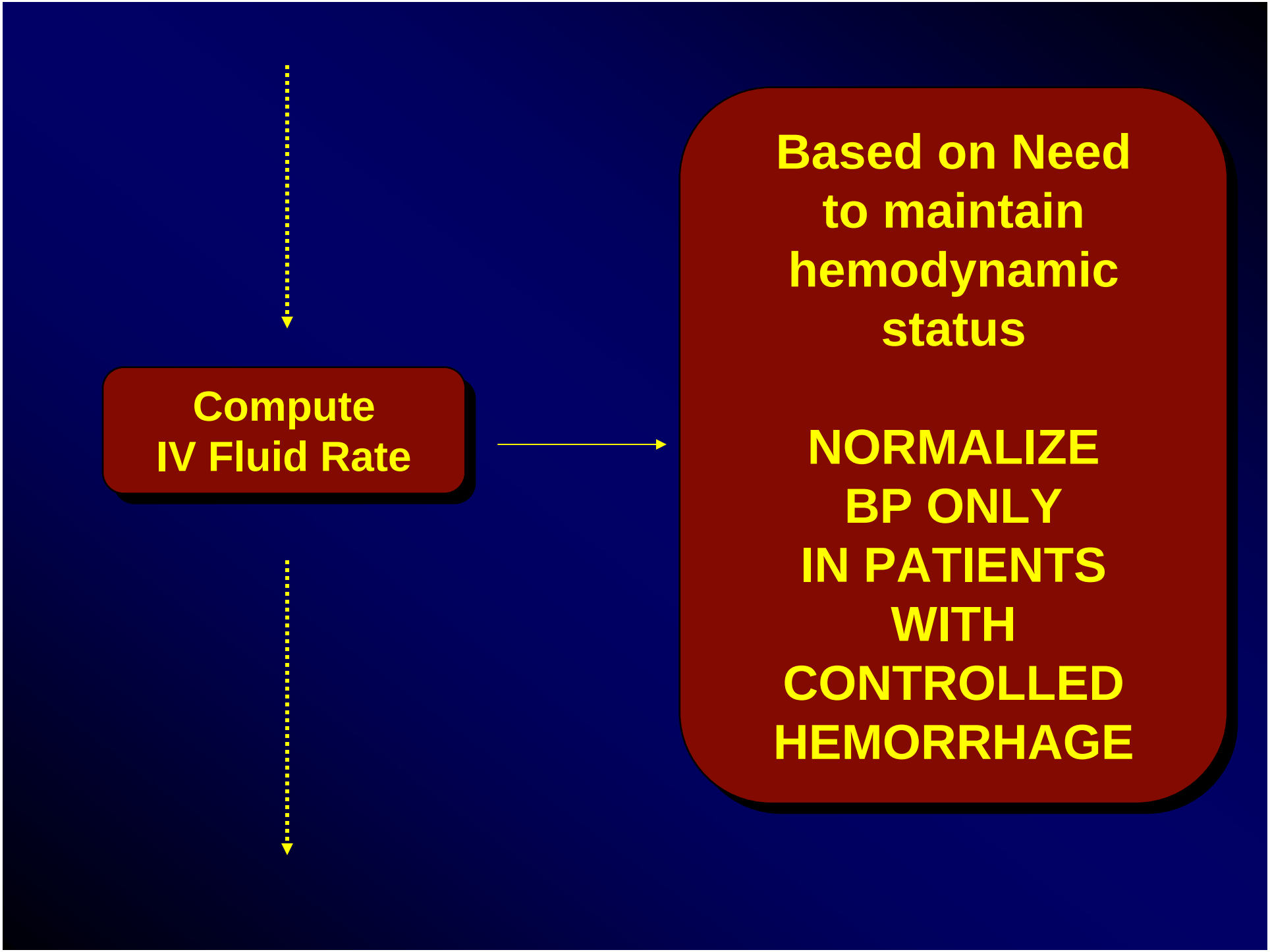
Now we’ll be using the body’s own “internal IV fluids”

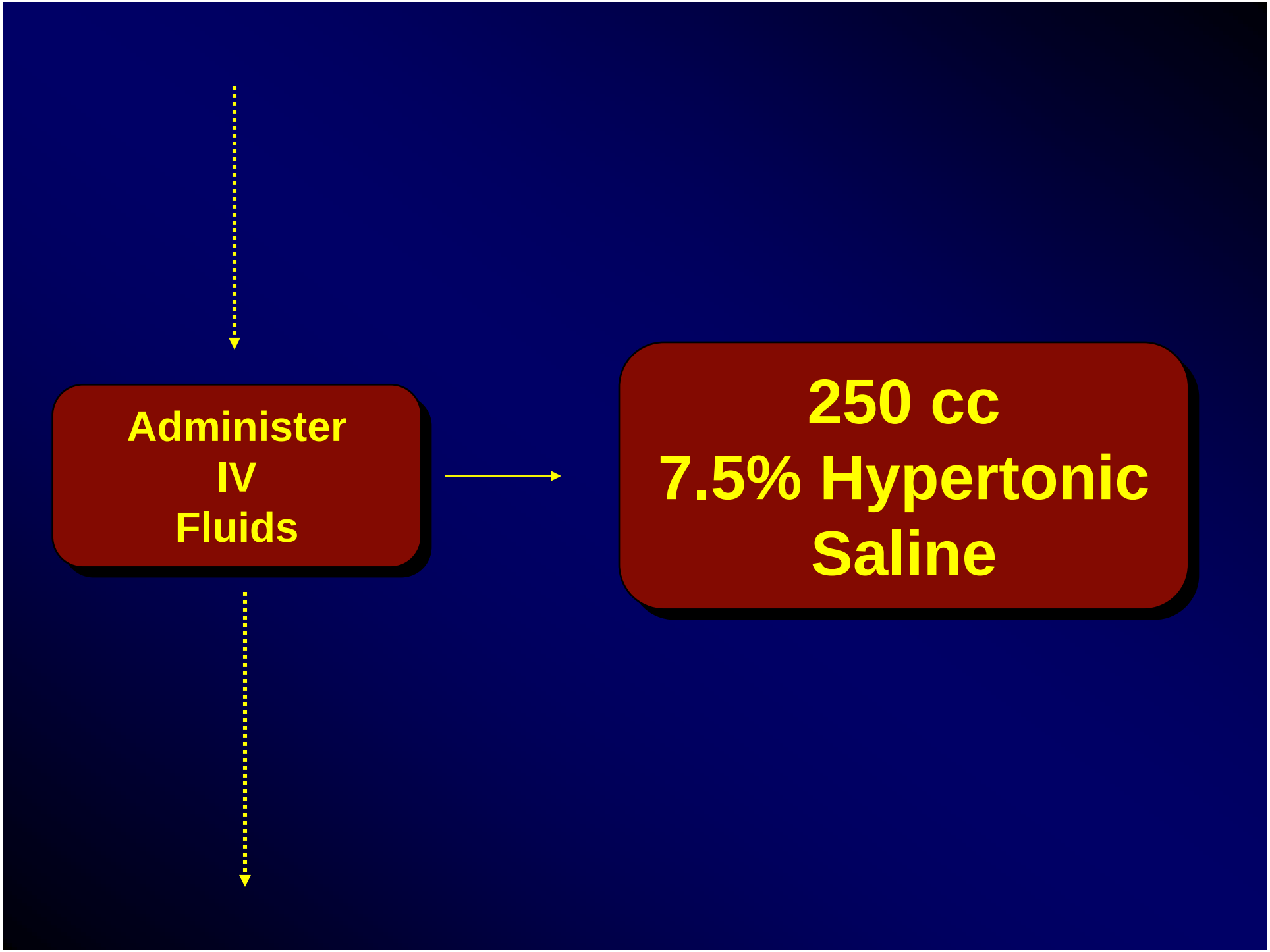
An Algorithm for Shock Management and Consideration of Hypertonic Saline Administration in Shock


Shock Management with Hypertonic Saline (Proposed)
Perform a Primary Survey
Determine Circulatory Status
What is the patient's circulatory status
LOC
Airway
Resp Rate
Pulse
Color
Chest/Abd
Bleeding
BP
Pulse Ox
ET CO_2


Bleeding Control
Choose the Method for Bleeding Control
Horizontal Position
Direct Pressure
?? Tourniquets ??
?? MAST ??

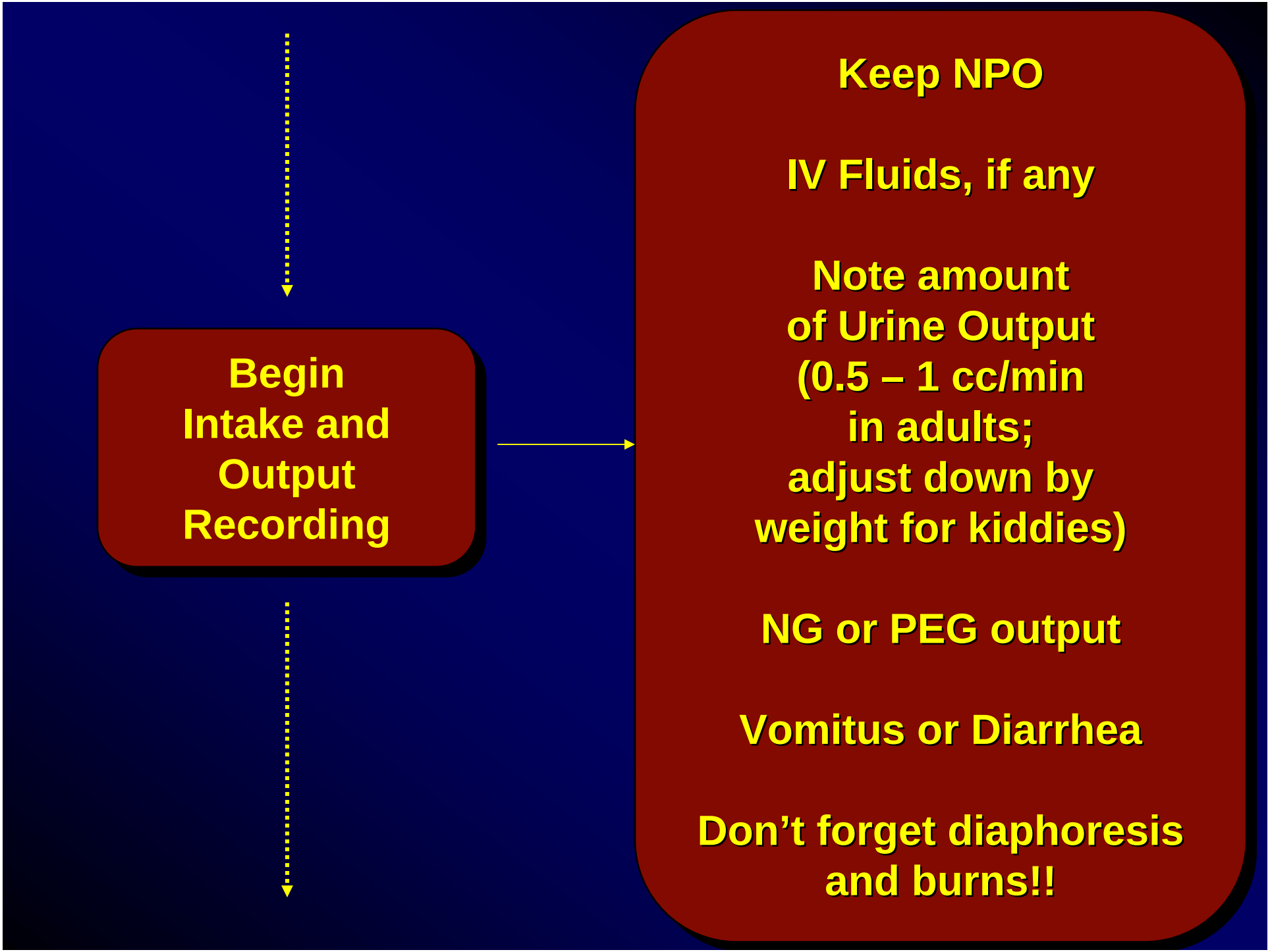

Establish
IV Access
Based on Need
for Fluid Administration
or IV Drugs
NOT NECESSARILY
ROUTINE!!

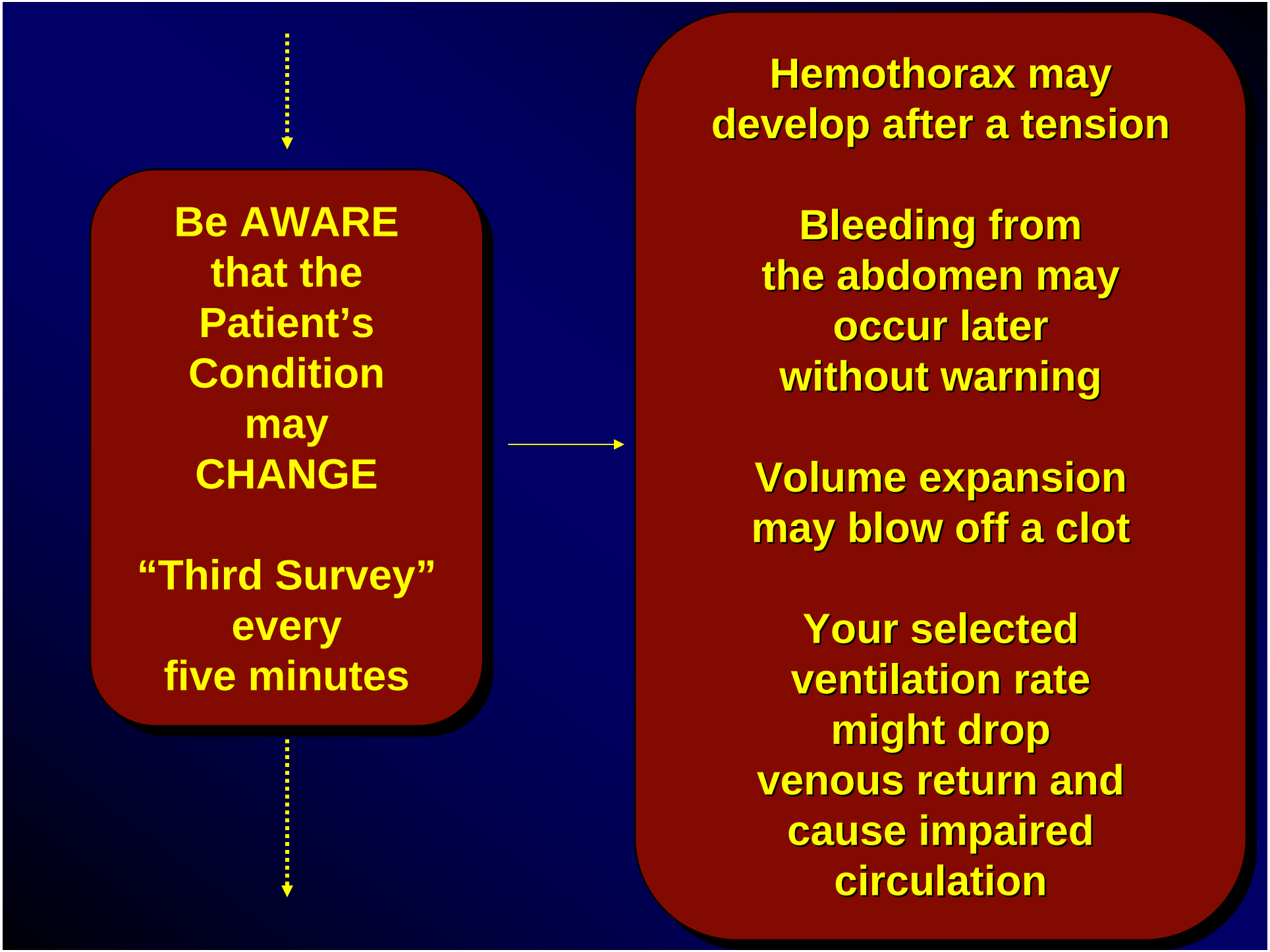

Compute
IV Fluid Rate
Based on Need
to maintain
hemodynamic
status
NORMALIZE
BP ONLY
IN PATIENTS
WITH
CONTROLLED
HEMORRHAGE

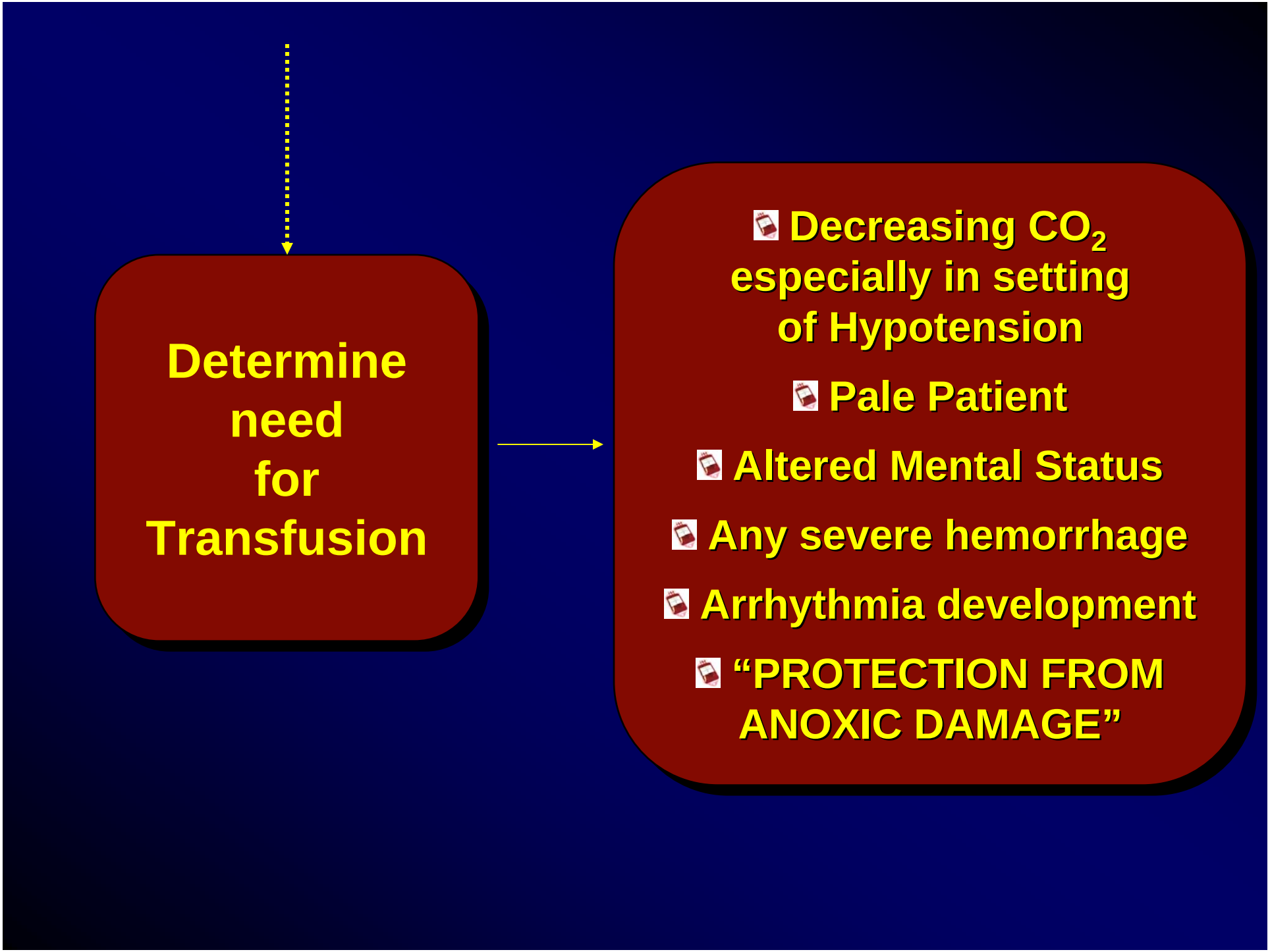

Administer
IV
Fluids
250 cc
7.5% Hypertonic
Saline

Additional IV Fluid Rate After HS?

- **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


Begin Intake and Output Recording
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!!


Be AWARE
that the
Patient's
Condition
may
CHANGE
"Third Survey"
every
five minutes
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


Determine need for Transfusion
Decreasing CO_2 especially in setting of Hypotension
Pale Patient
Altered Mental Status
Any severe hemorrhage
Arrhythmia development
"PROTECTION FROM ANOXIC DAMAGE"


3
TEMPORARY INSANITY II

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

ADPH
Alabama Department of Public Health

OEMST
Office of EMS and Trauma

PATIENT CARE PROTOCOLS

Third Edition, October 19, 2006

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 patents 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 PHYICIAN 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 A: 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.

DRUG/PROCEDURE	PROTOCOL
Albuterol	Respiratory Distress
Albuterol	Allergic Reaction
Amiodarone	Adult Vfib/Pulseless Vtach
Aspirin	Chest Pain
Aspirin	Stroke
Atropine Sulfate	Cardiac Arrest
Atropine Sulfate	Symptomatic Bradycardia
D50	Altered Mental Status
D50	Cardiac Arrest
D50	Coma
D50	Seizures
Diazepam	Seizures (Adult)
Diphenhydramine	Allergic Reaction
Epinephrine	Allergic Reaction
Epinephrine	Cardiac Arrest
Lidocaine	Cardiac Arrest

Patient Care Protocols
SECTION 3: Medical Direction for Drugs and Procedures (continued)

Category A (continued)

Lorazepam	Seizures
Naloxone	Altered Mental Status
Naloxone	Cardiac Arrest
Naloxone	Coma
Naloxone	Poisons & Overdoses
Naloxone	Seizures
Nitroglycerin	Cardiac Chest Pain
Normal Saline (IV Solution)	All Protocols as indicated
Oral Intubation	All Protocols as indicated
Thiamine	All Protocols as indicated
Vasopressin	Adult Vfib/Pulseless Vtach

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.

DRUG/PROCEDURE	PROTOCOL
Activated Charcoal	Poisons & Overdoses
Adenosine	Cardiac Dysrhythmias
Albuterol	Congestive Heart Failure
Albuterol	Burns with wheezing
Atropine Sulfate	Poisons & Overdoses
Calcium Gluconate	Cardiac Arrest
Calcium Gluconate	Poisons & Overdoses
Dextrose	Hyperthermia
Dextrose	Poisons & Overdoses
Diazepam	Seizures (Pediatrics)
Diazepam	Seizures (Rectal Administration)
Dopamine	Cardiac Arrest
Dopamine	Poisons & Overdoses
Dopamine	Shock
Epinephrine	Respiratory Distress
Furosemide	Respiratory Distress
Glucagon	Hypoglycemia
Glucagon	Poisons & Overdoses
Lidocaine	Cardiac Chest Pain
Lidocaine	Cardiac Dysrhythmias
Lorazepam	Seizures (Pediatrics)
Magnesium Sulfate	Preeclampsia/Eclampsia
Magnesium Sulfate	Cardiac Dysrhythmias (Torsades de Pointes)
Morphine Sulfate	All Protocols as Indicated
Nitroglycerin	Congestive Heart Failure
Nitroglycerin	Hypertensive Emergencies
Nitroglycerin	Respiratory Distress
Nitrous Oxide	Amputation, Burns, Cardiac Chest Pain, Fractures and Dislocations
Sodium Bicarbonate	Cardiac Arrest
Sodium Bicarbonate	Poisons & Overdoses

Intraosseous Infusion	Cardiac Arrest
Rectal Administration Diazepam (Pediatric)	Seizures
External Pacing	Cardiac Dysrhythmias
Intubation (Nasal) (Pediatric)	All Protocols
Naso-Gastric Tube Placement	All Protocols
Needle Decompression	Tension Pneumothorax

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	WHEN TO USE	NOTE
Amiodarone	Adult/Pediatric VFib/Pulseless Vtach	
Glucagon	Hypoglycemia	
Glucagon	Poisons and Overdoses	
Lorazepam	Seizures	
Nitrous Oxide	Amputation	
Nitrous Oxide	Burns	
Nitrous Oxide	Cardiac Chest Pain	
Nitrous Oxide	Fractures & Dislocations	
Morphine Sulfate	All Protocols as Indicated	Required if Available
Vasopressin	Adult VFib/Pulseless VTach	

PROCEDURES	WHEN TO USE	NOTE
12 Lead EKG	Chest Pain and/or Chest Trauma	Required if Available
End-Tidal **Electronic** CO_2 monitoring	Intubated patient, respiratory problem, trauma patient	May replace colormetric CO2 detector in monitoring ET tube placement (use of one or the other is mandatory)
Portable ventilator	Intubated patient and/or when following manufacturer's recommendations	

ABDOMINAL PAIN 4.3

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. Emesis: 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.

LIDOCAINE 5.14

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. Heat 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 VTach)-

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 VTach)-
1.0 mg/kg, IVP/IO

CLINICAL CARE GUIDELINES
03/01/2007

Fulton County Emergency Medical Services Clinical Care Guidelines

Grady Emergency Medical Service
Atlanta Fire Department
City of College Park Fire Department
Fulton County Fire Department
City of Hapeville Fire Department
City of Sandy Springs Fire Department
Rural/Metro Corporation

Fulton County Emergency Medical Services

Clinical Care Guideline – A10

Prehospital Acuity Classification

03/01/2007

Prehospital Acuity Classification (PAC)

1) The PAC System is designed to aid prehospital providers in classifying patients for refusal of care, destination and hospital diversion decisions. Prehospital providers should use these guidelines and their clinical impression 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 exclusive 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 vital signs 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, OP Airway, BVM)
- Severe respiratory distress with SPO_2 < 90%
- Pulseless
- Systolic BP < 90 mmHg
- Acute change in mental status
  - GCS < 14
  - **P** or **U** on the **AVPU** Scale

YES → **PAC Level One**

Time Dependent Emergency

- New onset CVA
- Chest pain with EKG or history consistent with MI
- New onset confusion or disorientation
- Severe pain unrelieved by prehospital intervention
- Patient condition not improving or deteriorating despite prehospital intervention
  - Respiratory distress
  - Allergic reaction
  - Hypoglycemia
  - Chest pain

YES → **PAC Level Two**

Vital Signs Outside of Normal Range

Age	RR	HR	SPO2
< 3 m	> 50	> 180	< 92%
3 m to 3 y	> 40	> 160	< 92%
3 – 8 y	> 30	> 140	< 92%
> 8 y	> 20	> 100	< 92%

With Concerning Clinical Presentation → **PAC Level Two**

Potential Emergency / Urgency

- A threat to life or time dependent emergency is not identified

YES → **PAC Level Three**

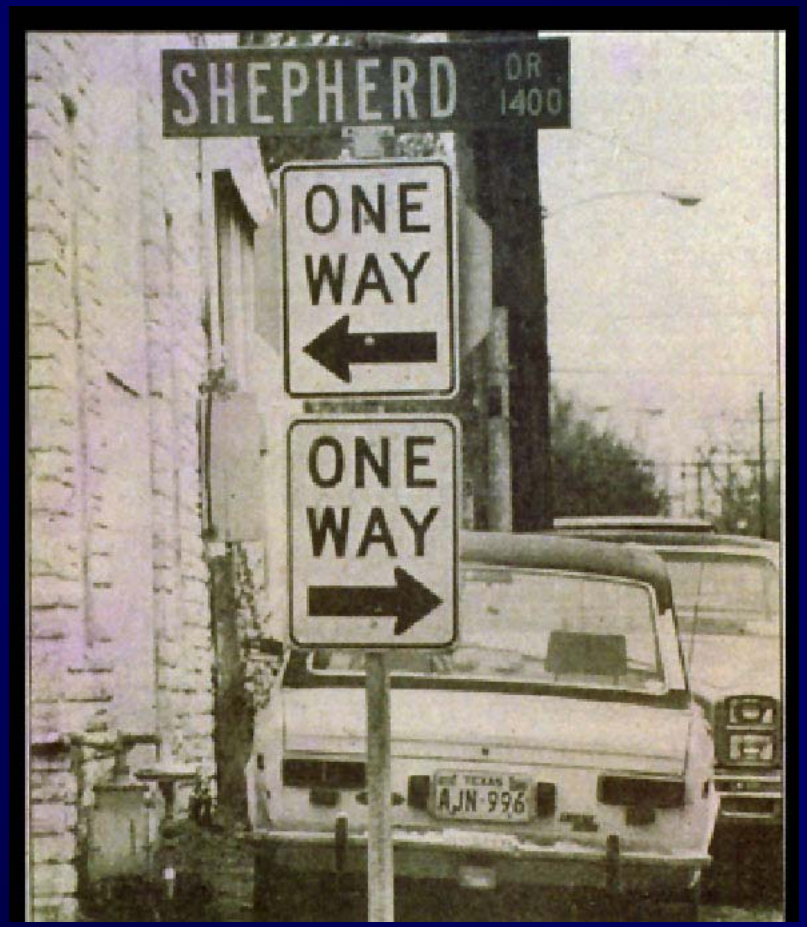
A Moment's Reprise…

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

BP = 88/55
P = 160
Resp = 36
TV = 800
Glu = 425
Hgb = 9

The Medics of the Near Future will be "Out of Hospital Intensivists"


SHEPHERD DR
1400
ONE
WAY
ONE
WAY
AJN 996

EMS

MUST LEAD THE WAY!

Questions or Comments??

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www.utsw.ws