

TRAUMA NOVA SCOTIA

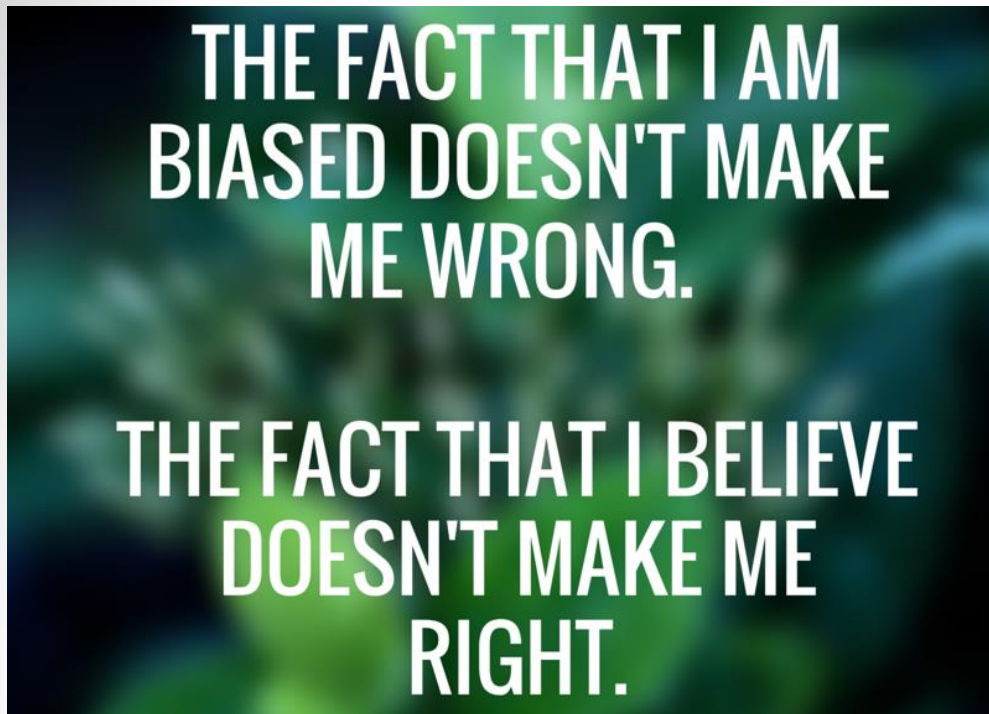
Where Emergency Medicine Meets Critical
Care:
Next Level Resuscitation

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Disclosures / conflict of interest



Support / acknowledgements

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- Dalhousie Department of Critical Care Medicine
- Dalhousie Department of Emergency Medicine
- Trauma Nova Scotia
- Dalhousie Department of Anesthesia
- NSHA

Objectives

- Discuss resuscitation priorities
- Review goals of resuscitation
- Critically evaluate the order of resuscitation interventions
- Learn how to not “pee of the electrical fence”



Sometimes, our patients ask alot...

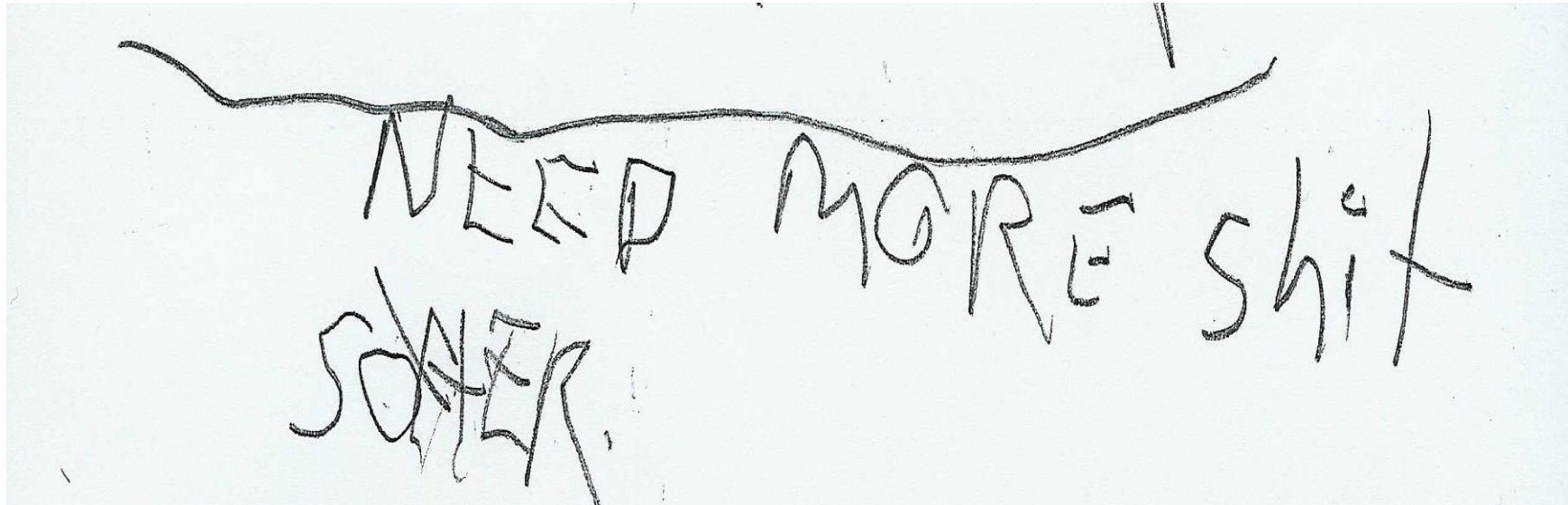
Drinks/NO
BELIAN Lines/NO
BODY MOVE/NO
NURSE 20/YEAR
Only you
now

Sometimes its ridiculous...

Shit softer more
BELLY GOT TO SHIT WHAT
THE COP

Did shit come out
Let SEE.

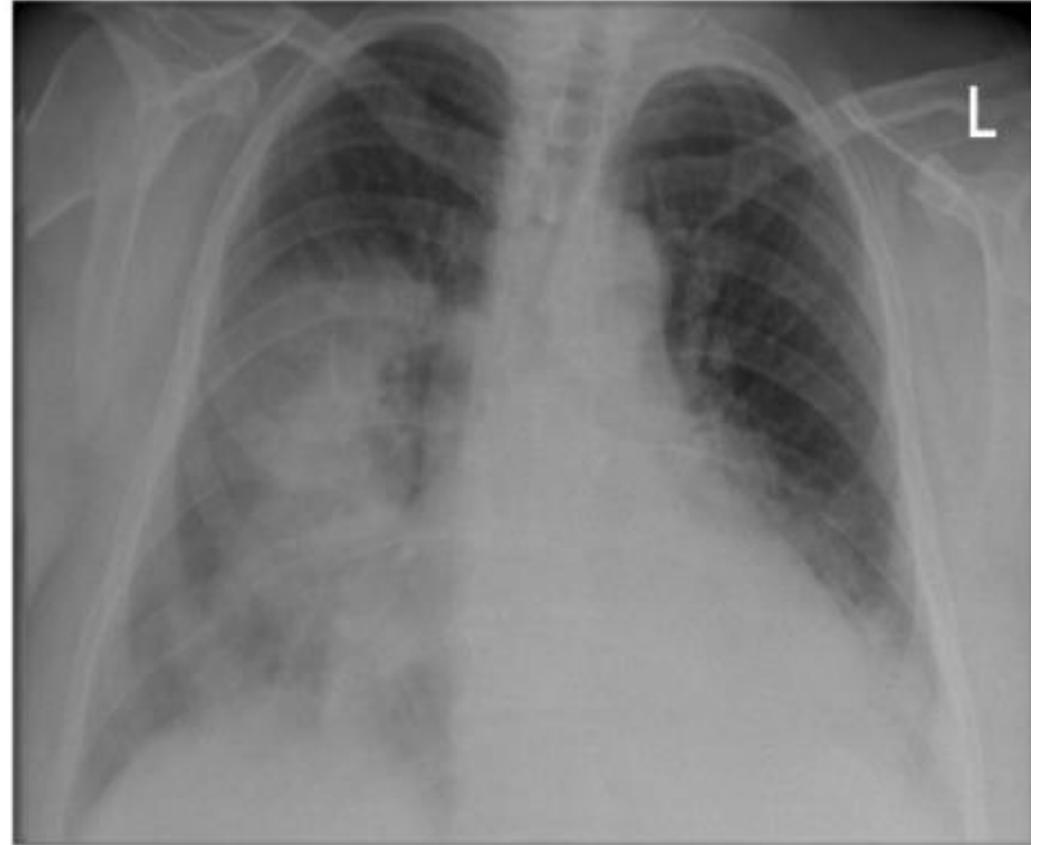
But, some actually know what they need to do...

A photograph of a piece of white paper with horizontal lines. A wavy horizontal line is drawn across the middle of the page. Below this line, the words "NEED MORE SHIT" are written in a large, blocky, hand-drawn font. Below that, the word "SOONER." is written in a similar hand-drawn font, with a period at the end. The paper is slightly off-white and shows some texture.

NEED MORE SHIT
SOONER.

Ralph H.

- 44 year old male in ED “SOB”
- Hand over from colleague
 - “He’s holding his own. Just take a peak at him. Either home or consult to medicine.”
- 45 min later, quick review of pts chart
 - Last vitals 2 hours ago:
HR 130,RR 37, BP 90/40, SaO2 89% (1.0)
 - 8L Normal Saline
 - ABG 3.5 hours ago: 7.11/23/56/16/91% (FiO2 1.0)
- Lactate: 4.9



Bedside

- UNWELL; wife and children at the bedside
- Repeat VS:
 - HR 120, RR 40, BP 96/36, SaO2 92% (1.0)
- Immediate resuscitation
 - Prepare for intubation
 - Consider central line placement
 - Administer 2L normal saline BOLUS
- “It will be ok in a few minutes”



Intubation

- Propofol 100 mg/Fentanyl 100 ug/
Sux 100mg
 - Not difficult, but desat to 72%
- Repeat BP 5 minutes later: SPB 50
 - Phenylephrine boluses
- CXR/Prep for central line
- PEA arrest



A	Airway
B	Breathing
C	Circulation
D	Disability
E	Exposure

The family

- “Why?”
- “He was alive and talking!”
- “Did you kill my husband?”



So, should we resuscitate differently?



**YOU DON'T
WANT TO
LOOK BACK
AND KNOW
YOU COULD'VE
DONE BETTER.**

Next Level Resuscitation: things I wish I knew 15 years ago.

- Most (all) patients should be resuscitated before intubation.
- In most cases, you shouldn't rush into a "crash" intubation
- "A-B-C's" are useful to remember key components of resuscitation, but the order is not correct in all patients
- Pre-intubation resuscitation can save your patient a whole lot of hurt

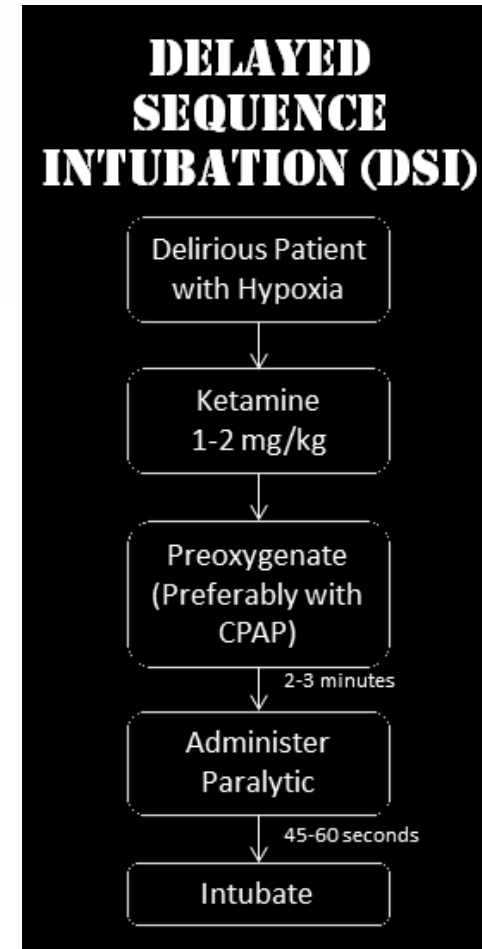
A	Airway
B	Breathing
C	Circulation
D	Disability
E	Exposure

AHA / PALS
ABC or CAB?



“Delayed Sequence Intubation”

- Pre-ETI resuscitation
- As apposed to “delayed intubation” DSI
- Much more to intubation than oxygenation and ventilation



Pre-intubation resuscitation: It's a new order

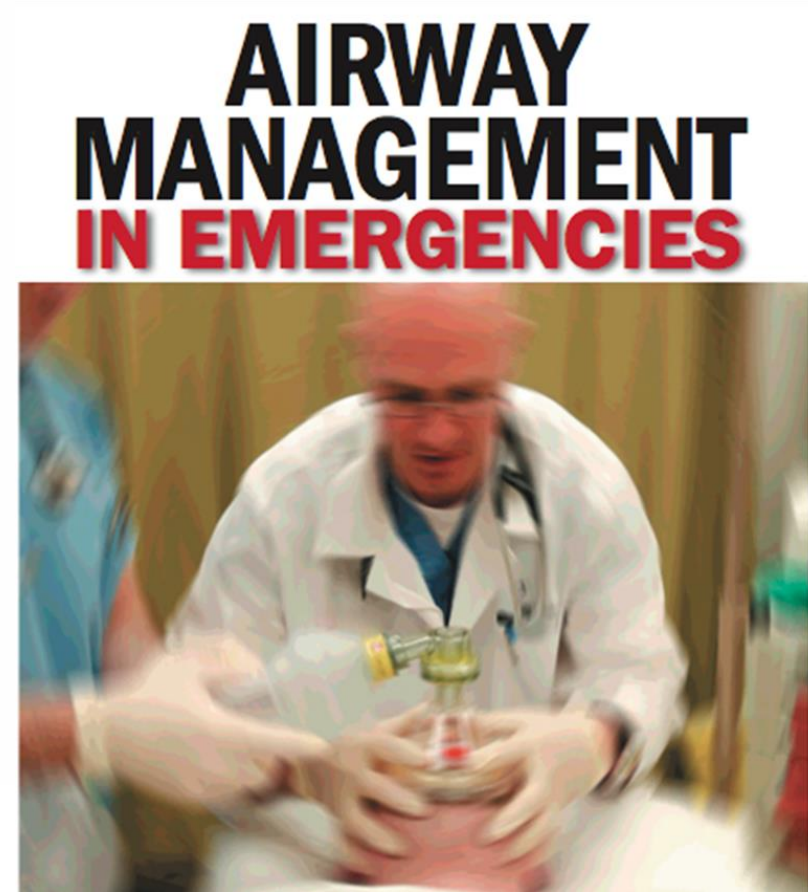
- Optimization of O₂ saturation
- Ensure appropriate intravascular volume
- Hemodynamic stabilization



Optimization of O₂ saturation

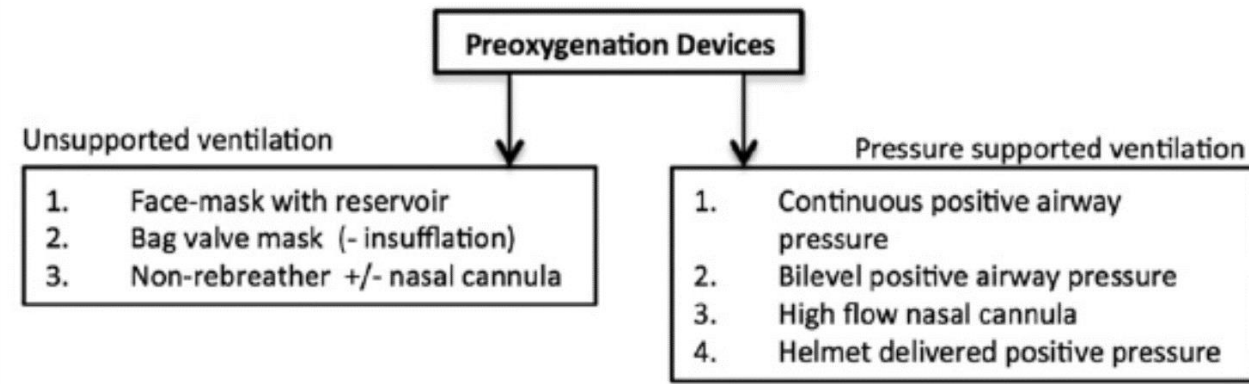
We don't think about this much.

- 30% of patients desat to $<90\%$
- Associated with AE
 - Organ dysfunction/Cardiac arrest
- Goal of pre-oxygenation is to denitrogenate lung residual capacity
- Better oxygenation/ventilation BEFORE intubation will allow patient to better tolerate ETI



Ask yourself:

- Is your patient sitting up?
- What do I have available for oxygenation?
- Does the patient need PEEP?



Is your patient sitting up?



What do I have available and do I need PEEP?

- What do I have available for oxygenation?
 - Nasal cannula
 - Facemask with reservoir
 - non-rebreather mask with reservoir
 - Bag-valve-mask
- Does the patient need PEEP?
 - CPAP
 - BiPAP
 - High-flow Nasal Cannula

Oxygenation: Unsupported ventilation



Oxygenation and Ventilation



Pre-intubation optimization of O2 saturation

- Think about what your patient needs
 - 30° HOB
- Consider both oxygenation and ventilation
- Try to achieve the highest O2 sat possible for at least 5-10 minutes
- This is the new “A”.



Ensure appropriate intravascular volume



Fill 'em up!

- Most patients have some degree in intravascular fluid deficit (relative or real)
- What fluid should we use? Does it matter?
- When is it too much?



What not to use: colloids

ORIGINAL ARTICLE

A Comparison of Albumin and Saline for Fluid Resuscitation in the Intensive Care Unit

The SAFE Study Investigators*

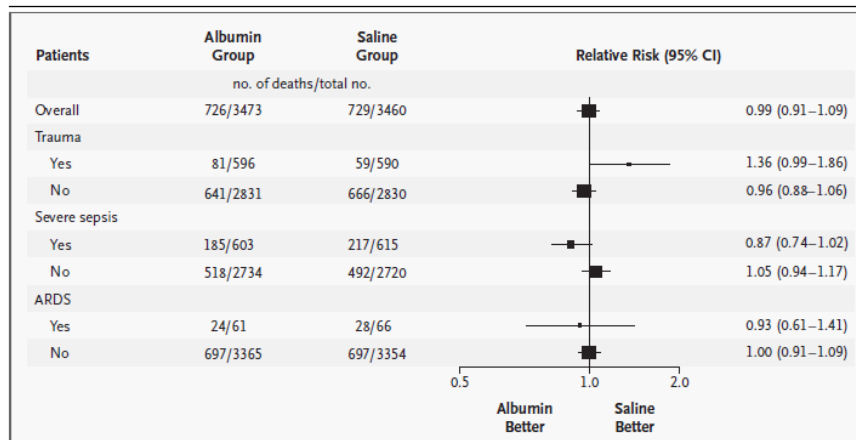


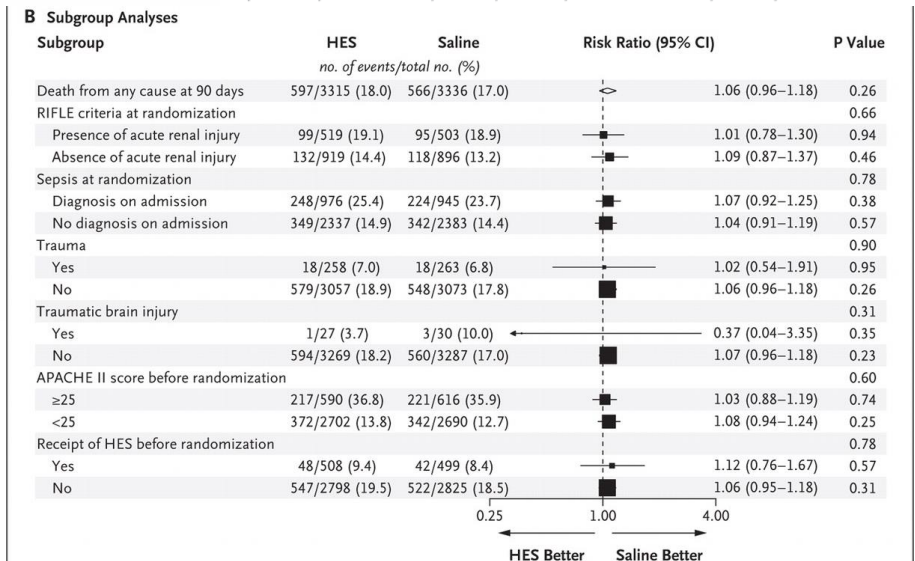
Figure 2. Relative Risk of Death from Any Cause among All the Patients and among the Patients in the Six Predefined Subgroups.

The size of each symbol indicates the relative number of events in the given group. The horizontal bars represent the confidence intervals (CI). ARDS denotes the acute respiratory distress syndrome.

ORIGINAL ARTICLE

Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care

John A. Myburgh, M.D., Ph.D., Simon Finfer, M.D., Rinaldo Bellomo, M.D.,
Laurent Billot, M.Sc., Alan Cass, M.D., Ph.D., David Gattas, M.D.,



Crystalloids: balanced vs. unbalanced



	“Normal” Saline	Ringers Lactate	Plasmalyte
pH	5.5	6.5	7.4
Na	154	131	140
K	0	5	5
Cl	154	111	98
HCO ₃	0	0	0
Lactate/Acetate	0	29	27

Balanced vs. unbalanced crystalloids: does it matter?

Original article

A comparison of balanced and unbalanced crystalloid solutions in surgery patient outcomes

- 796 vascular surgery patients
 - 158 received only NS
 - 213 received both
 - 425 received only balanced
- On logistic regression, both mortality and ventilator requirement after OR associated with NS administration

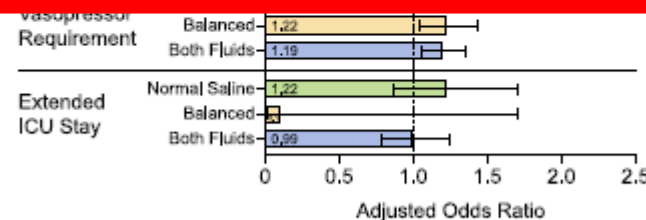


Fig. 2. Adjusted odds ratio and 95% CI for primary and secondary endpoints per each 500 ml of fluid administered in the groups that received normal saline, balanced crystalloids, or both types of fluid.

How much is too much?

- No good test
- Ultrasound of IVC is “ok”, difficult in spontaneously breathing patient
- Old ICU trick: your OK with 2-3L, until your SaO₂ drops



Pre-intubation volume administration

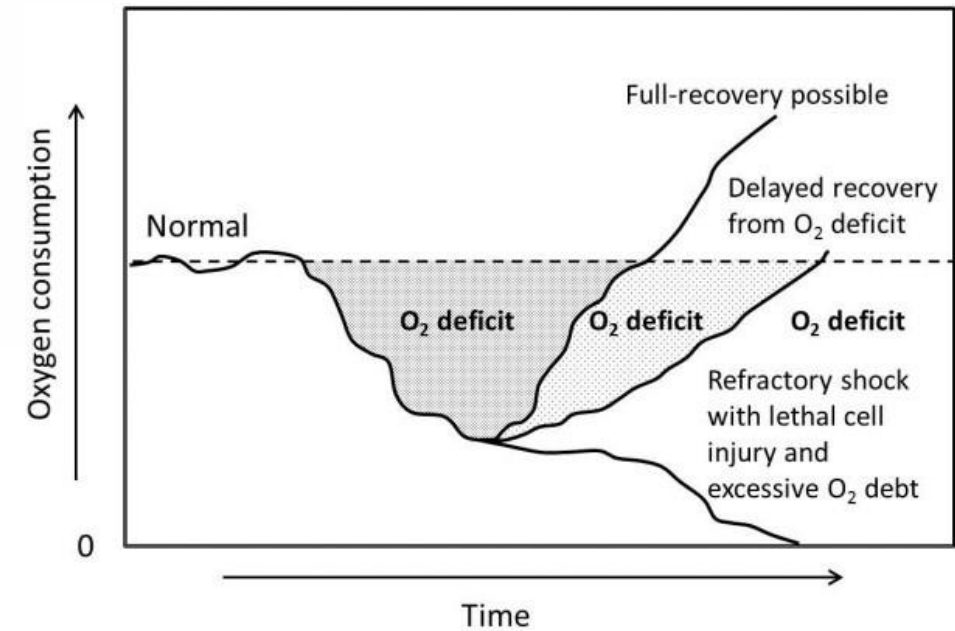
- 1-3 L of crystalloid
- Balanced solution if possible
- More is not always better

JUST DO IT.

Hemodynamic stabilization

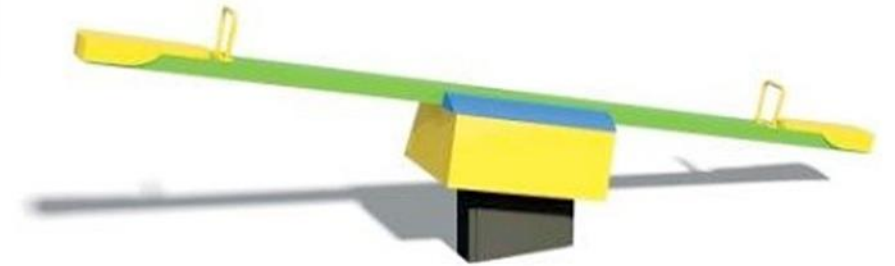
Shock concepts

- Adequate BP = adequate tissue perfusion
- Duration of tissue hypoperfusion = organ dysfunction
- Organ dysfunction = increased mortality
- Key is to minimize time in shock



Why not start a vasopressor early?

- Is my patient's "tank" full?
- Should I put in a central line first?
- Does it matter?



What about peripheral vasopressors?

A systematic review of extravasation and local tissue injury from administration of vasopressors through peripheral intravenous catheters and central venous catheters ☆,☆☆



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^b Trauma Nova Scotia, 1276 South Park St, Centennial Building Room 1-026B, Halifax, Nova Scotia B3H 2Y9, Canada

- Exactly what is the evidence against peripheral vasopressors?
- Our SR: 65,129 unique papers identified from 1940 to 2012.
- 616 articles retrieved for full review.

Peripheral vasopressors in sepsis and cutaneous adverse events



Duration infusion (hours)	Number cases (percent)
<1	1 (0.96)
1-6	10 (9.6)
7-24	43 (41.3)
>24	50 (48.1)

Canadian Association of Emergency Physicians Guidelines: Peripheral vasopressors

- Short term infusions (<1-2 hours) are unlikely to cause local complications.
- Prolonged vasopressor infusions (>2-6 hours) should be administered via central venous catheters.



Maintain blood pressure

- Does the “tank” really have to be full before we use vasopressors??



I do this

- Immediate intravascular fluid administration
- Simultaneous administration of a peripheral vasopressor
- Wean vasopressor while “filling the tank”
- Stabilize pts physiology BEFORE insertion of central line

Now take a step back

- Your patient should now have:
 - Good pre-oxygenation
 - Intravascular volume
 - Blood pressure
- Better cardiovascular physiology
- Should be able to tolerate the stress of intubation
- Or, maybe they won't need intubation at all....



**YOUR LIPS
KEEP MOVING**

**...BUT ALL I HEAR
IS
“BLAH, BLAH,**

Don't just take my word for it:
Pre-intubation resuscitation really works....

Samir Jaber
Boris Jung
Philippe Corne
Mustapha Sebbane
Laurent Muller
Gerald Chanques
Daniel Verzilli
Olivier Jonquet
Jean-Jacques Eledjam
Jean-Yves Lefrant

**An intervention to decrease complications
related to endotracheal intubation
in the intensive care unit: a prospective,
multiple-center study**

2010 France

- Before/After study to determine if pre-intubation resuscitation and preparation would reduce EETI AE's
- 3 ICU's in France 12 month (6 before/6 after)
- 10 point bundle

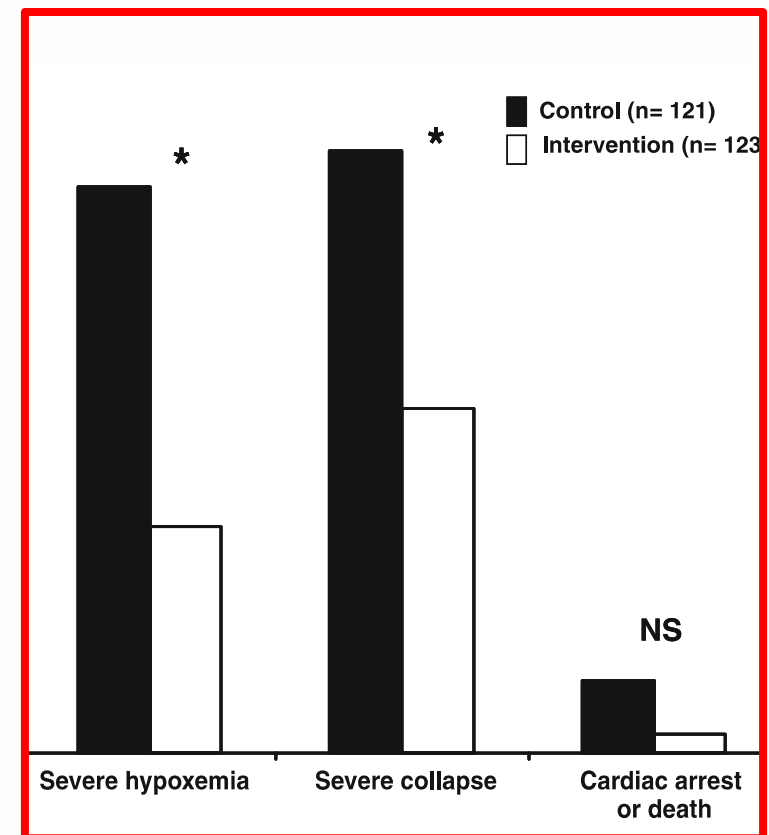
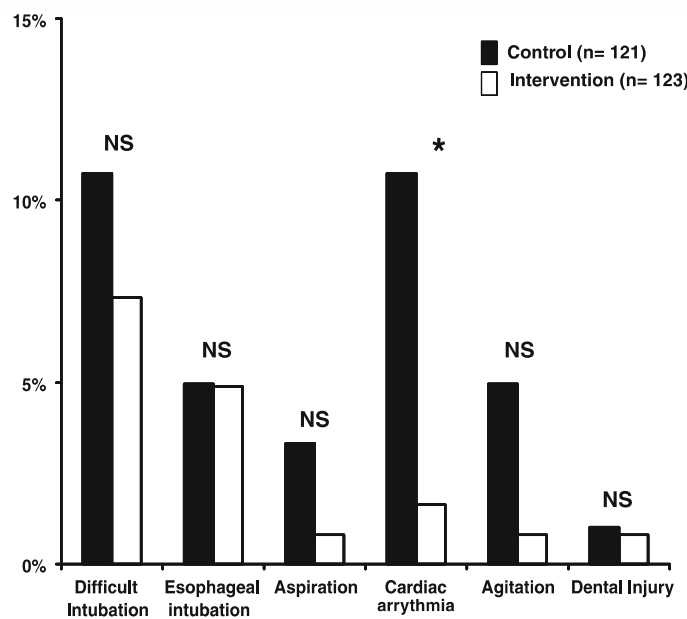


Intubation “bundle”

- Pre-oxygenation with noninvasive positive pressure ventilation
- fluid loading
- preparation and early administration of sedation and vasopressor use if needed
- rapid sequence intubation
- protective ventilation



Reduced Incidence of all AE's



Yea, but in Canada we do all this anyway,
don't we?



ORIGINAL RESEARCH

Resuscitation Prior to Emergency Endotracheal Intubation: Results of a National Survey

Robert S. Green, MD*†

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¶Université Laval, CHU de Quebec Research Center, Hôpital de l'Enfant-Jesus, Population Health and Optimal Health Practices Unit, Trauma-Emergency-Critical Care Medicine Group, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Quebec City, Quebec, Canada

Do we practice pre-intubation resuscitation?

3 Clinical Scenarios

CHF

67 year old male presents with CHF and respiratory distress. History of hypertension and hypercholesterolemia.

Sepsis

59 year old male presents with pneumonia and respiratory distress. History of ischemic heart disease, hypertension, hypercholesterolemia, and mild renal insufficiency.

Trauma

29 year old male involved in a motor vehicle crash presents abrasions on head, chest, and abdomen. Has a chest tube on his left hemithorax for a “flail chest”, remains in a cervical spine immobilization collar and backboard. Previously healthy.

Vital signs for all 3 scenarios:

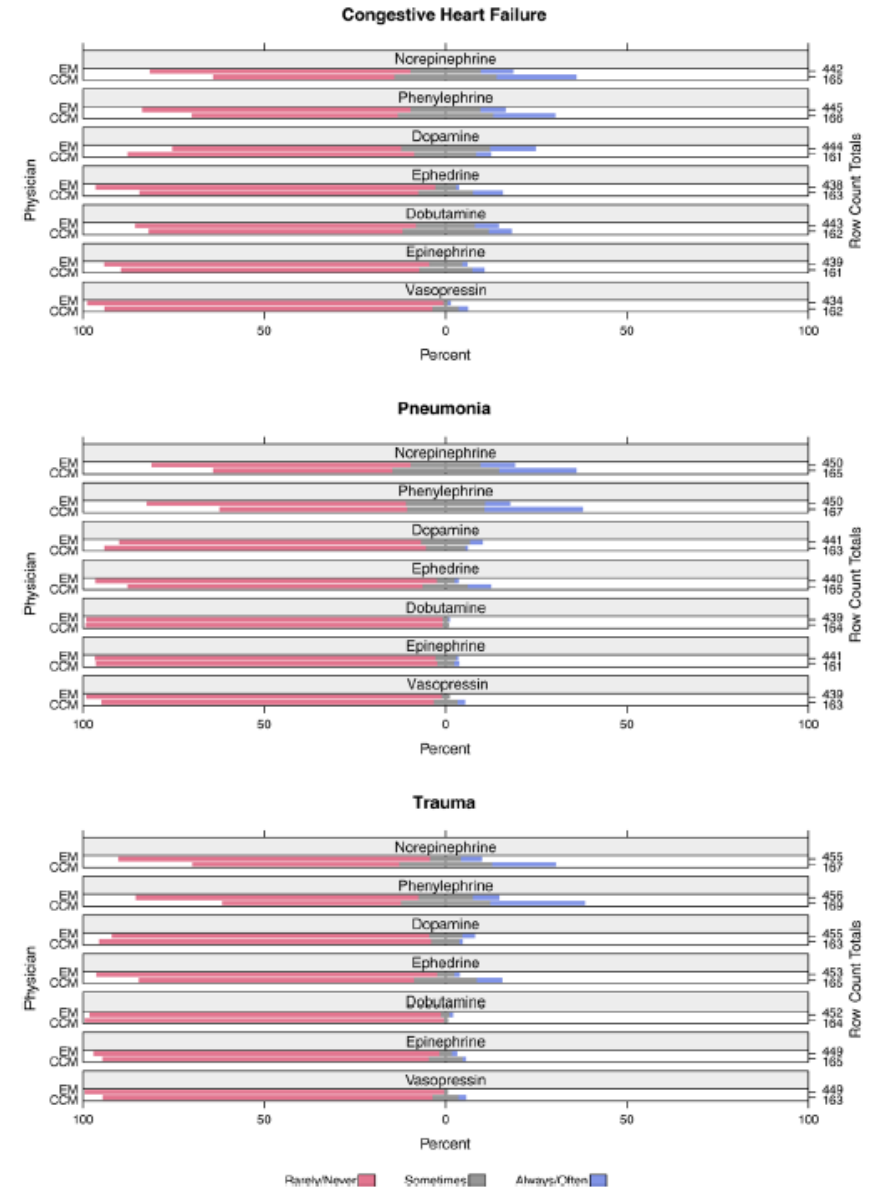
HR 120, RR 32, BP 100/56, SaO₂ 90% (on FiO₂ 100%)

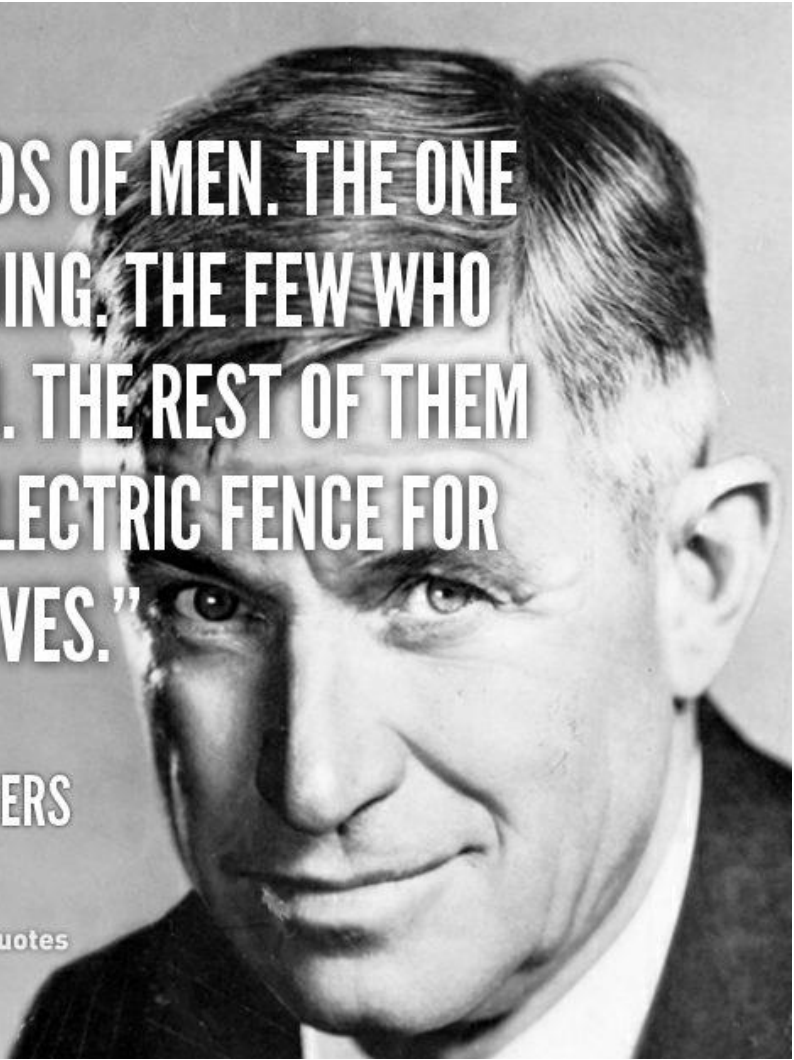
You feel the patient requires immediate intubation.

Patient has no predictors of a difficult airway
(other than cervical immobilization in the trauma scenario).

Nope.

- Response: 882/1758 (50.2%)
- Pre-intubation resuscitation:
 - Pre-ETI IV fluids: 81%
 - Vasopressors: 4.9%
 - CCM more likely than EM



A black and white portrait of Will Rogers, a man with short, dark hair, wearing a suit and tie. He is looking slightly to the left with a gentle smile. The portrait is positioned on the right side of the image, partially obscured by the quote text.

**“THERE ARE THREE KINDS OF MEN. THE ONE
THAT LEARNS BY READING. THE FEW WHO
LEARN BY OBSERVATION. THE REST OF THEM
HAVE TO PEE ON THE ELECTRIC FENCE FOR
THEMSELVES.”**

WILL ROGERS

© Lifehack Quotes

What if I did this for my patient 15 years ago?

**ONE STUPID
MISTAKE
CAN CHANGE
EVERYTHING.**

Take home

- Resuscitation prior to intubation is the new standard
- Optimization for intubation will improve patient outcomes
- Pre-intubation resuscitation is not all that difficult.....a simple re-order





→ Adult
EMERGENCY +

**PLEASE ENTER
IF
CRITICALLY
ILL !**