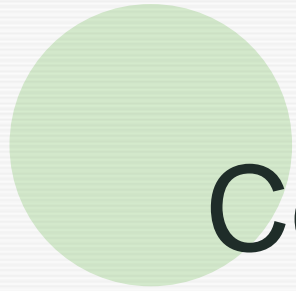


Dr. Kroll

Permissive Hypotension




Conflict of Interest

- I do not have any significant financial relationships to report



Agenda

- How we usually do it
 - How we can do it better
 - Why less is sometimes more more
- 

Patient scenario

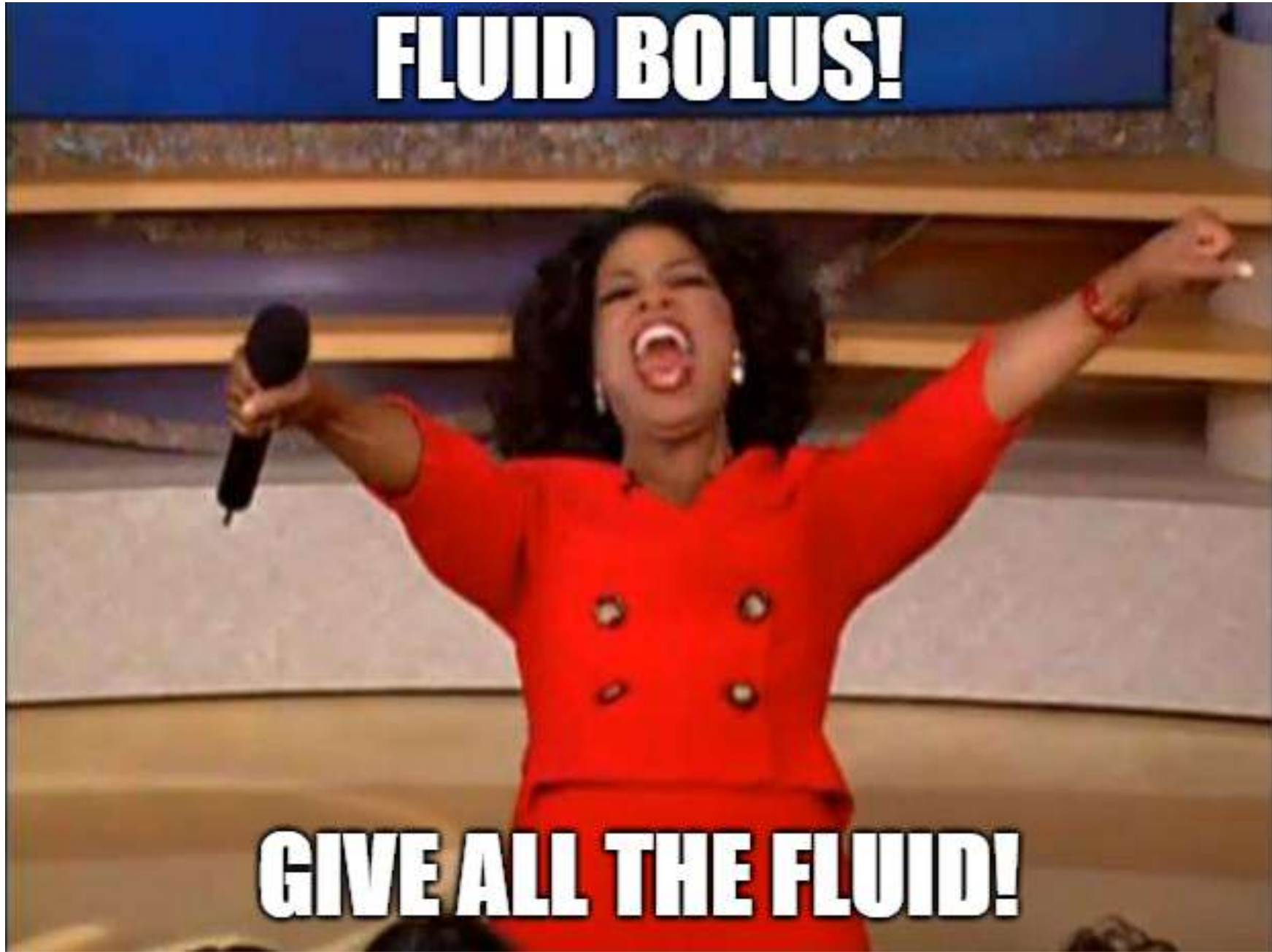
- Drive by shooting
- One victim, young male
- Scene is secured



Patient Scenario

- Breath sounds bilaterally
- Pale, sweaty
- BP 75/40
- Distressed, but awake

FLUID BOLUS!



GIVE ALL THE FLUID!

Historic
Treatment

2 Liters Normal
Saline Bolus



Continue fluid
resuscitation until
SBP > 100, or
reach hospital

But is this the
right
treatment??

Fixing the number vs
fixing the patient

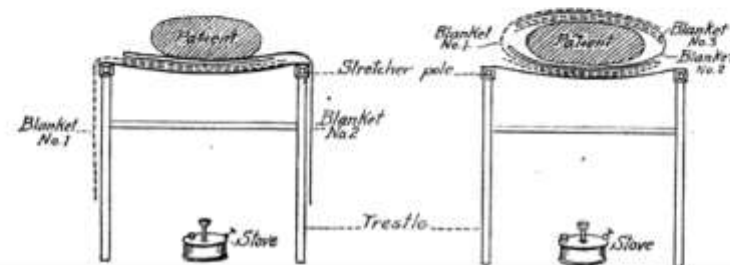
Cannon 1918

- World War 1 Surgeon
- Aggressive fluid administration prior to surgical control causes need for additional blood products

32

TREATMENT OF WAR WOUNDS

“As soon as a patient arrives he should be given a few ounces of hot drink, and his wet boots and puttees removed, along with any other clothing which may cover wounds. Meanwhile the dry stretcher is prepared by arranging the first two blankets so that four folds will come underneath the patient (Fig. 2). The blankets are covered temporarily



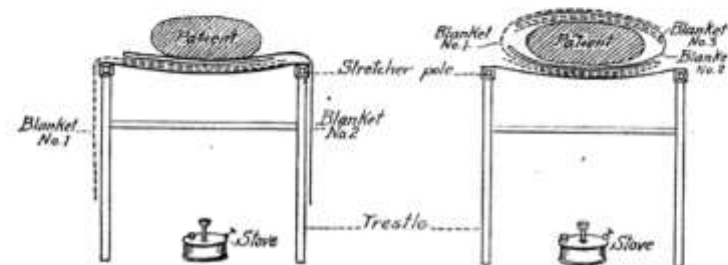
Cannon 1918

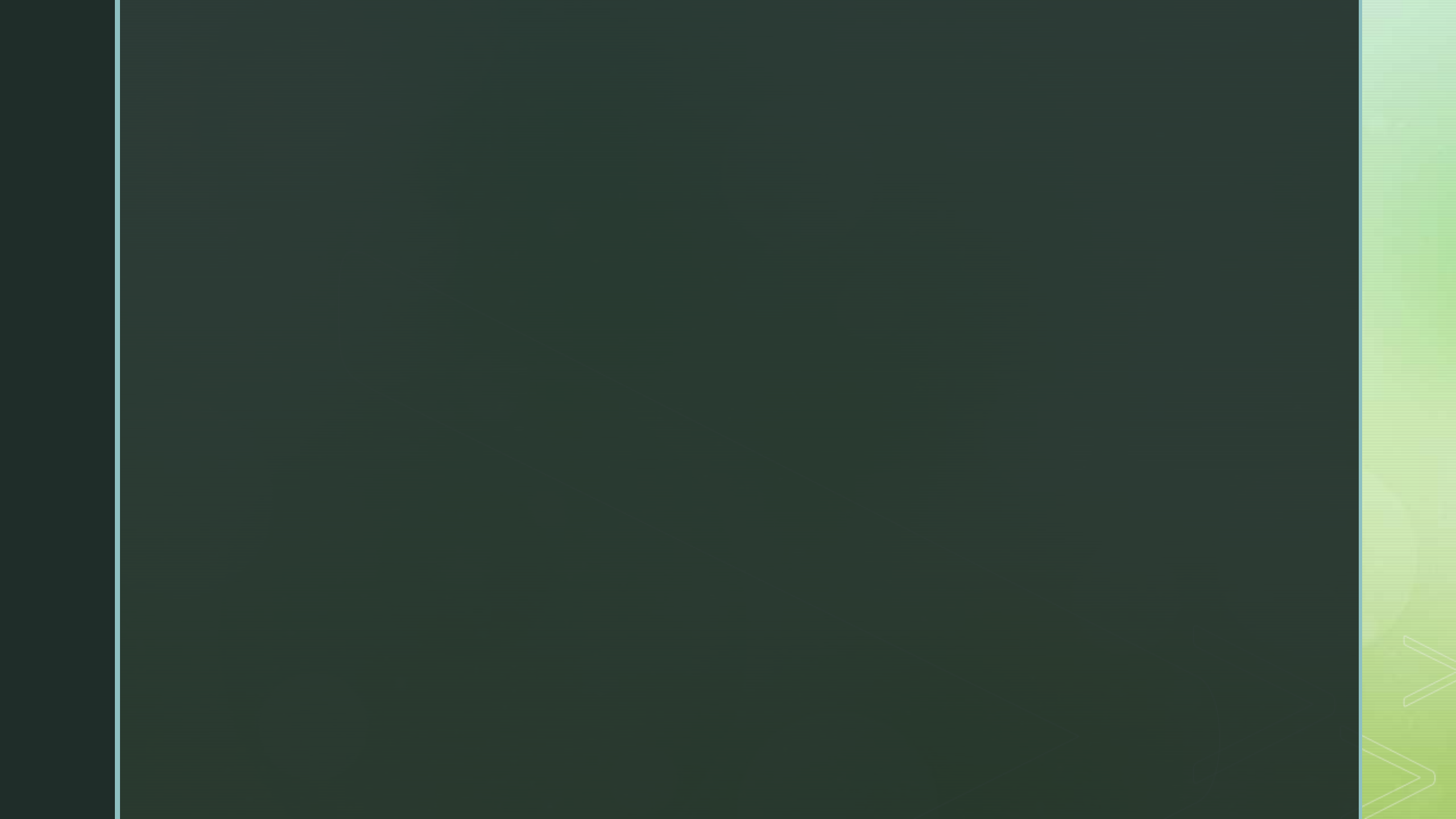
- World War 1 Surgeon
- Aggressive fluid administration prior to surgical control causes need for additional blood products

32

TREATMENT OF WAR WOUNDS

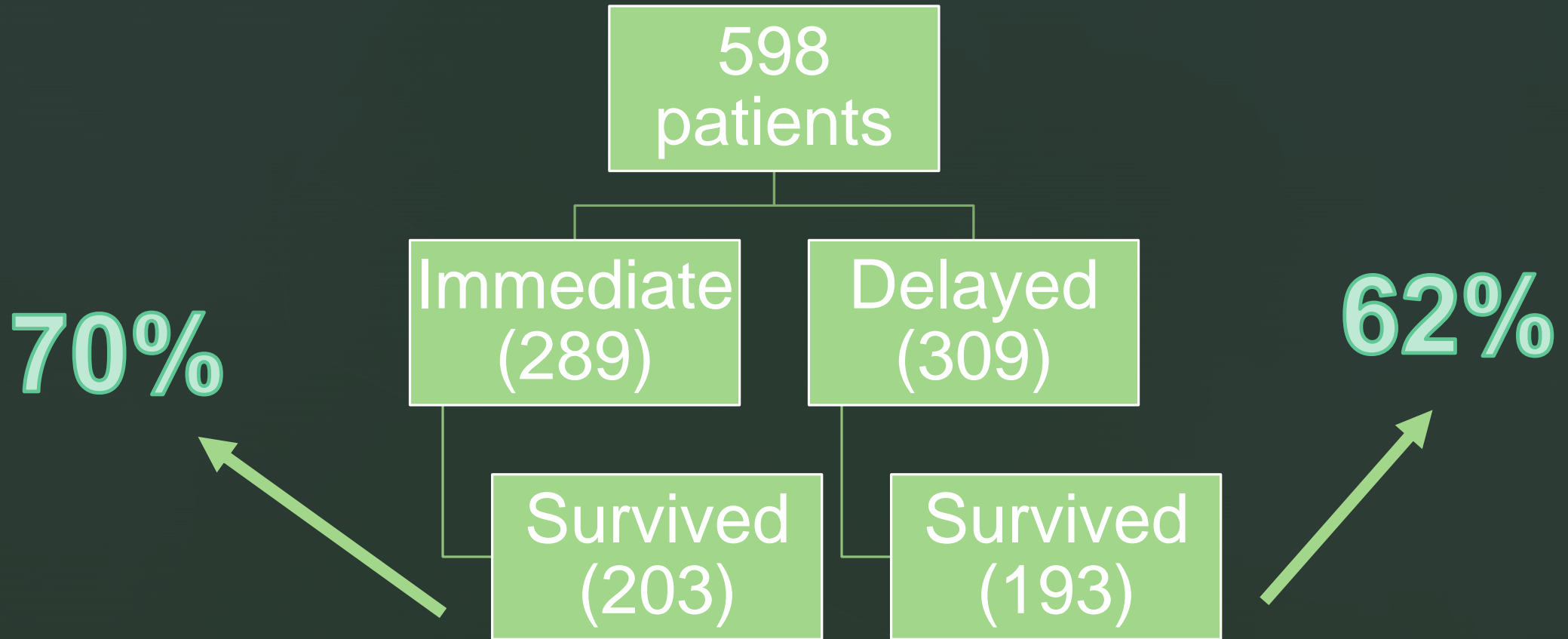
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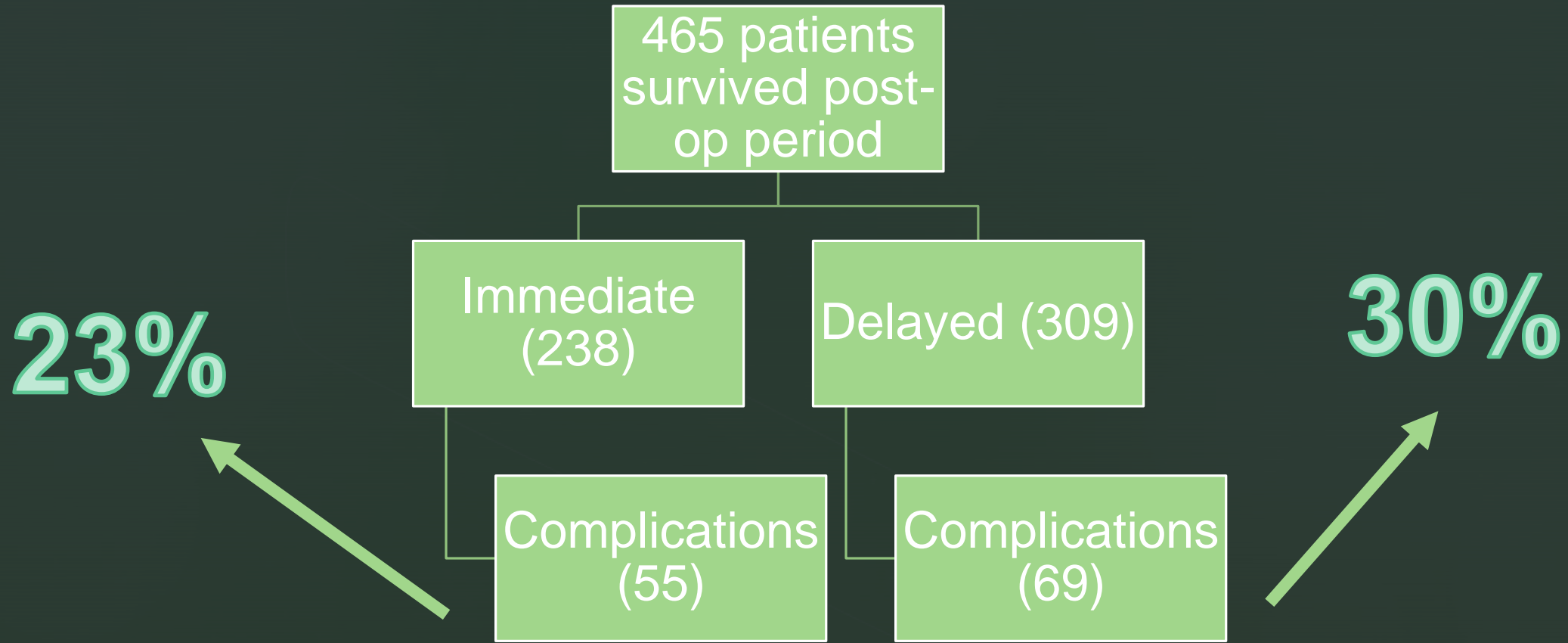




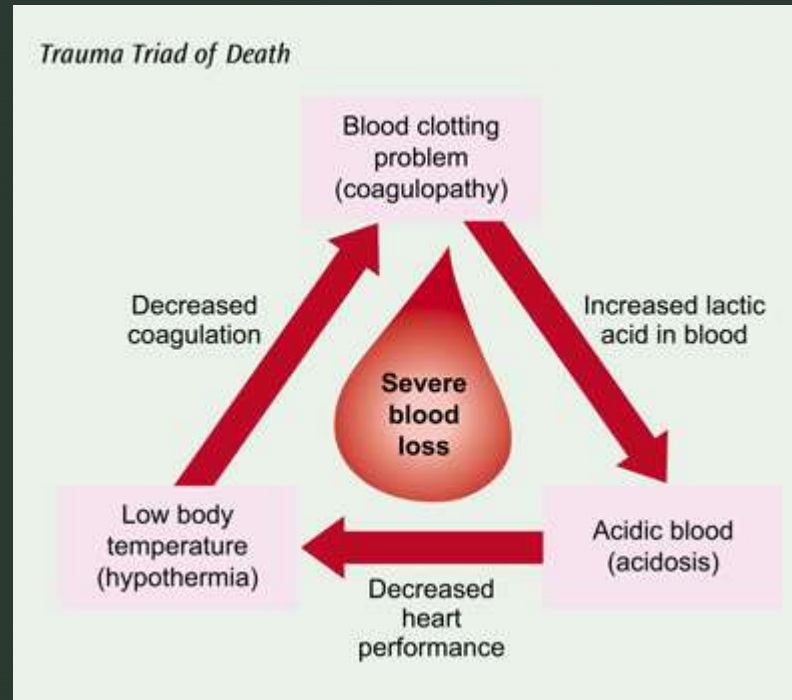
Bickwell et al.

- Adults with penetrating torso injury randomized to immediate fluid resuscitation if SBP<90 vs delayed fluid resuscitation
 - IV placed, no fluid given until reached the OR
- 598 adults randomized

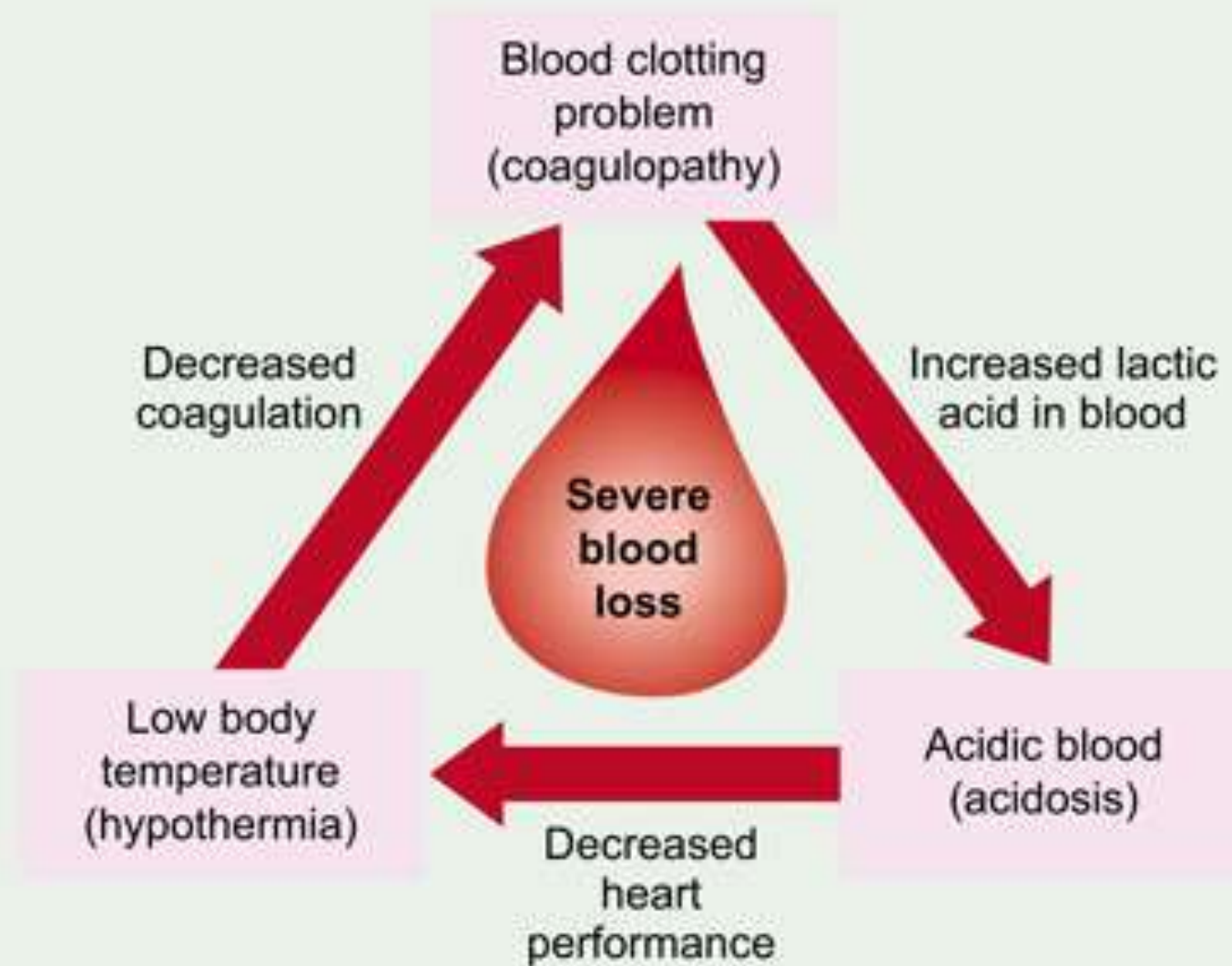




Why do those with delayed resuscitation have better survival?



Trauma Triad of Death



Trauma Triad



Blood clotting
problem
(coagulopathy)

Morrison et. al.

Decreased
coagulation

Increased lactic
acid in blood

Severe
blood
loss

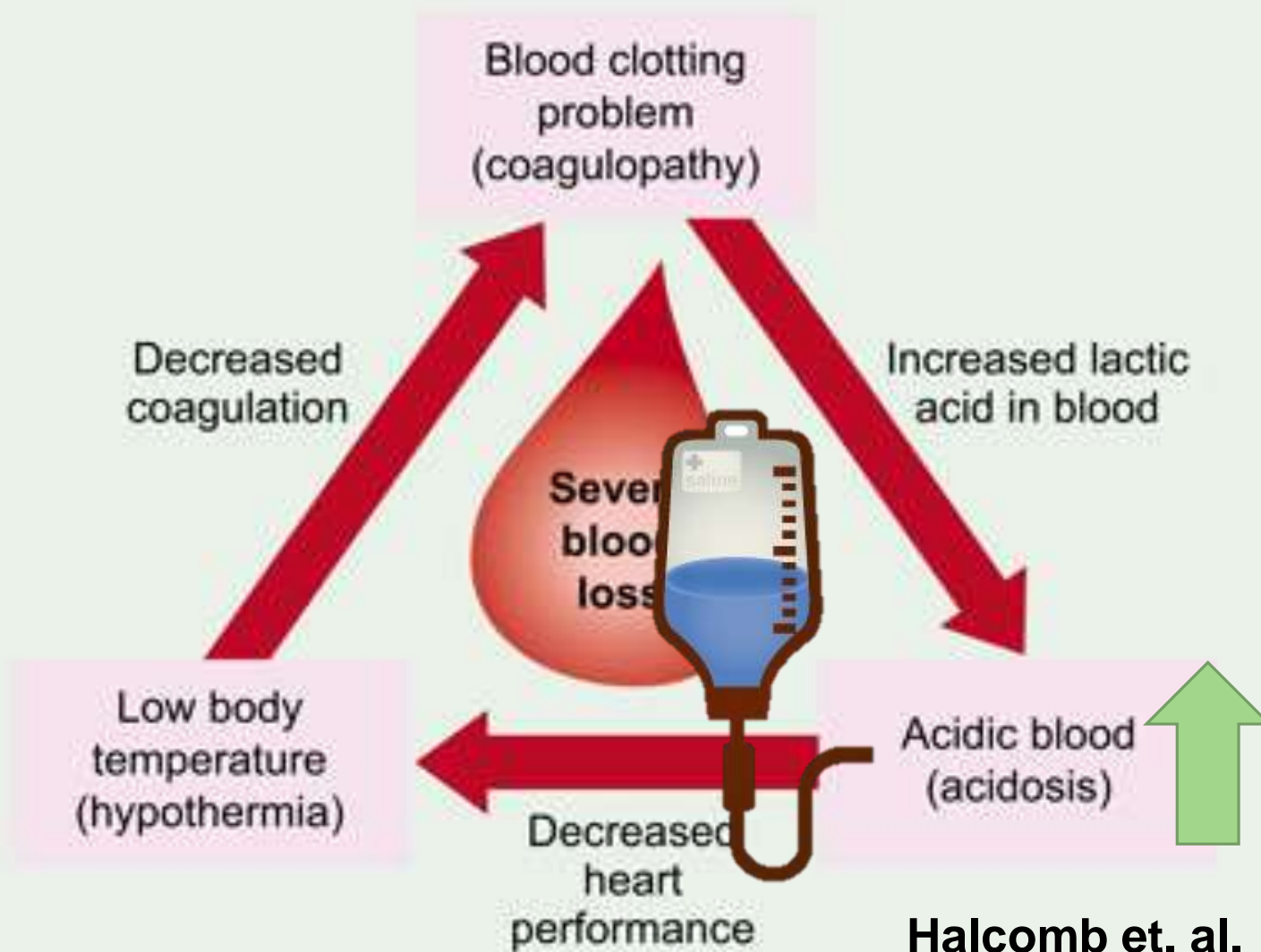
Low body
temperature
(hypothermia)

Acidic blood
(acidosis)

Decreased
heart
performance

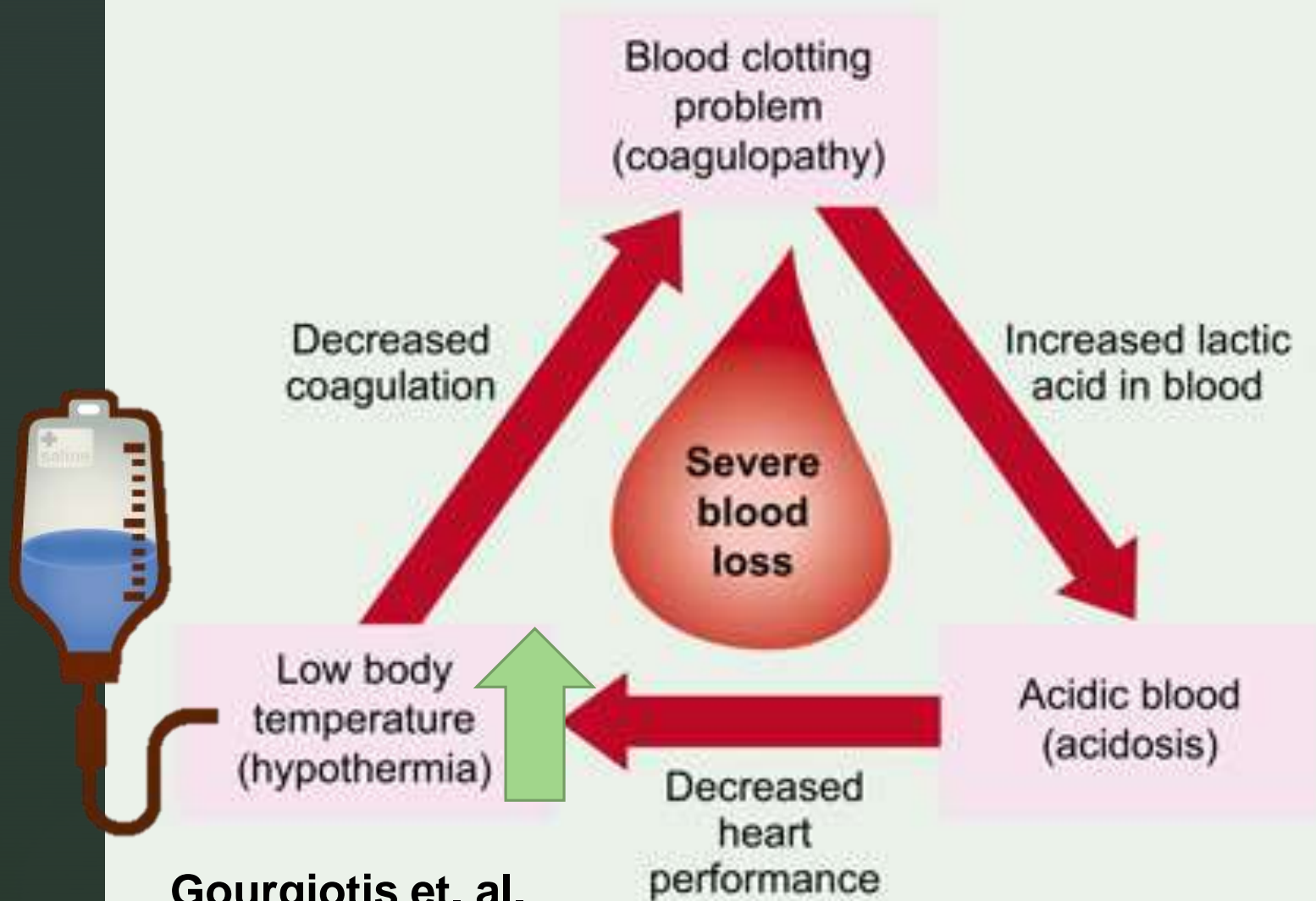


Trauma Triad of Death



Halcomb et. al.

Trauma Triad of Death




Gourgiotis et. al.

Increased pressure can mean Increased Bleeding

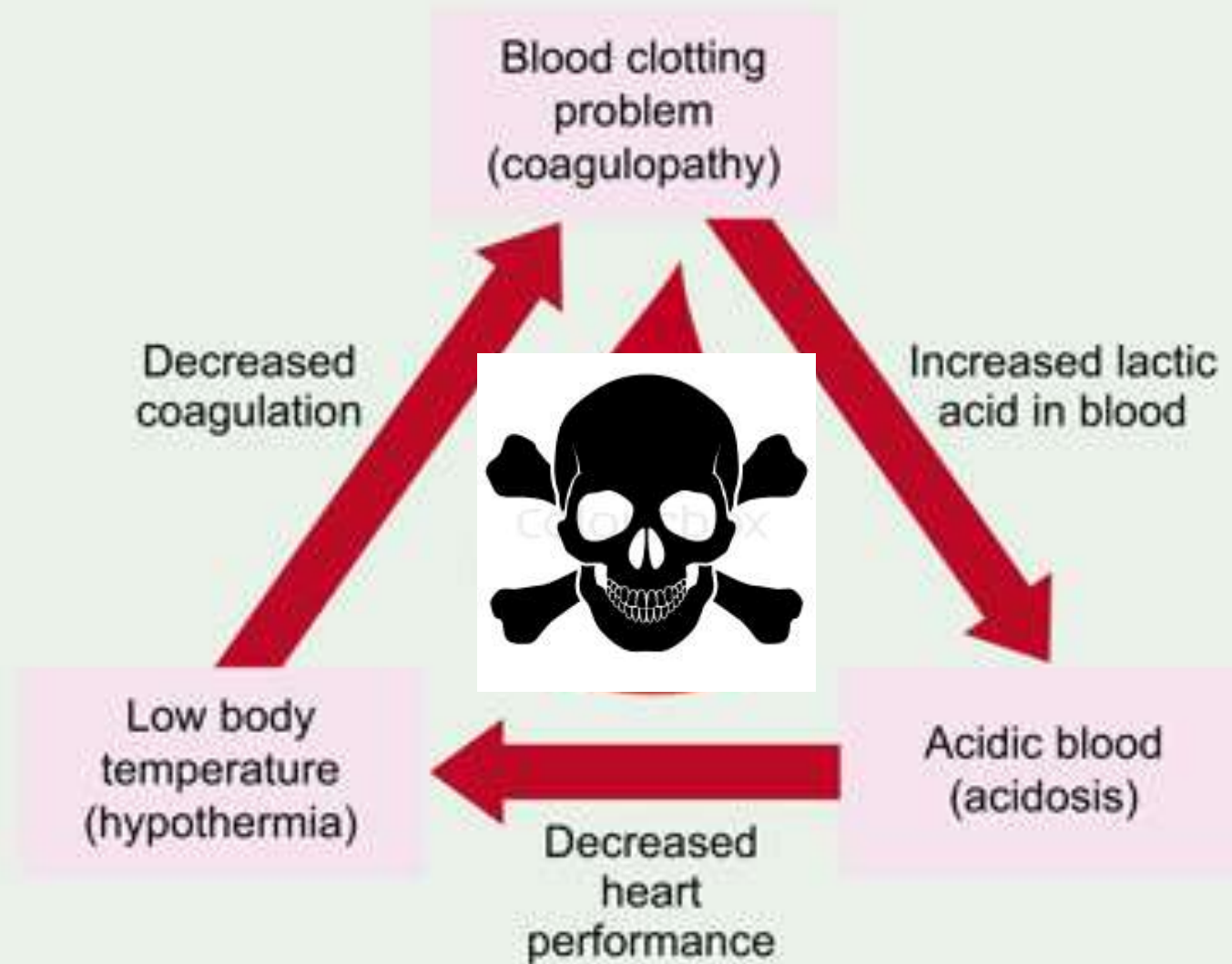




Other complications...


- Increased time on ventilator (difficulty weaning)
 - Increased risk of ARDS
 - Increased risk of multi-organ failure
 - Increased risk of abdominal compartment syndrome
- 

Trauma Triad of Death





Further research

- Initial studies were on penetrating trauma
 - Additional studies were done with blunt abdominal trauma
- 

Tran et. al.

- Meta-analysis
 - 722 abstracts
 - 5 randomized studies
 - 1,158 patients included
 - No single study was strong enough to prove benefit
 -
 -
 -

Tran et. al.

- Meta-analysis
 - 722 abstracts
 - 5 randomized studies
 - 1,158 patients included
 - No single study was strong enough to prove benefit
 - Combined results
 - Improved 30 day survival
 - Decreased blood administration

Back to our patient

- Breath sounds bilaterally
- Pale, sweaty
- BP 75/40
- Distressed, but awake



NO FLUIDS!



NONE OF THE FLUIDS!

Exceptions



Head Trauma

- Winchell et al.
 - Head trauma patients in the ICU
 - 157 patients



Head Trauma

- Winchell et al.
 - Head trauma patients in the ICU
 - 157 patients
 - Tracked transient hypotension (SBP<100)
 - Increased episodes of hypotension associated with increased mortality and decreased function



▶ Pediatric Trauma

- Wegner
- Reviewed literature for pediatric trials
 - Found 0 trials
- Further research needed



Elderly

- May have a higher blood pressure at baseline
- May not tolerate drop in BP
-
-
-
-



Elderly

- May have a higher blood pressure at baseline
- May not tolerate drop in BP
- Ley et al
 - Retrospective study 3,137 patients
 - More than 1.5L of NS associated with increased mortality
 - Even for those >70 years old





General Recommendations

- Follow your protocol
- Listen to your Medical Direct

General Recommendations

- Consider delayed fluid resuscitation if $MAP > 55$ or $SBP > 75$
 - Follow mentation
- Aggressive fluid resuscitation if presumed brain injury (altered, GSW to head, etc)
- Cautious use of the permissive hypotension in pediatrics, adults
 - Follow mentation

Summary

- Too much fluid resuscitation can be a bad thing
 - Can cause increased bleeding and death
- IV access with delayed resuscitation may help your patients
- Remember the exceptions
 - Brain injury, pediatric, elderly

Questions?

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