



Anesthesia
" Eish Jack!!
We Need More Blood, FFP's Cryoprecipitate
and Platelets.
Oh yes and I need to give Tranaxamic Acid
Too....
We Also Must Keep The Patient Warm!
But Stop the Bleeding Now.. "

Mehr Cartoons unter:

Damage Control Resuscitation

A rural FPA Perspective

Disclosures

Nothing to disclose

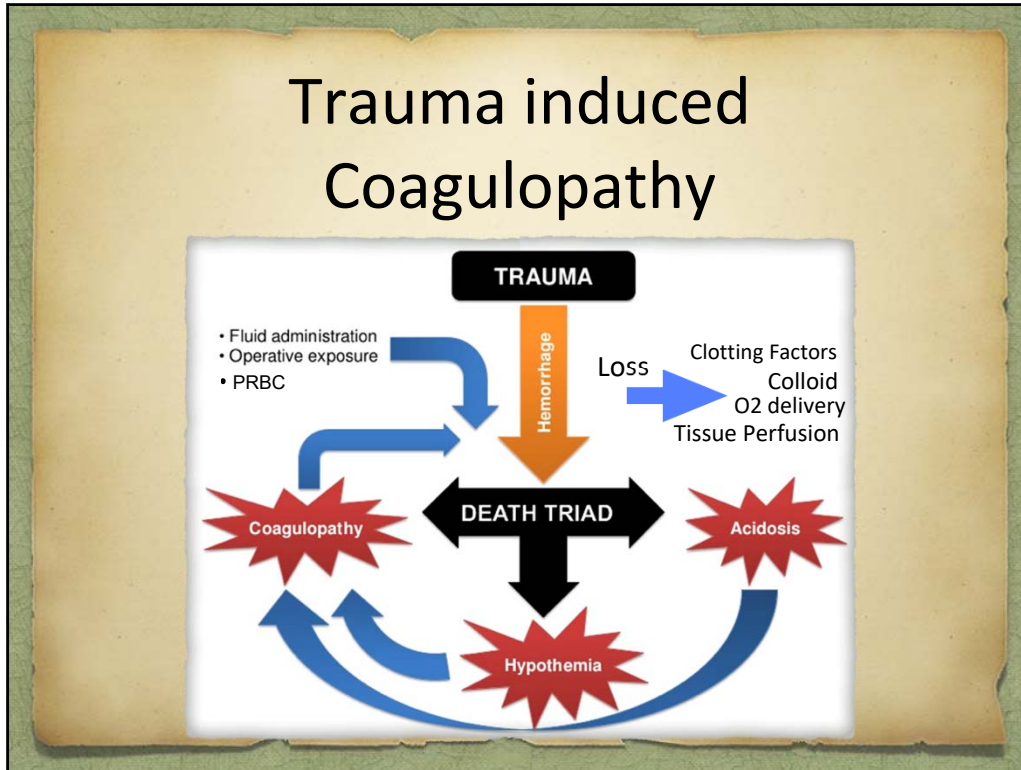
Damage Control “Resuscitation”

- › “For **damage control laparotomy** to be optimized, effective **early hemostatic resuscitation** of the exsanguinating patient should be intimately coupled with surgical control of life-threatening injury” Damage Control Resuscitation in Combination with Damage Control Laparotomy: A Survival Advantage. Juan C Deschene MD, et al. J Trauma 2010;69:46-52

American College of Surgeons- Trauma Quality Improvement Program “Damage Control Resuscitation”

- › 1. Rapid recognition of coagulopathy and shock
- › 2. Permissive hypotension
- › 3. Rapid surgical control of bleeding
- › 4. Prevention/treatment hypothermia, acidosis, hypocalcemia
- › **5. Avoidance of hemodilution (crystalloid)**
- › **6. Transfusion of Plasma:Platelets:PRBC 1:1:1 ratio**
- › **7. Coagulation factor concentrates**
- › **8. Fresh RBC and whole blood when available.**

Trauma induced Coagulopathy



Military Experience

The Ratio of blood products transfused affects mortality in patients receiving massive transfusions at a combat support hospital. BORGMAN MA, SPIRELLA PC, ET AL. J. TRAUMA 2007.

- ▷ Retrospective study 246 Massive Transfusions at US combat support hospitals.
- ▷ Plasma:RBC ratio independently associated with survival

Plasma : RBC	Overall mortality rate	Hemorrhage mortality rate
1:8	65%	92.5%
1:2.5	34%	78%
1:1.4	19%	37%

“Damage Control Resuscitation in Combination with Damage Control Laparotomy: A Survival Advantage”

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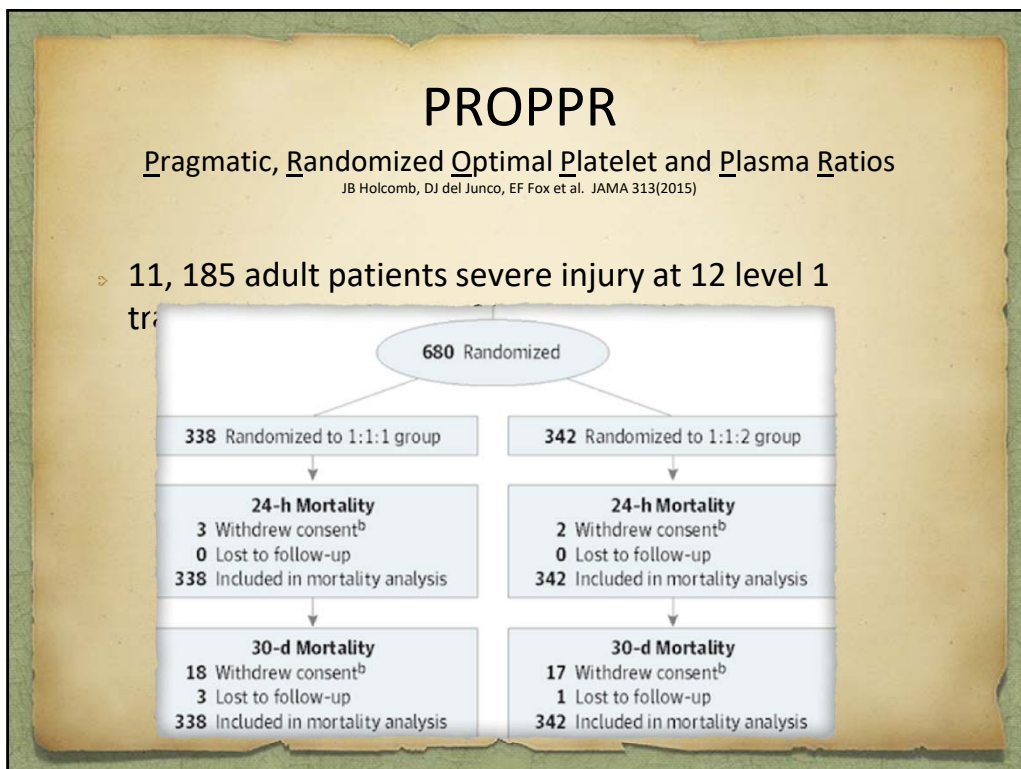
- 4 year retrospective cohort study all trauma patients >10u PRBC before and after implementation of DCR/DCL protocol
- Cohort 1 conventional resuscitation/DCL
- Cohort 2 DCR/DCL
- 30 day survival 74% DCR cohort vs 55% CRE cohort
- Also decreased LOS in DCR group.

PROMMT

Prospective, observational, multicenter, major trauma transfusion

JB Holcomb, DJ del Junco, EF Fox et al. JAMA Sure 148(2013)127-136

- 1245 patients from 10 US trauma centres. 2009-2010.
- Higher ratios of Plasma:RBC and Plt:RBC independently associated with **decreased early (6h)mortality due to hemorrhage.**
- Ratios <1:1:2 had 3-4x increased risk of death.



PROPPR

- Primary outcomes of all-cause mortality at 24h and at 30 days...No statistically significant difference.
- Significantly decreased rates of death from exsanguination and improved hemostasis
- No increased risk of adverse outcomes.

Adjuncts/other

- Tranexamic Acid-CRASH-2. Benefit within 3 hours.
- Calcium replacement
- Cryoprecipitate
- Factor VIII, DDAVP
- Prothrombin complex concentrates (“Octaplex”)

The future

- Point of care goal directed therapy
- Thromboelastography(TEG)
- Rotational thromboelastometry(ROTEM)

Application to rural trauma

- **Queen Victoria Hospital blood bank**
 - **PRBC**
 - O- 4 u, O+4 u, A+ 4u, A-2u
 - **Fresh Frozen Plasma**
 - 4u AB+
 - **Platelets**
 - None
 - **Cryoprecipitate**
 - None
 - **Prothrombin Complex Concentrate ("Octaplex")**
 - 2 u

Damage Control Resuscitation

Queen Victoria Hospital

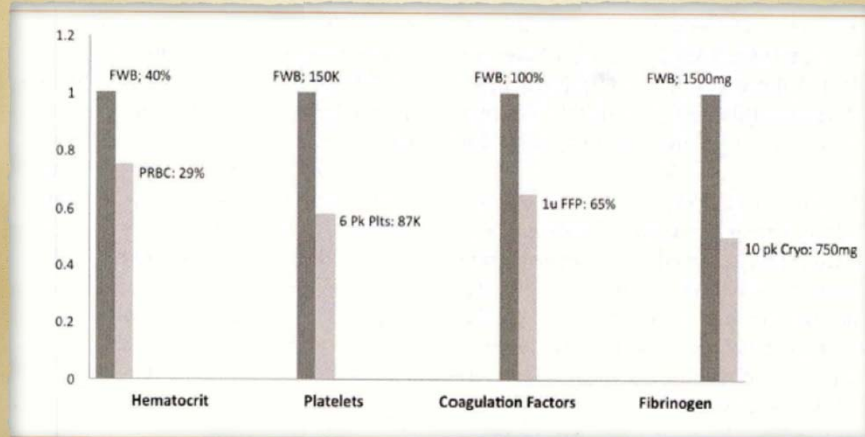
- 1. Rapid recognition ✓
- 2. Permissive Hypotension ✓
- 3. Rapid surgical control of bleeding ✓
- 4. Prevention hypothermia/acidosis/hypocalcemia ✓
- 5. Avoid hemodilution ✓
- 6. Transfusion of 1:1:1 reconstituted blood ✗
- 7. Coagulation factor concentrates ✗
- 8. Fresh RBC and whole blood ?

Fresh whole blood

? The Future for Rural



Fresh whole blood transfusions



Fresh whole blood transfusions

- ↳ “Warm fresh whole blood is independently associated with improved survival for patients with combat related injury” J trauma 2009.
- ↳ Military retrospective study 2004-2007. Component therapy (1:1:1.3) vs fresh whole blood

Fresh whole blood transfusion

- Volume of FWB independently associated with 30 day survival
- 24h Survival 96% vs 88% (p= 0.001)
- 30 day survival 95% vs 82% (p=0.002)
- Risks.....Infections, Transfusion Reactions, AKI, ?DVT.

Summary

- 1. Damage control resuscitation needs to be coupled with damage control surgery to avoid the lethal triad of coagulopathy, acidosis, hypothermia.
- 2. Most aspects of DCR can be implemented into practice in a rural setting
- 2. Challenges remain with availability of blood products and point of care testing
- 3. Should we be looking at a fresh whole blood strategy in rural to manage these patients.