

TRAUMA UPDATES IN 30 Minutes

John McNelis MD FACS

Jacobi Medical Center

Bronx USA

RESUSCITATIVE THORACOTOMY 2015



SPECTRUM

OPEN
EVERYONE

BLUNT AND
TRAUMA
WITH SOL

NO ONE



Gene Moore
20 Minutes
BLUNT

PENETRATING
ONLY

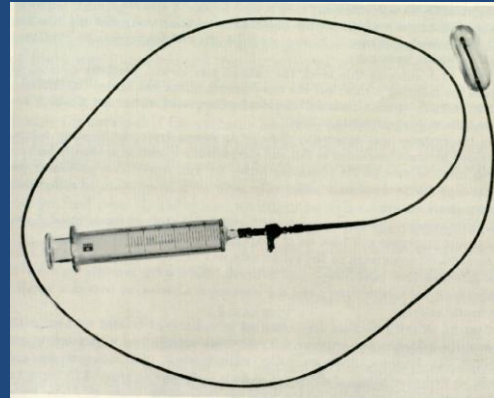
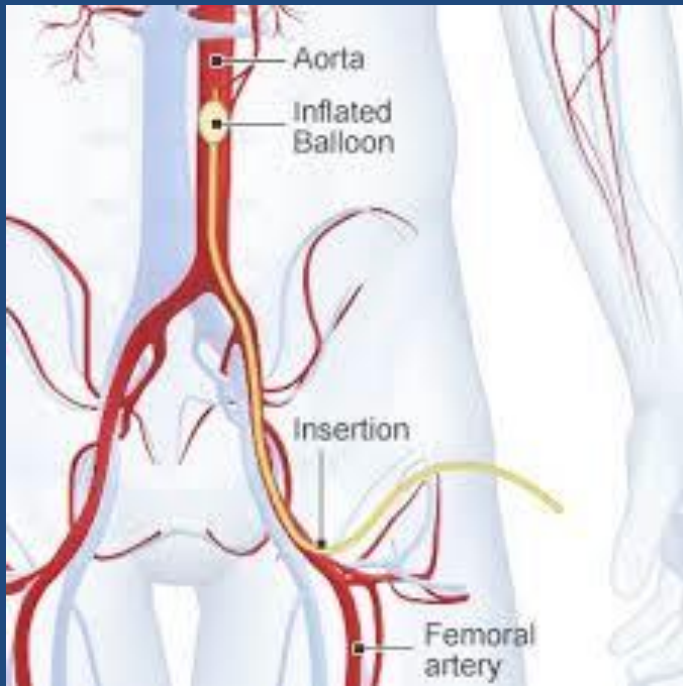
EAST RECOMMENDATIONS 2015

Question	Recommendation
PICO #1	In patients who present pulseless to the Emergency Department <u>with signs of life</u> after <u>penetrating thoracic injury</u> , we strongly recommend resuscitative Emergency Department thoracotomy. Strong Recommendation
PICO #2	In patients who present pulseless to the Emergency Department <u>without signs of life</u> after <u>penetrating thoracic injury</u> , we conditionally recommend resuscitative Emergency Department thoracotomy. Conditional Recommendation
PICO #3	In patients who present pulseless to the Emergency Department <u>with signs of life</u> after <u>penetrating extra-thoracic injury</u> , we conditionally recommend resuscitative Emergency Department thoracotomy. Conditional Recommendation
PICO #4	In patients who present pulseless to the Emergency Department <u>without signs of life</u> after <u>penetrating extra-thoracic injury</u> , we conditionally recommend resuscitative Emergency Department thoracotomy. ¹ Conditional Recommendation
PICO #5	In patients who present pulseless to the Emergency Department <u>with signs of life</u> after <u>blunt injury</u> , we conditionally recommend resuscitative Emergency Department thoracotomy. Conditional Recommendation
PICO #6	In patients who present pulseless to the Emergency Department <u>without signs of life</u> after <u>blunt injury</u> , we conditionally recommend <u>against</u> resuscitative Emergency Department thoracotomy. ² Conditional Recommendation

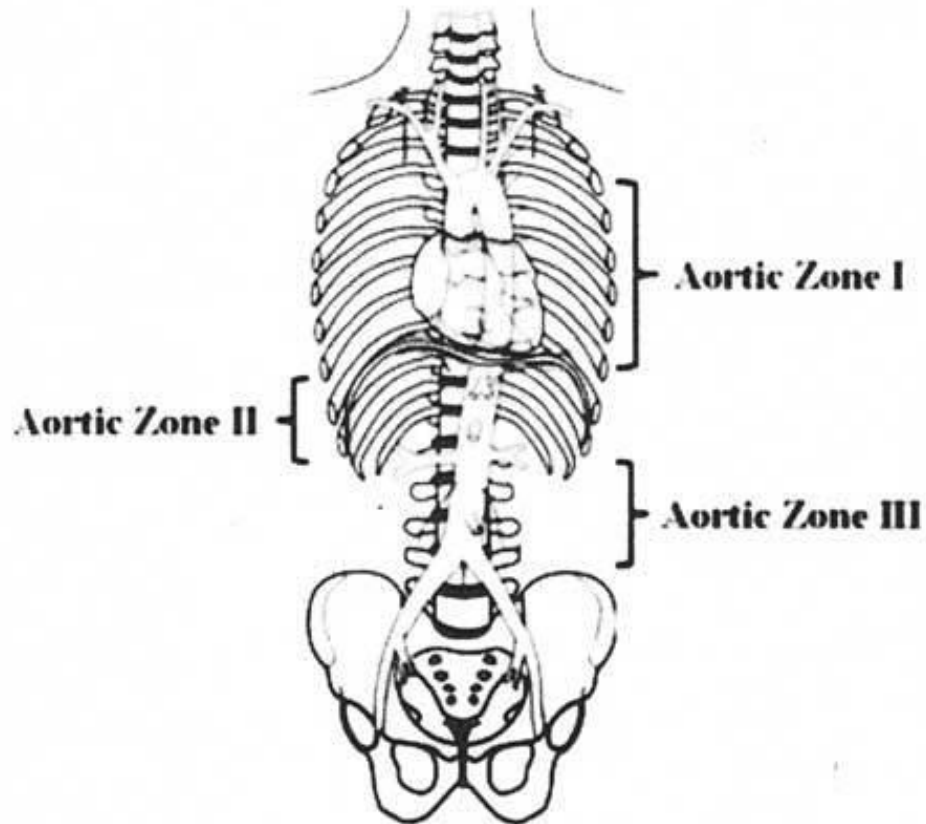
REBOA

- R esuscitative
- E ndovascular
- B alloon
- O cclusion
- A orta
- *Everything old is new again.....*

REBOA



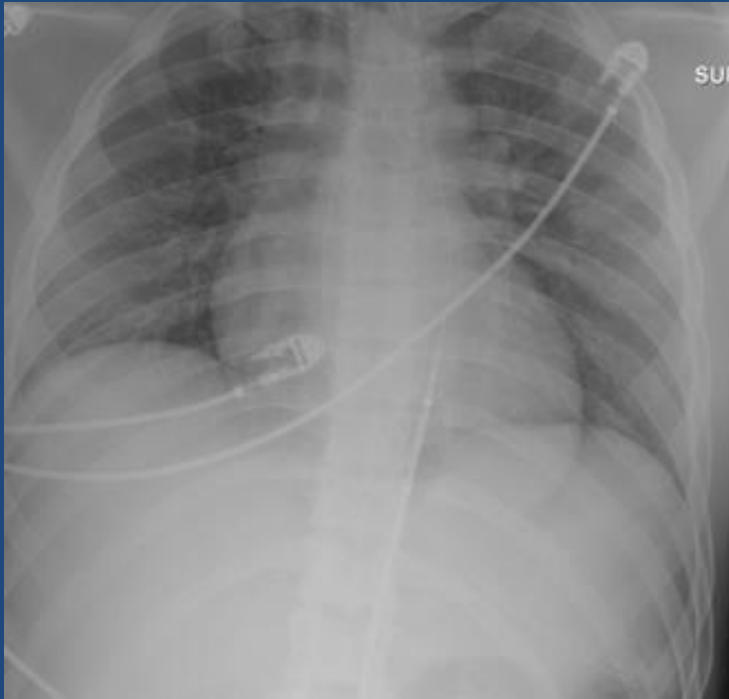
Landing Zones



Zone I = Origin of left subclavian artery to the celiac artery

Zone III = Lowest renal artery to aortic bifurcation

XRAY CONFIRMATION

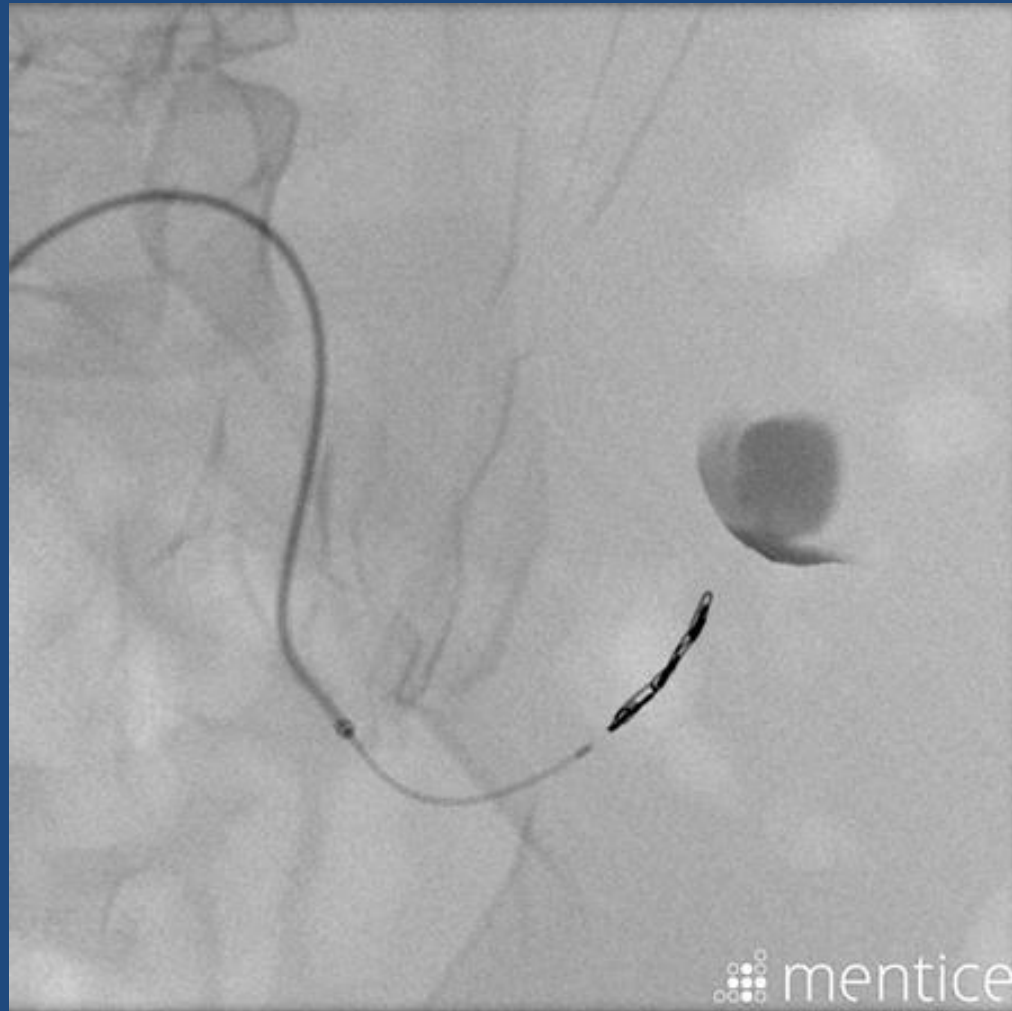


CASE: (Loosely based on the truth)

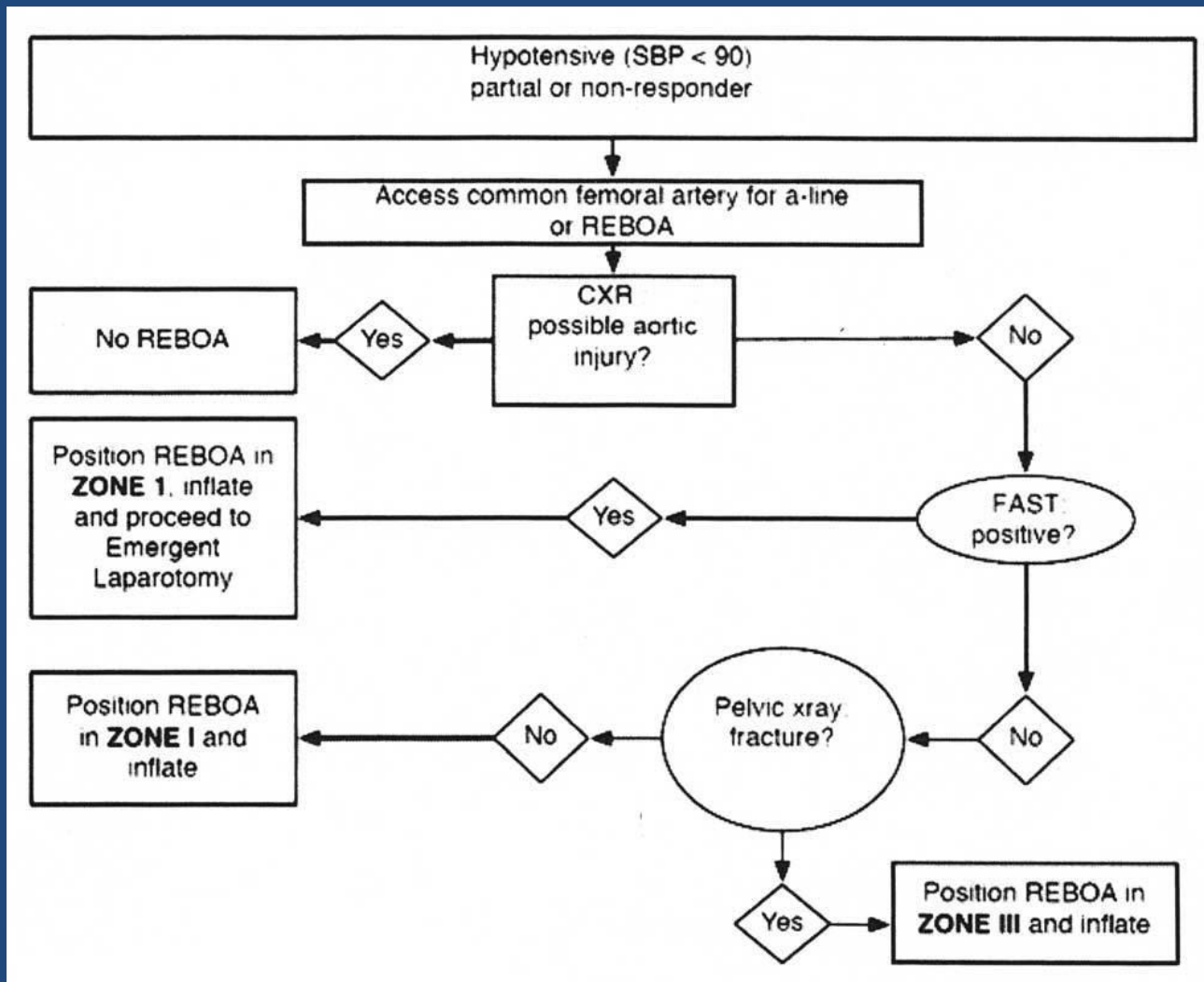
- 38 year old male s/p 6 story fall. Presents GCS-5, BP- 90 HR-120
- During Primary Survey SBP drops to 50
- FAST EQUIVOCAL, MTP called



ANGIO



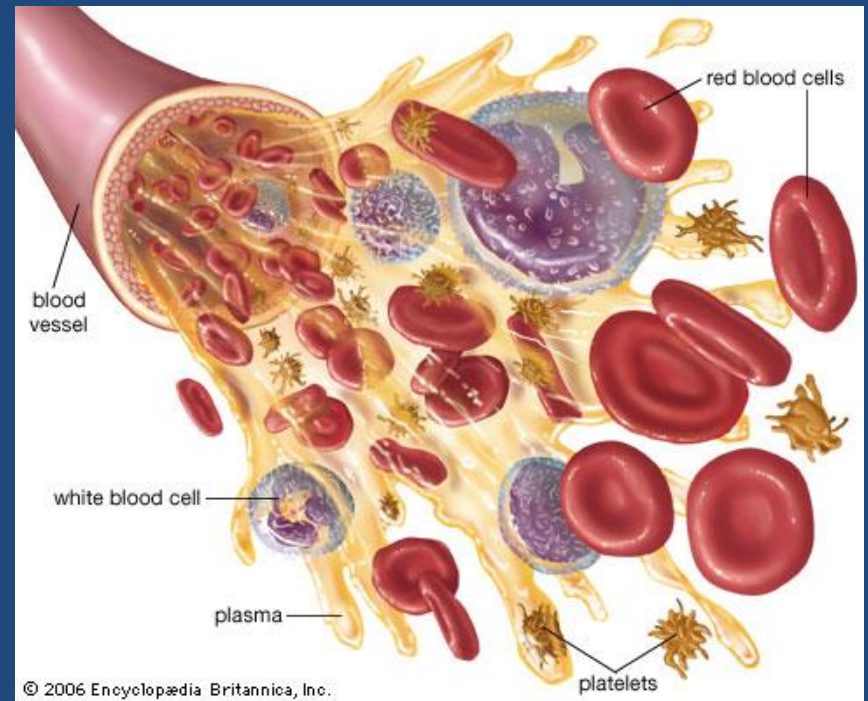
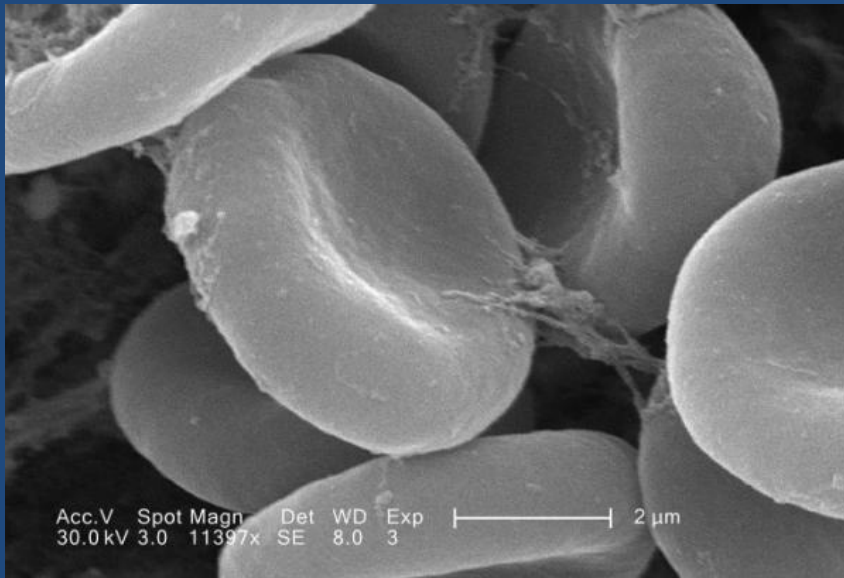
SHOCK TRAUMA PROTOCOL



PROBLEMS?

- Appropriate Patients?
- Inflation time?
- Reperfusion?
- Effect on Cerebral and Cardiac Perfusion?
- Credentialing? Vascular? Trauma? EM? Medics? Competency?
- Training?
- 12F Catheter- open repair
- Lack of data (AORTA Trial)

Blood Is More Than PRBC's...



Whole Blood Composition Compared With Component Therapy

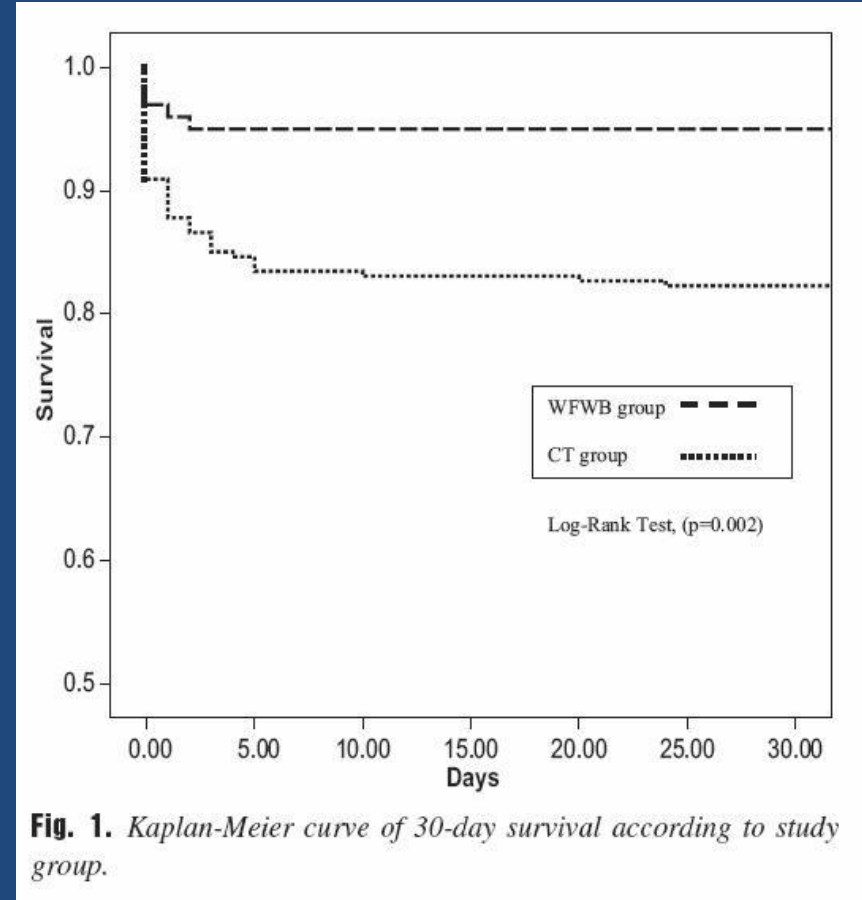
Whole Blood (500 mL)	Component Therapy (660 mL)
Hematocrit 38%-50%	1 unit PRBC = 335 mL with hematocrit 55%
Platelets 150-400 K/ μ L	1 unit platelets = 50 mL with 5.5×10^{10} platelets
Plasma coagulation factors = 100%	1 unit plasma = 275 mL with 80% of the coagulation activity compared with whole blood

Thus, 1 unit PRBCs + 1 unit platelets + 1 unit FFP = 660 mL with hematocrit 29%, platelets 88 K/ μ L, and coagulation activity 65% compared with whole blood. PRBC = packed red blood cells.

Warm Fresh Whole Blood Is Independently Associated With Improved Survival for Patients With Combat-Related Traumatic Injuries

J Trauma 2009; 66: S69–S76

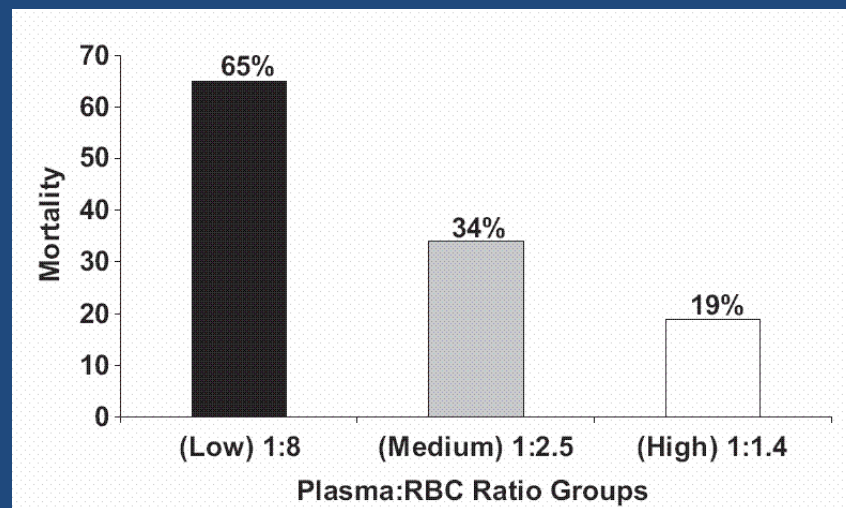
- 968 pts transfused in the US Army Institute of Surgical Research 2004-07
- Iraq and Afghanistan theaters
- Both 24 hour (96 vs 88%) and 30 day (95 vs 82%) survival were higher in the whole blood group over component therapy



The Ratio of Blood Products Transfused Affects Mortality in Patients Receiving Massive Transfusions at a Combat Support Hospital

J Trauma 2007; 63: 805 – 813

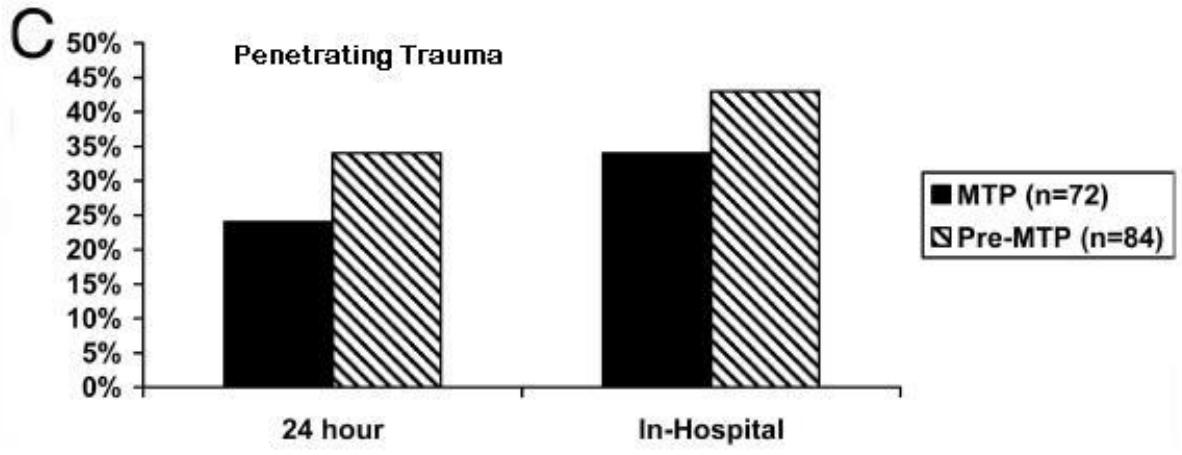
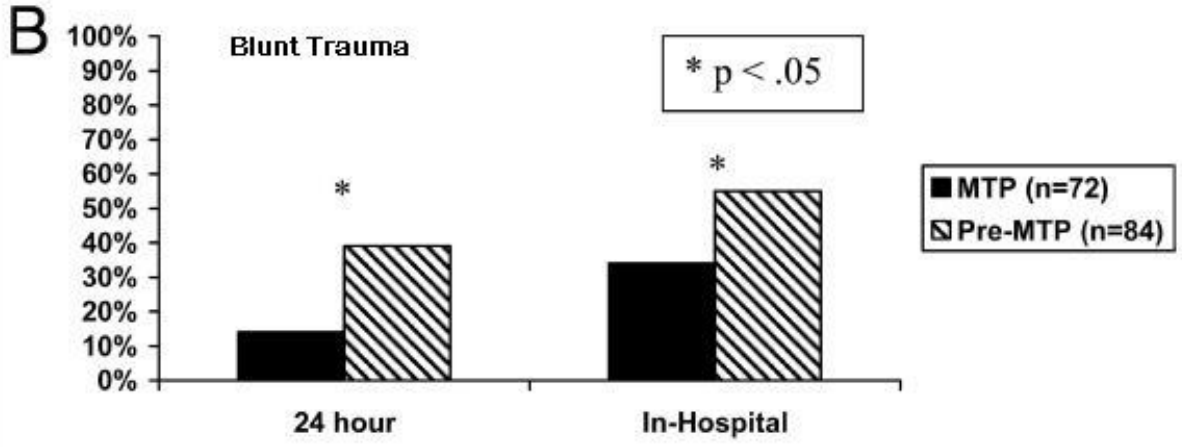
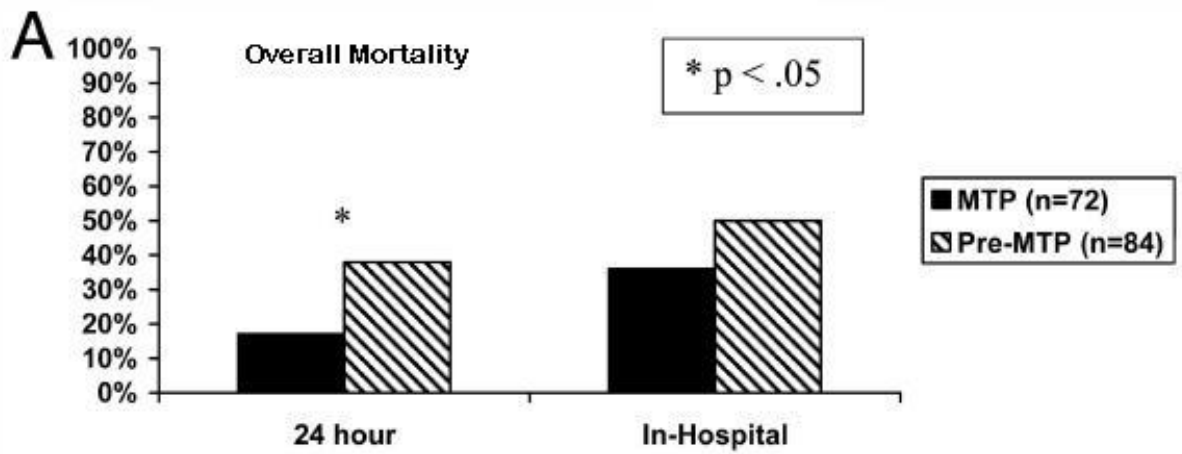
- Retrospective review of 246 massive transfusion pts
- Divided into 3 groups based on FFP:PRBC ratio:
 - Low
 - Medium
 - High



Improvements in Early Mortality and Coagulopathy are Sustained Better in Patients With Blunt Trauma After Institution of a Massive Transfusion Protocol in a Civilian Level I Trauma Center
J Trauma. 2009;66:1616–1624.

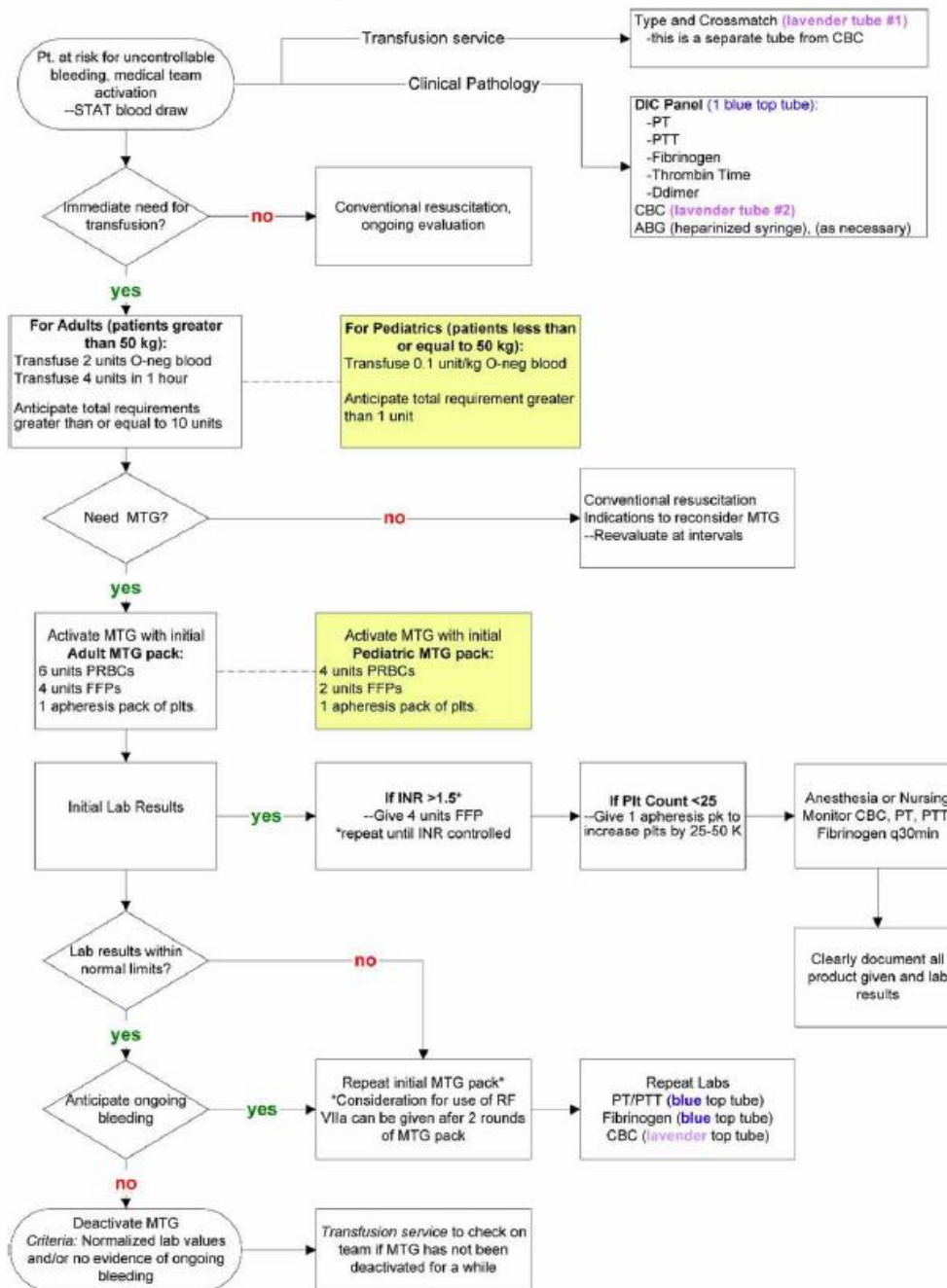
- Grady Memorial Hospital, Georgia
- MTP activations on 73 trauma pts, and compared to historical controls
- Had similar demographics and ISS (29)
- Multidisciplinary team designed the protocol, led by trauma surgeons, and key areas of the hospital were inserviced

Improvements in Early Mortality and Coagulopathy are Sustained Better in Patients With Blunt Trauma After Institution of a Massive Transfusion Protocol in a Civilian Level I Trauma Center
J Trauma. 2009;66:1616–1624.



Massive Transfusion Guidelines

(Estimated activation 1-2/week)



Problem.....

- While it is clear that patients benefit from early institution of a MTP...
- It is not so simple to predict those that would most benefit from this, and the blood bank has limited resources
- Unfortunately, at most centers, the decision to implement the MTP is often subjective, and based on the injuries, rather than physiologic data
- Current ongoing research into identifying and predicting the exsanguinating patient earlier is in the process

KISS

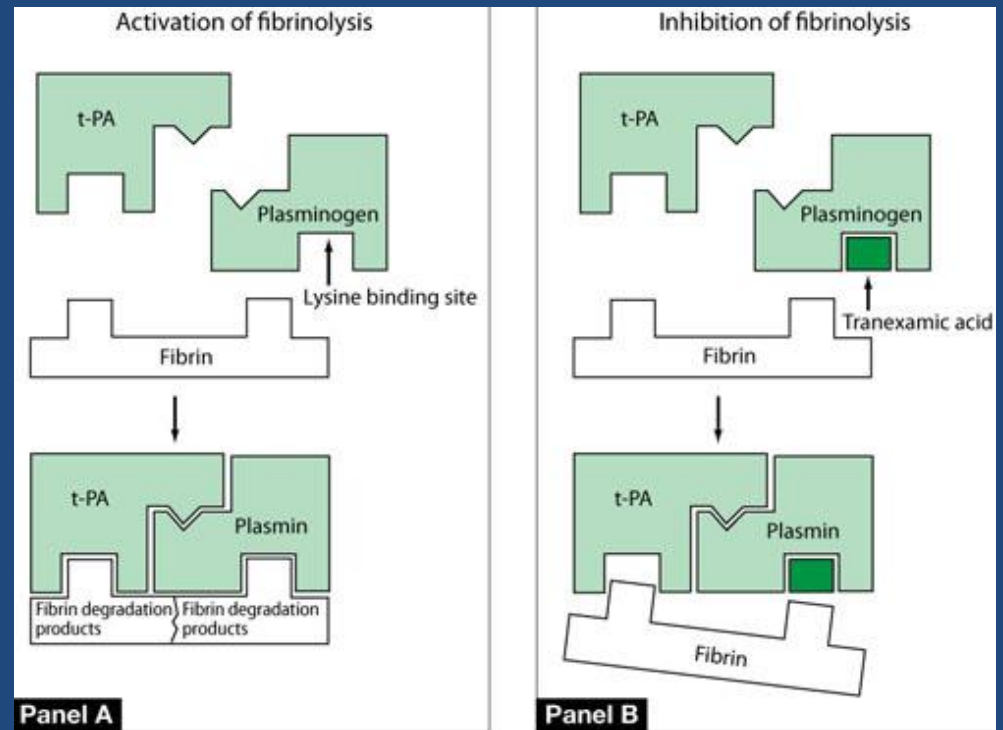
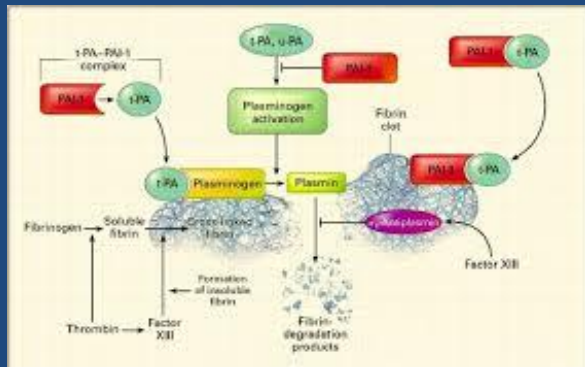
- Penetrating mechanism (0 = no; 1 = yes)
- Emergency department systolic blood pressure <90 mm Hg (0 = no; 1 = yes)
- Emergency department heart rate >120 beats per minute (0 = no; 1 = yes)
- Positive FAST (0 = no; 1 = yes)

- A score of 2 or greater was used to define “predicted to receive MTP.”



Multicenter Validation of a Simplified Score to Predict Massive Transfusion in Trauma
J Trauma 2010; 69: S33 – S39.

Tranexamic acid (TXA)



CRASH 2



- Reduction in all-cause mortality;
14.5% in the TXA (1463/10,060)
16% in the placebo (1613/10,067), $P=0.0035$
- Bleeding-related mortality reduced;
4.9% in TXA vs. 5.7% in Placebo
without an increase in fatal vascular occlusive events.
- All cause mortality decreased;
10% (RR 0.91, 95% CI 0.85-0.97)
- Risk of death from bleeding decreased;
15% (RR 0.85, 95% CI 0.76-0.96).

[JAMA Surg.](#) 2013 Mar;148(3):218-25. doi: 10.1001/jamasurg.2013.764.

Association of cryoprecipitate and tranexamic acid with improved survival following wartime injury: findings from the MATTERS II Study.

[Morrison JJ](#), [Ross JD](#), [Dubose JJ](#), [Jansen JO](#), [Midwinter MJ](#), [Rasmussen TE](#).

National Institute of Health Research, New Queen Elizabeth Hospital.

Abstract

OBJECTIVE: To quantify the impact of fibrinogen-containing cryoprecipitate in addition to the antifibrinolytic tranexamic acid on survival in combat injured.

DESIGN: Retrospective observational study comparing the mortality of 4 groups: tranexamic acid only, cryoprecipitate only, tranexamic acid and cryoprecipitate, and neither tranexamic acid nor cryoprecipitate. To balance comparisons, propensity scores were developed and added as covariates to logistic regression models predicting mortality.

SETTING: A Role 3 Combat Surgical Hospital in southern Afghanistan.

PATIENTS: A total of 1332 patients were identified from prospectively collected U.K. and U.S. trauma registries who required 1 U or more of packed red blood cells and composed the following groups: tranexamic acid ($n = 148$), cryoprecipitate ($n = 168$), tranexamic acid/cryoprecipitate ($n = 258$), and no tranexamic acid/cryoprecipitate ($n = 758$).

MAIN OUTCOME MEASURE: In-hospital mortality.

RESULTS: Injury severity scores were highest in the cryoprecipitate (mean [SD], 28.3 [15.7]) and tranexamic acid/cryoprecipitate (mean [SD], 26 [14.9]) groups compared with the tranexamic acid (mean [SD], 23.0 [19.2]) and no tranexamic acid/cryoprecipitate (mean [SD], 21.2 [18.5]) ($P < .001$) groups. Despite greater Injury Severity Scores and packed red blood cell requirements, mortality was lowest in the tranexamic acid/cryoprecipitate (11.6%) and tranexamic acid (18.2%) groups compared with the cryoprecipitate (21.4%) and no tranexamic acid/cryoprecipitate (23.6%) groups. Tranexamic acid and cryoprecipitate were independently associated with a similarly reduced mortality (odds ratio, 0.61; 95% CI, 0.42-0.89; $P = .01$ and odds ratio, 0.61; 95% CI, 0.40-0.94; $P = .02$, respectively). The combined tranexamic acid and cryoprecipitate effect vs. neither in a synergy model had an odds ratio of 0.34 (95% CI, 0.20-0.58; $P < .001$), reflecting nonsignificant interaction ($P = .21$).

CONCLUSIONS: Cryoprecipitate may independently add to the survival benefit of tranexamic acid in the seriously injured requiring transfusion. Additional study is necessary to define the role of fibrinogen in resuscitation from hemorrhagic shock.

TXA

- A further, exploratory analysis found that death due to bleeding was reduced if tranexamic acid was administered up to 3 hours from injury
- death due to bleeding seemed to increase with administration later than 3 hours after injury.

THANK YOU...Questions?

- “If you ask me anything I don't know, I'm not going to answer. “

Yogi

