From Idea to Impact

A Retrospective on the Evolution of Ideas to Meaningful Change

The Lenworth Jacobs Keynote Address

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Idea to Impact?

- Boston EMS
- Founder EAST
- The Connecticut Trauma System
- Life Star Air Medical Transport
- Hartford Hospital Level I Designation
- Center for Education, Simulation and Innovation (CESI)
- Advance Trauma Operative Management (ATOM)
- The Hartford Consensus
- THREAT Assessment
- Stop the Bleed


MELIORA

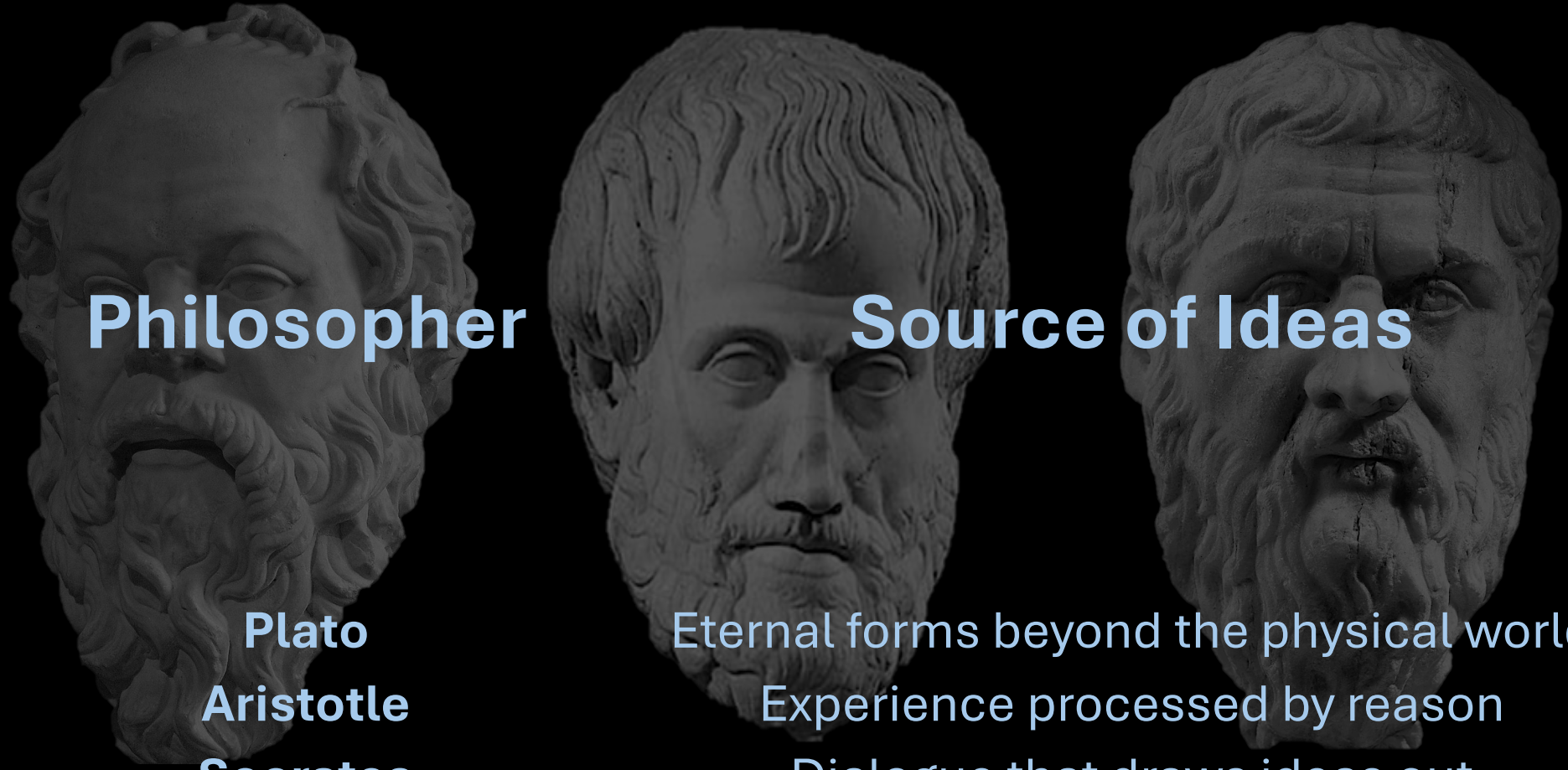
What is the proper treatment approach for a patient with a gun shot wound to the abdomen with multiple visceral injuries and multiple vascular injures in the presence of physiologic instability?

In a patient with a **gunshot wound to the abdomen, multiple visceral and vascular injuries, and physiologic instability**, the correct paradigm is **Damage Control Resuscitation (DCR) coupled with Damage Control Surgery (DCS)**.
This is **not** a definitive repair situation—the priority is **rapid control of hemorrhage and contamination while reversing the lethal triad (hypothermia, acidosis, coagulopathy).**

One-Line Summary

An unstable patient with destructive abdominal GSW requires rapid damage control—pack, control bleeding and contamination, temporary closure, ICU resuscitation, and only later definitive repair.

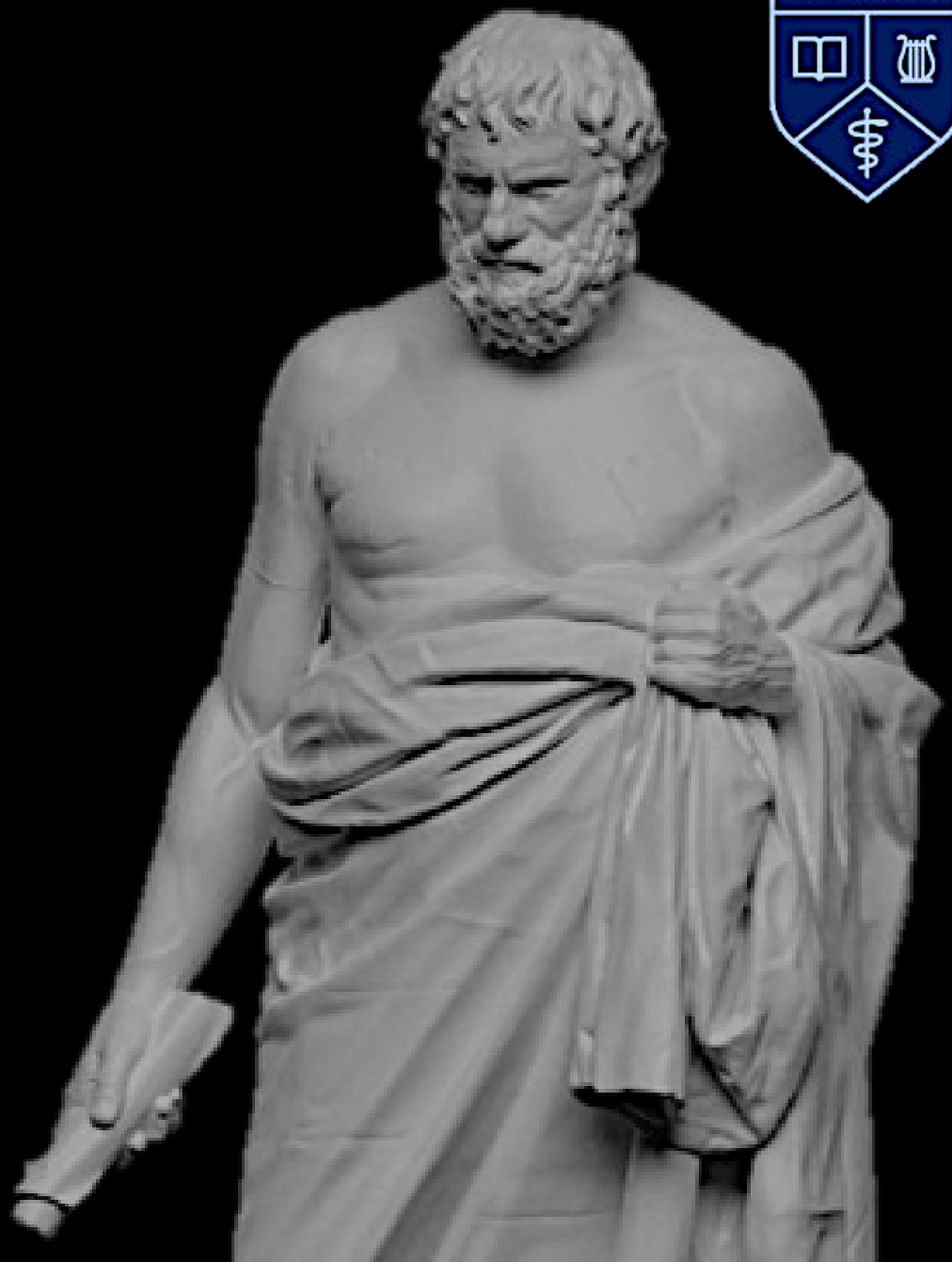

Ideas
MELIORA



Philosopher	Source of Ideas
Plato	Eternal forms beyond the physical world
Aristotle	Experience processed by reason
Socrates	Dialogue that draws ideas out
Stoics	Rational judgment of impressions
Epicurus	Sensory experience
Neoplatonists	Divine emanation

- Collision not creation
- Problems looking for relief
- Pattern recognition under pressure
- Permission + safety
- Borrowing shamelessly

*__Ideas__ = Volume of Thinking + Diversity of Input + Rapid Expression




MELIORA
Strategy

- Make clear, hard choices
- Create a distinctive value proposition
- Translate strategy into executional alignment

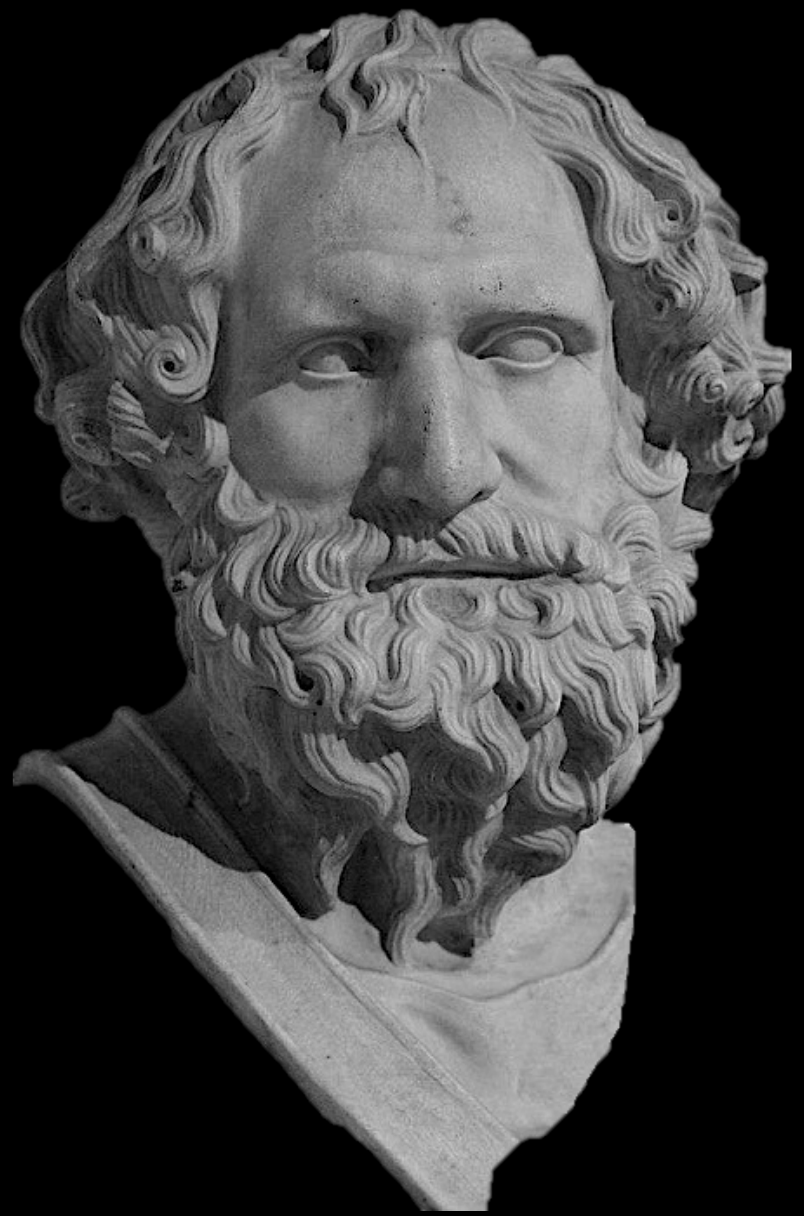
*__Strategy__ = Choices + Differentiation + Aligned Execution


MELIORA
Tactics

- Prioritize actions that directly advanced the strategy
- Sequence and pace the work realistically
- Assign clear ownership with measurement outcomes

***Tactics** = Focused Actions + Thoughtful Sequencing + Relentless Accountability


MELIORA
Innovation



- Innovation starts with a problem worth solving
- Innovation requires a system, not a moment of genius
- Adoption is the real innovation – implementation beats invention

***Innovation** = Meaningful Problem + Repeatable Process + Scaled Adoption


MELIORA
Impact

- Impact is defined by outcomes, not intentions
- Scale and sustainability turn good work into real impact
- Impact happens when efforts align with a larger purpose

***Meaningful Impact =** Measurable Change + Scalable Durability + Mission Alignment

Three Graces of Innovation

- Grace - Competency
- Place - Culture
- Space - Courage

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'DAMAGE CONTROL': AN APPROACH FOR IMPROVED SURVIVAL IN EXSANGUINATING PENETRATING ABDOMINAL INJURY

Michael F. Rotondo, MD, C. William Schwab, MD, FACS, Michael D. McGonigal, MD, FACS, Gordon R. Phillips, III, MD, Todd M. Fruchterman, BA, Donald R. Kauder, MD, FACS, Barbara A. Latenser, MD, and Peter A. Angood, MD

Idea

- Retrospective study of 46 patients - *J Trauma 1993*

Table 1
Demographic data, injury scoring, and survivorship for the definitive laparotomy (DL) and damage control (DC) patients in the overall group (n = 46)

	DL (n = 22)	DC (n = 24)
Age (years)	31.5 ± 12.3	30.6 ± 9.6
Sex (M:F)	22:0	23:1
Mechanism of Injury (GSW:SW)	18:4	19:5
RTS	6.44 ± 2.1	6.11 ± 2.2
ISS	22.9 ± 8.7	24.2 ± 7.7
Ps	0.835 ± 0.292	0.781 ± 0.302
PATI	29.8 ± 15.7	37.0 ± 13.9
Actual Survival	12 (55%)	14 (58%)

Reported as mean ± standard deviation.

Table 6
Injury scoring and survivorship for patients with one or more major vascular injury and two or more visceral injuries—the maximum injury subset (n = 22)

	DLM (n = 9)	DCM (n = 13)
RTS	5.29 ± 2.8	6.22 ± 2.6
ISS	23.8 ± 10.8	22.9 ± 6.2
Ps	0.670 ± 0.396	0.810 ± 0.295
PATI	40.9 ± 12.4	43.6 ± 11.0
Actual Survival	1 (11%)	10 (77%)

Reported as mean ± standard deviation.
* Fisher's exact test, $p < 0.02$.

Why did Damage Control Surgery become so prevalent so fast in the absence of little scientific evidence to support it?

Damage Control Surgery (DCS) spread rapidly in the 1990s not because of early high-level evidence, but because it solved an immediately visible clinical failure that trauma surgeons were confronting daily. Its adoption was driven far more by **physiologic plausibility, reproducible bedside success, and cultural transmission within trauma systems** than by randomized trials.

- It addressed and obvious clinical catastrophe
- The lethal triad was clinically self evident
- It was technically simple and reproducible
- Trauma culture allowed rapid knowledge transfer
- The patient population could not wait for randomized trials
- Military experience reinforced civilian observations
- Early outcome signals were too strong to ignore
- It represented a paradigm shift – NOT a technical advance
- Evidence came later and validated practice

`Who is considered the father of Damage Control Surgery?`

There is no single universally designated “father” of **Damage Control Surgery (DCS)**, but the concept is most closely associated with **Dr. H. Hirshberg, Dr. Michael F. Rotondo, and colleagues**, who formalized and named the approach in the early 1990s.

Key Figure Most Commonly Credited

Dr. Michael F. Rotondo, MD, FACS

He is widely regarded as the principal architect who:

- Clearly articulated the **three-stage framework** of Damage Control Surgery
- Linked abbreviated laparotomy to correction of the **lethal triad** (acidosis, hypothermia, coagulopathy)
- Helped move the practice from an ad-hoc maneuver to a reproducible surgical strategy

The landmark paper:

> **Rotondo MF, Schwab CW, McGonigal MD, et al.**
> *“Damage Control: An Approach for Improved Survival in Exsanguinating Penetrating Abdominal Injury.”*
> **Journal of Trauma, 1993.**

This publication is generally considered the **defining scientific description** of DCS and is why Rotondo is most often cited as its “father.”

Strategy

Damage Control ...

PART I – OR
- control of hemorrhage
- control of contamination
- abbreviation/packing
- temporary closure

PART II – ICU
- restoration of physiology

PART III – OR
- definitive reconstruction

Tactics

Rotondo et al, Journal of Trauma 1993

...a series of sequential steps...

Result: Damage Control Surgery

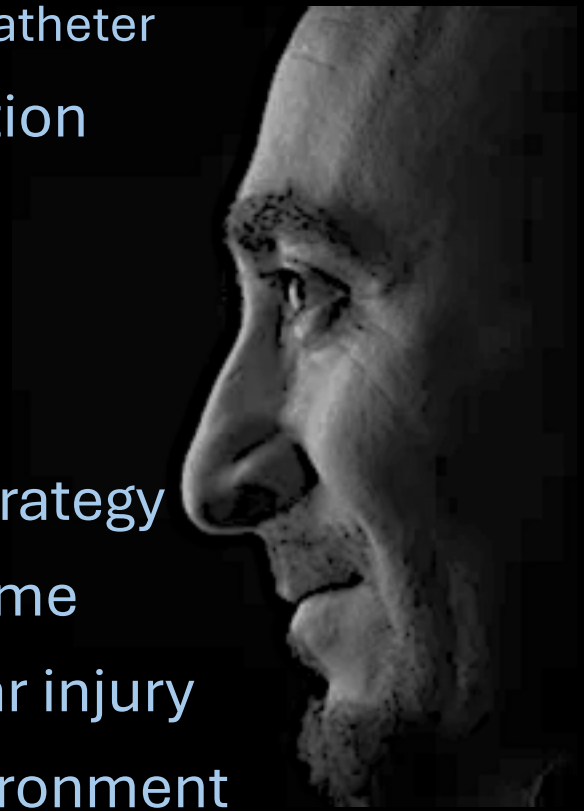
Tactics

- Reframing the surgical objective: from anatomic perfection to physiologic survival
  - DCS redefined success as rapid control of bleeding and contamination, not definitive reconstruction
- Creation of a new physiology, driven model of trauma care
  - Trauma surgery became a stage physiological strategy, not a single operative event
- Systems level transformation of trauma, infrastructure, and teamwork
  - An accelerated the development of dedicated trauma, ICUs, mass, transfusion protocols, etc.

The Evolution of Surgical Critical Care

(1985-2005)

- **Hemodynamic Monitoring**: fall of the pulmonary artery catheter
- **Fluid Stra**tegy: hypervolemia to euvolemic resuscitation
- **Mechanical Ventilation**: lung protection
- **PEEP**: oxygenation tool to lung stabilizing strategy
- **Rescue Ventilation**: new modes/strategies emerge
- **The Open Abdomen**: surgical failure to intentional strategy
- **Discovery:** IAH and abdominal compartment syndrome
- **Oxygen Metabolism**: delivery to dysoxyia and cellular injury
- **Cultural Shift**: ICU as a controlled resuscitation environment



Innovation

Core Conceptual Philosophic Pivot

Pre-1990	By 2005
Normalize number	Protect organs from iatrogenesis
More fluid = better perfusion	Fluid overload causes organ failure
Fix anatomy now	Stage surgery around physiology
Large title volumes prevent ARDS	Large title volumes cause ARDS
Monitoring drivers care	Biology drives care
Shock = oxygen debt	Shock = inflammatory + microcirculatory failure

What was the impetus for the development of Damage Control Resuscitation?

The impetus for the development of **Damage Control Resuscitation (DCR)** was the realization—about a decade after Damage Control Surgery (DCS) was introduced—that surgeons could not "operate their way out" of the lethal triad unless the **resuscitation itself was fundamentally redesigned.**

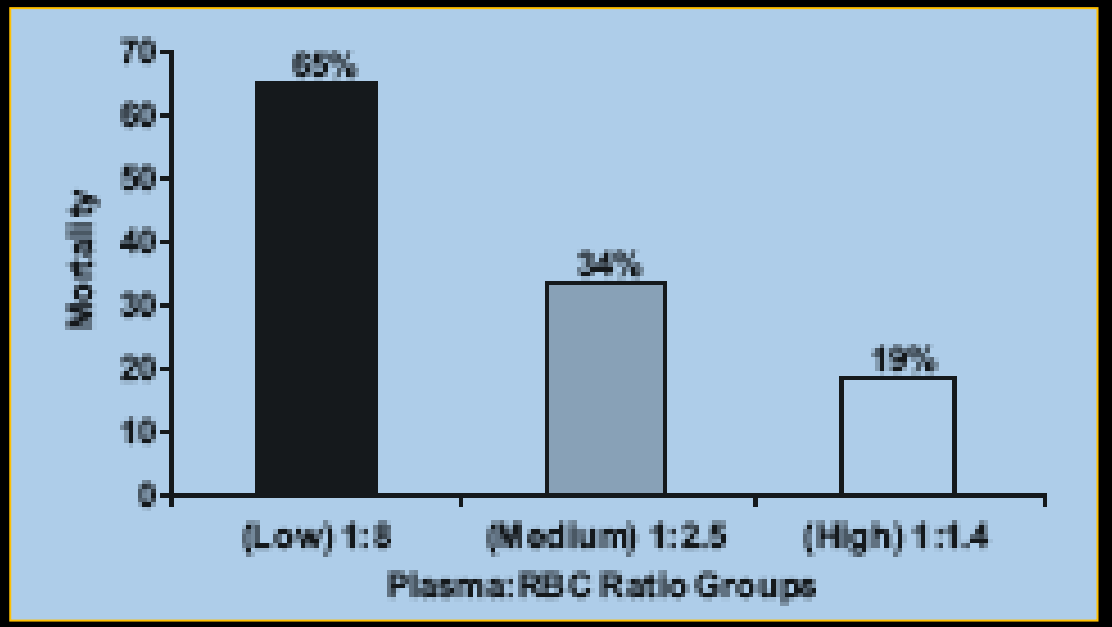
- Persistent death, despite successful damage control operations
- Recognition that traditional ATLS era resuscitation was harmful in exsanguinating trauma
- Identification of trauma due coagulopathy as an early primary event
- Military experience in Iraq and Afghanistan was a catalyst
- The shift from volume replacement to hemostatic resuscitation
- Data confirmed with clinicians were saying

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

Matthew A. Borgman, MD, Philip C. Spinella, MD, Jeremy G. Perkins, MD, Kurt W. Grathwohl, MD, Thomas Repine, MD, Alec C. Beekley, MD, James Sebesta, MD, Donald Jenkins, MD, Charles E. Wade, PhD, and John B. Holcomb, MD

Innovation

- Retrospective Operation Iraqi Freedom Operation: 1:1.4 ratio (Plasma:PRBC) independently associated with improved survival
  - *J Trauma 2007*



Conceptual Arc of DCS and DCR

Era	Primary Question	Answer
1970s-1980s	Why are patients dying in the OR?	Lethal Triad
1990s	How do we change the operation?	Damage Control Surgery
2000s	Why do they have multiple complications and some still die?	Resuscitation is the Problem
2010s	How do we resuscitate differently?	Damage Control Resuscitation
2020s	How do we individualize hemostasis?	Precision + Whole Blood

Conceptual Integration of DCS and DCR

DCS Observations	DCR Solutions
Patients die from physiology NOT anatomy	Resuscitation targets physiology first
Stopping surgery early helps	Hemostatic resuscitation sustained that survival
ICU phase critical	ICU becomes active resuscitation battlefield
Triad recognized	Triad actively prevented

Result: Damage Control Resuscitation

- **Physiologic Outcome:** reversal of the “lethal triad”
  - Mortality from exsanguination fell dramatically, especially in the first 24 hours
- **Operational Outcome:** redesign of trauma systems
  - DCR became the physiologic partner to DCS and the approach shifted from a sequential model to a simultaneous resuscitation control strategy
- **Translational Outcome:** DCR spread beyond injury care
  - Promoted bidirectional learning, expanded to other hemorrhagic states and reframed shock as a failure of hemostatic regulation not just perfusion

Impact

Metric	Pre-integration era	DCS plus DCR era
Early hemorrhage death	Common	Markedly reduced
Crystalloid related complications	Frequent	Much less common
Abdominal compartment syndrome	10 to 20%	Now uncommon
Massive transfusion survival	Poor	Substantially improved
Late MOF deaths	Major cause	Declined

Epilogos

Ideas

Strategy

Tactics

Impact

Innovation

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