

Mission Zero and Beyond:

Maintaining Readiness and Pursuing New
Innovations in Trauma Care – a Military and
Civilian Partnership

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The Hersperger-Pryor Lecture

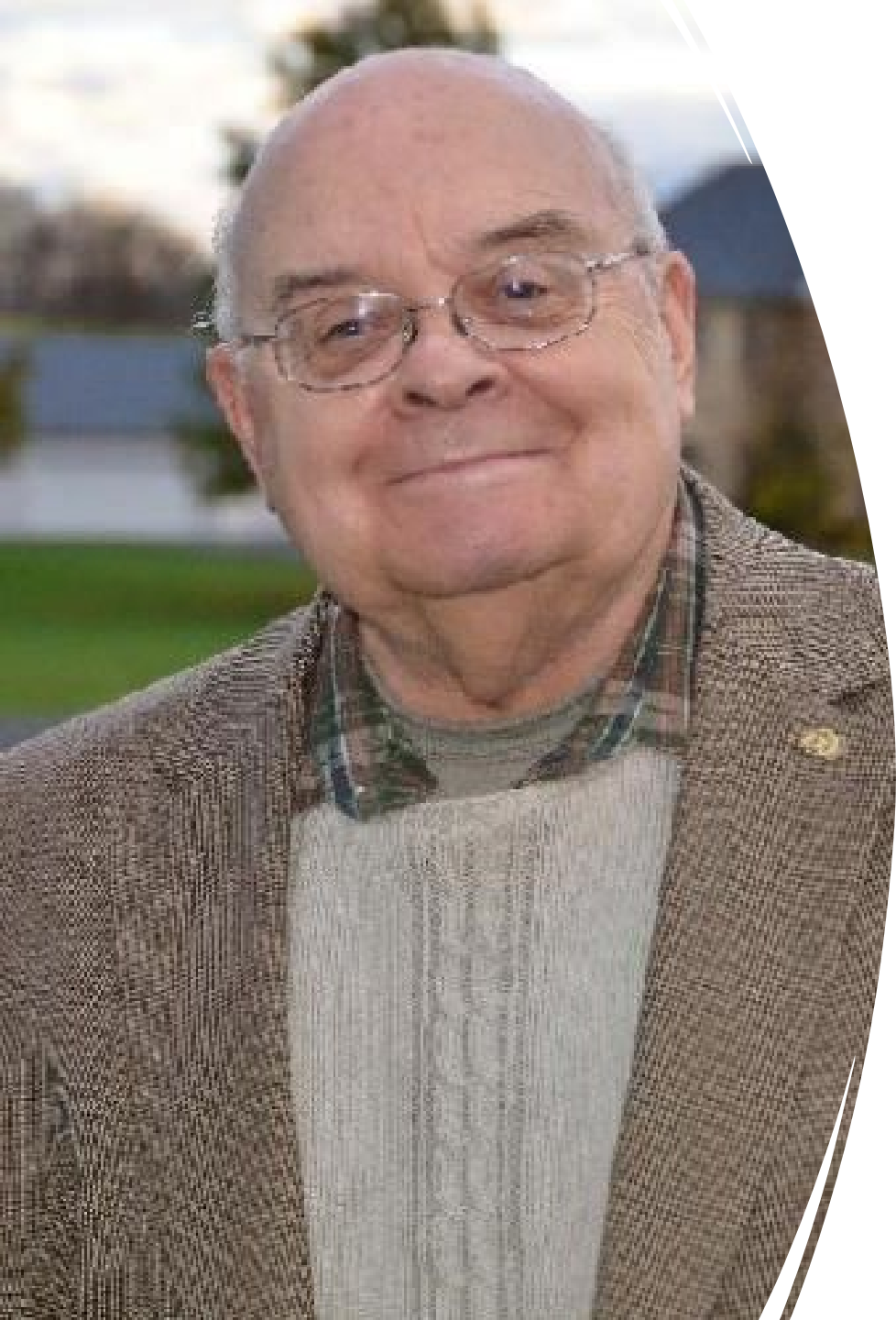
- **Patrolman Webb Sellman Hersperger**
 - Montgomery County Police Department
 - Commended often for outstanding service
 - Leaped onto the running board of a getaway car from a moving police car and arrested 2 men who had been preying on motorists at Rock Creek Park, DC
 - EOW 18 June 1933
 - Killed in head-on collision while on duty



The Hersperger-Pryor Lecture

- **Major John Pryor, MD**
- Trauma surgeon for University of Pennsylvania and the U.S. Army Reserve Medical Corps
- Died Christmas Day 2008 in Mosul, Iraq as a result of injuries sustained when a mortar round hit near his living quarters
 - Serving a second tour of duty with a forward surgical team with the Army's 1st Medical Detachment
- Recipient of the Bronze Star and the Purple Heart
- Chief Medical Advisor to the Red Cross of Southeastern PA
- “We, more than almost anyone else, know he was a true American hero. I also want you to know that I will never forget your son, and that I will pray for him and all of the children lost in this war.”





Dr. Webb Hersperger, MD

- Consummate small-town doctor
- Physician in the US Army (Fort Sam Houston, Fort Gordon, Fort Leavenworth, St. Louis, MO)
- Residency at Geisinger Medical Center, Danville
- Settled down in Carlisle in 1967
- Community service: Deacon/elder at second presbyterian church, Executive Board of the Keystone Area Council of the Boy Scouts (led efforts to save Hidden Valley Scout Reservation – still open 25y later!), Chaired United Way's Professional Division, VP of Carlisle Crimestoppers, board member of the American Trauma Society, PA Division.
- People were his passion in life.
- Passed away April 29, 2022 – age 91

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Airman Heather Edsall

- Enlisted in the Air Force in August, 2001
- Dental technician
- Dover AFB (2002-2006)

- Tangible proof of proficiency gaps



“Medicine is the only victor in war”

-Dr William J Mayo

- First two decades of the 21st century, significant medical growth took place
 - Surgery – trauma and vascular surgery
 - Critical care
 - En-route care
- What we gained:
 - Rapid evacuation with timely definitive care
 - Surge of innovation – caring for patients that otherwise would have died on the battlefield
 - Empiricism: knowledge devised from sense-experience
 - Live and learn



We were quickly learning a lot of lessons

- Combat injuries in Iraq and Afghanistan posed the toughest challenge since the Vietnam War.
- In the wars' early phase – no overarching system was present to collect actionable data
- In 2004, Army, Navy, and Air Force formed the JTS (Joint Trauma System)
 - Modeled after high-performing trauma systems
 - Most pressing problems were illuminated:
 - Bleeding control, resuscitation, supply chain, many other subjects
 - When pressing problems were identified, we needed to act FAST!!! – Lives depended on it.
 - No time for randomized controlled trials, JTS used continuous performance-improvement process



What they learned:

- 25% of prehospital deaths and 50% of in-hospital deaths (2001-2009) were preventable.
- Vast majority >80% were associated w/hemorrhage
- HARD TO ACKNOWLEDGE!!!



Changes were made...



Determination



Innovation

*Focused
empiricism*



Air superiority



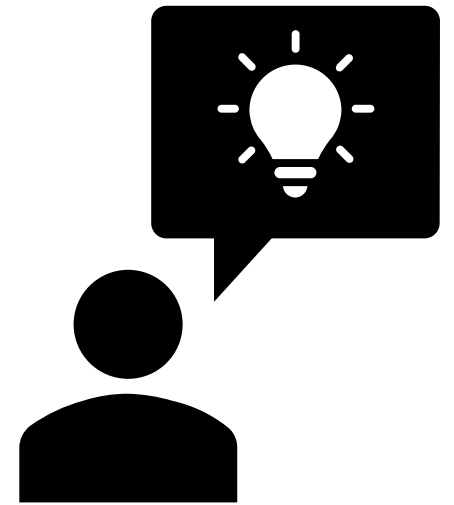


JTS, in coordination with combat medics and Army Ranger Regiments, demonstrated that new knowledge, materials, and consistent training prevented death

- Case fatality rate decreased by 50% between 2005 and 2013,
- Despite an increase in ISS among US troops

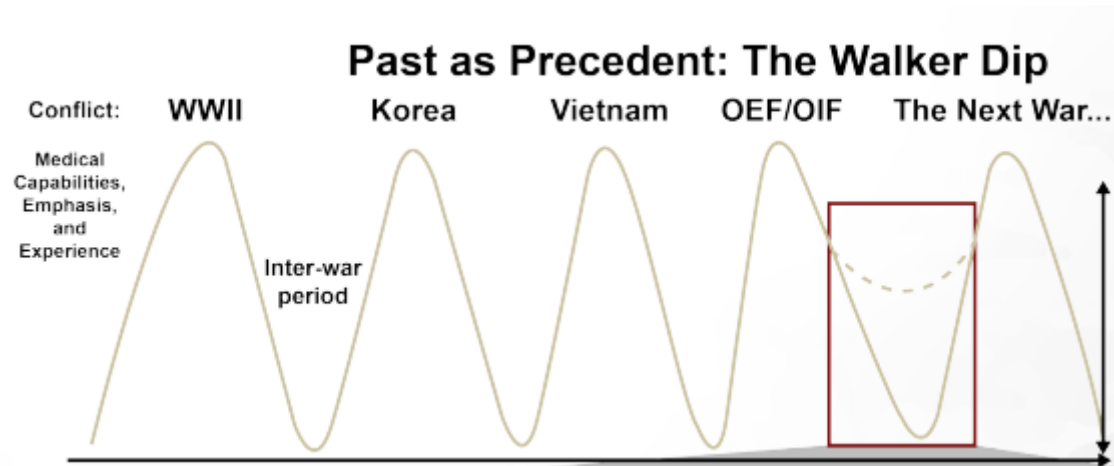
Battlefield Borne Innovations

- Timely stabilization and transfer to definitive care
- Resuscitation approaches –BLOOD PRODUCTS FIRST!!!
- Training and equipment of 1st responders (TCCC)
- Protocols/guidelines
 - Clinical practice guidelines were created – continue to evolve currently
 - DOD-funded research and development efforts
- Hemorrhage management
- Culmination of 20 years of work!!



Avoiding the *Walker Dip* / *Peacetime Effect*

- During peacetime/inter-war periods see atrophy of military surgical readiness
 - One USAF report – only 3.6% of diagnoses at MTF's were war-related!
- Cost is eventually borne by those injured in future wars if we let lessons/skills atrophy



Alasdair Walker, Surgeon-General
British Armed Forces

Defense Committee on Trauma

- Provides subject matter expertise to support the Joint Trauma System
- Multiple subcommittees
- Improve trauma readiness and outcomes through evidence-driven performance improvement
- Provide best practice procedures to the DOD
- Inform DOD regarding performance capability gaps



Identified Pitfalls → Looking forward

- **Limited capability to perform DCS and resuscitative care**
 - Shelf-stable blood components
 - Perishable skills
- **Diminished surgical capabilities at point of injury and in prolonged care**
 - Non-surgical solutions to remedy?
- **? Ability to assess, monitor, enhance casualty care provider performance/effectiveness**
 - Re-evaluating training structure/methods/frequency
- **? Sufficient evacuation of wounded, ill and injured warfighters**
- **Pain management**



Identified Solutions



Partner with universities –
data
infrastructure/maintenance



Patient tracking



Real-world validation



Sustainment partnerships

LITES

Linking Investigations in Trauma
and Emergency Services



Collaborative LITES Network

- Network of medical professionals, prehospital providers, and emergency medical services
- Joined to perform injury care and outcomes research
- DOD-funded
- Carries out a variety of research projects focused on trauma, blood/whole blood resuscitation, TBI, airway management and hemorrhagic shock

Ongoing LiTES Network Projects

Cold-Stored Platelet
Early Intervention in
Hemorrhagic Shock Trial
(CriSP-HS)

Cold-Stored Platelet
Early Intervention in
Traumatic Brain Injury
Trial (CriSP-TBI)

Trauma, Brain Injury,
and Emergency Medical
Systems (Task Order
One)

Shock, Whole blood and
Assessment of TBI
(SWAT)

Prehospital Airway
Control Trial (PACT)

Type O Whole Blood
and Assessment of Age
During Prehospital
Resuscitation Trial
(TOWAR)

Prehospital Analgesia
Intervention Trial (PAIN)



What gadgets
are on the
horizon?



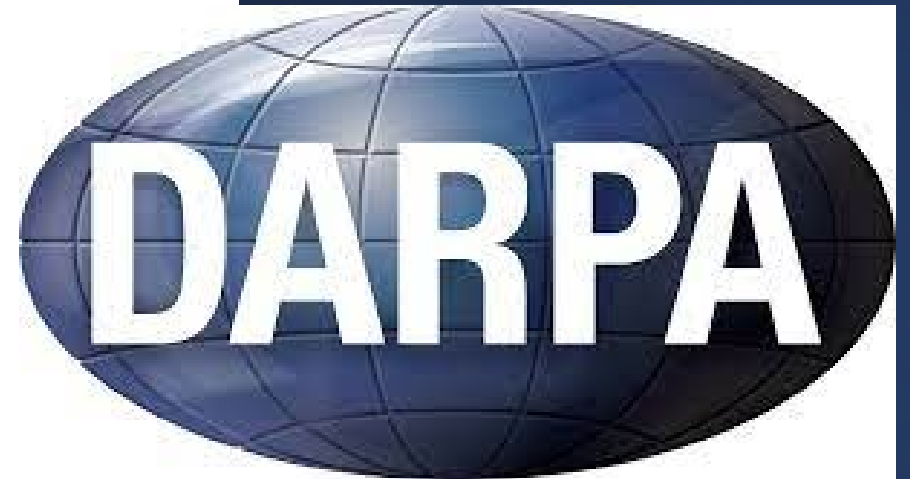
TRACIR

- **TRAuma Care In a Rucksack**
- Data-driven functional hemodynamic monitoring and machine learning
- Autonomous Unmanned Robotic Controlled Casualty Care
 - Devices/sensors, robotics, cloud computing (security, bandwidth compression)



DARPA - Defense Advanced Research Projects Agency

- Research and development agency of the DOD
- Government, academic and corporate offices/innovators
- ~250 research and development programs
 - (not just in healthcare)





JUST IN: DARPA Developing X-Plane for Special Operators

3/27/2023

By Stew Magnuson



DARPA Selects 3 Teams to Develop Self-Healing Substances for Military Structures

by Naomi Cooper March 27, 2023 1 min read

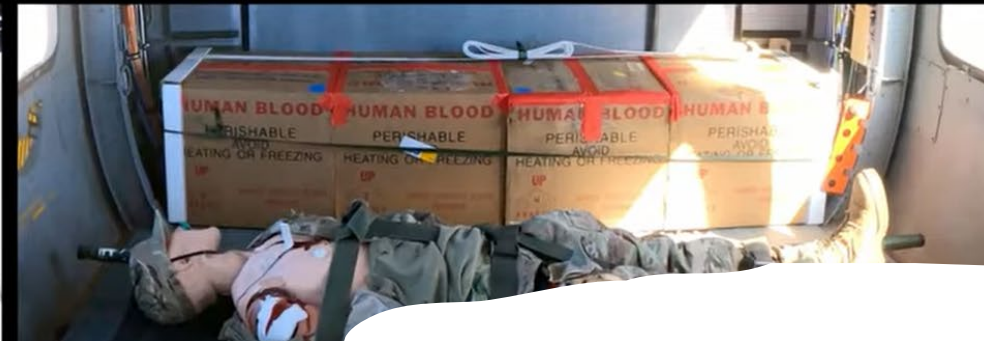
DARPA Is Looking For A Drug That Can Keep You Warm

The hunt is on for drugs to help humans resist freezing temperatures.



JACK DUNHILL

Published March 9, 2023



Unmanned UH-60

DARPA ALIAS Program

February 5, 2022

DARPA Triage Challenge

DTC BAA

SAM.GOV

Proposal Closing Date **February 27th, 2023**



DARPA Triage Challenge

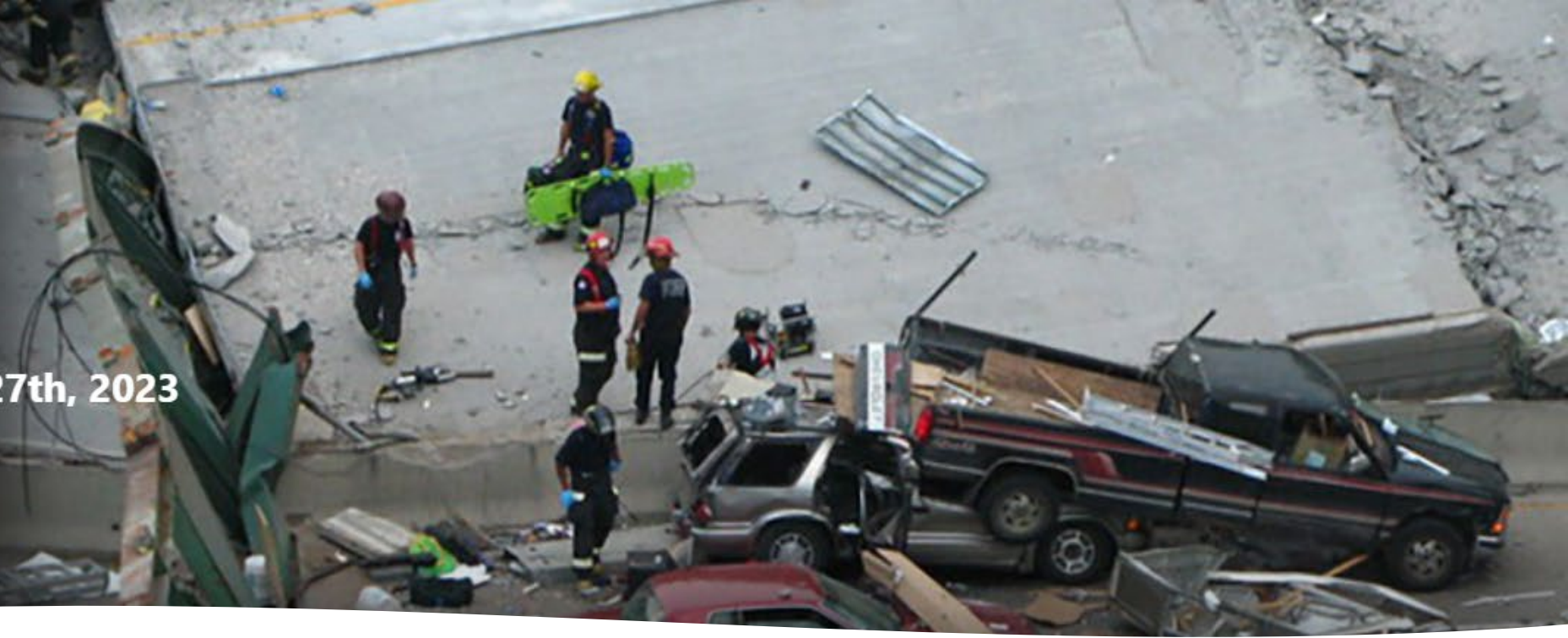
- Searching for signatures of injury that will help medical responders perform timely and accurate triage
- Series of challenge events to spur development of novel patient physiological features/signatures of injury.
- Especially important for mass casualty events

DARPA Triage Challenge

DTC BAA

SAM.GOV

Proposal Closing Date **February 27th, 2023**



DARPA Triage Challenge MCI Triage

- Primary stage
 - Sensors/stand-off platforms – deliver triage to point of injury
 - UAVs
 - Algorithms that analyze data in real-time
 - Identify casualties for urgent hands-on evaluation
- Secondary stage
 - After most urgent casualties treated
 - Non-invasive contact sensors placed on casualties
 - Algorithms that analyze sensor data in real-time



- What does the next battlefield look like?

- What does a future MCI look like?



Battle-borne innovations → Civilian Gains

Timely stabilization and transfer to definitive care

Resuscitation approaches

Training and equipment of 1st responders

Hemorrhage management

Protocols/guidelines



One and the Same?

- Do we need to view military and trauma system as the similar systems?
- What do we have in common?
- What can we learn from one another?



Civilian vs. Military Trauma Systems

- **Civilian Trauma System**

- Strengths
 - Personnel/institution longevity
 - Constant need
 - No scale-up/move
- Challenges
 - No clarity of mission
 - No stable command/control
 - Variable commitment of system elements

- **Military Trauma System**

- Strengths
 - Mission Clarity
 - Command/control structures
 - Well-developed (developing) system elements
- Challenges
 - Wartime mission disappears during peace
 - Need for rapid scale-up, anywhere in the world
 - Personnel turnover

JTS



JTS Mission

The mission of the Joint Trauma System (JTS) is to improve trauma readiness and outcomes through evidence-driven performance improvement. The JTS vision is that every Soldier, Sailor, Airman and Marine injured on the battlefield or in any theater of operations will be provided with the optimum chance for survival and maximum potential for functional recovery.

ACS-COT

Mission

The mission of the American College of Surgeons Committee on Trauma (ACS COT) is to develop and implement programs that support injury prevention and ensure optimal patient outcomes across the continuum of care. These programs incorporate advocacy, education, trauma center and trauma system resources, best practice creation, outcome assessment, and continuous quality improvement.

**Very Similar Missions:
Optimum Patient Care!!!**



Landmark report by National Academies of Science, Engineering and Medicine - 2016

Calls for trauma care system redesign

1/4 military trauma deaths and 1/5 civilian trauma deaths could be prevented if advances in trauma care reached all injured patients.

Many improvements/changes not reaching all civilian providers

Many military surgeons not performing trauma surgery at their MTF

Goal is to support and build military-civilian partnerships



LITES

Linking Investigations in Trauma and Emergency Services



east



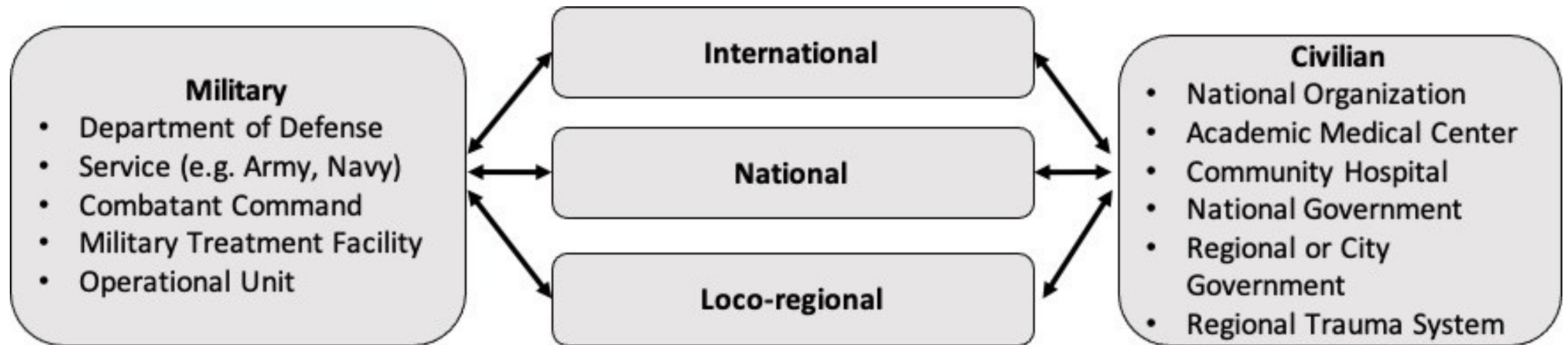
A Portrait of Contradiction

- On one hand, nation has never seen better systems of care for wounded on battlefield.
- On other hand, depending on when/where injured, do not receive the benefit of those gains.



Military-Civilian Partnerships

- Just-in-Time training
- Skill-Sustainment MCP – regular intervals
- Integrated – embedded full-time into trauma centers, typically as faculty



(J Trauma, 2022. 92, e57-e76)

Mission Zero Act

A hand holding an American flag against a dark background. The flag is the central focus, with its stars and stripes clearly visible. The hand is in silhouette, holding the flagpole from the right side. The background is a dark, gradient-like color, possibly representing a sunset or a night sky.

- Signed into law in 2019, authorizes funding for grants to civilian trauma centers for the cost of training and incorporating military healthcare providers.
- Grant from HHS to cover the administrative costs of embedding military trauma professionals in civilian trauma centers
- Recently cut by about 75%



Mission Zero

Military trauma care teams gain exposure to treating critically injured patients and increase readiness

Improving civilian access to care.

HEALTHCARE IS

NOW
DESPERATELY
HIRING

The Blue Book:

Military-Civilian Partnerships
for Trauma Training, Sustainment,
and Readiness

-
- Information for developing and sustaining military-civilian partnerships such as obtaining institutional commitment, governance and administration, human resources, physical resources, education, and evaluation.





Bottom Line



Driving Preventable Deaths after Injury to Zero

- Share this endeavor across all stakeholders responsible for surgical care
 - Civilian and military surgical communities
 - Surgeons, Emergency providers
 - Prehospital and in-hospital specialists
 - Global health
 - Humanitarian
 - Military Providers
 - International – across borders





Captain Heather Edsall

- Trauma/ER RN
- TCCC, Stop the Bleed, AFWERX Spark Cell
- BLUF: Airman Edsall has taken responsibility.
 - Will we?





Thank You!