

## Extraordinary War Wounds

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## Goals of the Discussion

- Review national scope of health needs and long term cost after 15 years of war;
  - Cost in Human terms
  - Cost in Health care
- Signature Wounds
- Current Wound Warrior Care
- Private –Community-Government Relationships
- Advances in Military Wound Care
- Discussion

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## The Only Winner In War Is Medicine<sup>1,2</sup>

- Whether you support or oppose the current armed conflicts in the Middle East-Operation Iraqi Freedom and Enduring Freedom in Afghanistan (OIF-EFA); "I believe we can all agree that the common denominator of war is loss of life and limb."(Salcido 2007)<sup>3</sup>
- "If war is the dark side of humanity, then military medicine is the light," (2013) Dr,Jonathan Woodson is the Assistant Secretary of Defense for Health Affairs <sup>4</sup>

1. Haberman TM, Zimer RE, Beck CS: The Mayo Brothers' Heritage. Quotes and Pictures. Rochester, MN: Mayo Clinic Scientific Press; 2009:16.  
 2. Cleaveland H.: The Doctors Mayo. Rochester, MN: Mayo Foundation for Medical Education and Research, 1969.  
 3. Salcido, R. (2007). Polytrauma: the wounds of war. *Advances in skin & wound care*, 20(9), 471-473.  
 4. Medical Advancement is War's Positive Outcome, Top Doc Says. *Health.mil* (2013)

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## Estimated War Cost



Economic Costs Summary: \$4.4 Trillion and Counting

## Human Cost

- 6,800 American SM's have died in the wars in Iraq and Afghanistan
  - deaths include IEDs, hostile fire, vehicle crashes, illness, and suicide
- An estimated 6,790 private contractors working for the US have died in the war zones.
  - In recent years, contractor deaths have exceeded uniformed deaths.
- Coalition partners: 30,500 uniformed Afghans, Iraqis and other allies have died since 2001
- High percentage of returning young veterans have died
  - as a result of drug overdose, suicide or vehicle crashes
  - The suicide rate doubled in the Army during the first decade of the wars among both the deployed and the non-deployed

Bimes, L. (2013). The financial legacy of Iraq and Afghanistan: How wartime spending decisions will constrain future national security budgets. <http://www.brown.edu>. Brown University, Watson Institute

## U.S Battlefield Casualties and Post-Combat Disability Claims



## Families & Communities' Assume Burden



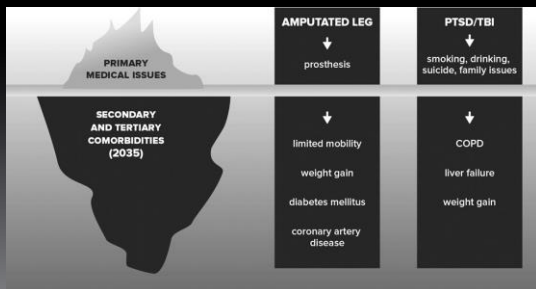
- 2.5 million SMS deployed since 2000, nearly half with mult-deployments
- Burden falls to families and to Communities'
- Child Abuse in Army families three times higher with parent deployment (2010)
- From 2001 through 2011, alcohol use associated with physical domestic violence in Army families increased by 54%, and child abuse by 40%.
- Related Issues;
  - Suicide, unemployment, preexisting conditions, high mortality in auto crashes

## Five Myths: Military Suicide

1. Suicides have increased because we have overstretched our troops.
2. Suicides should decline with the end of the Iraq and Afghanistan wars.
3. Suicides have increased because the military lowered its recruitment standards and forced soldiers to remain on active duty.
4. The weakest troops are most at risk.
5. This is a problem unique to the military.

The Invisible Front: Loss and Loss in an Era of Endless War... <http://www.amazon.com/The-Invisible-Front-Loss-Endless/dp/0385347639> (accessed March 15, 2015). [http://www.washingtonpost.com/opinions/five-myths-about-suicide-in-the-military/2014/11/07/61ce60aa-6376-11e4-830c-83bc4f26e67\\_story.html](http://www.washingtonpost.com/opinions/five-myths-about-suicide-in-the-military/2014/11/07/61ce60aa-6376-11e4-830c-83bc4f26e67_story.html)

## Long Term Care: Iraq & Afghanistan



Gelling J, Rosen JM, Edwards RD. Medical costs of war in 2030: long-term care challenges for veterans of Iraq and Afghanistan. *Mil Med*. 2012; Nov;177(11):1235-44. Review.

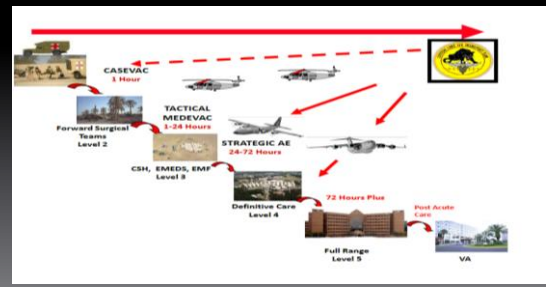
## Signature Wounds

- Traumatic Brain Injury
- PTSD, Moral Injuries
- Mental Health Issues,
- Musculoskeletal
- Blast Injuries [IEDs]
  - Extremity Amputations
  - Complex Perineal Injuries
  - Pulmonary
  - Abdominal

## Evacuation Chain



## From Injury to Definitive Care



Bailey J, Spitt M, A, Costanzo G, P, Dunne J, R, Dorac W, & Eastridge B. Joint Trauma System Development, Conceptual Framework, and Optimal Elements. U.S. Department of Defense, U.S. Army Institute for Surgical Research, 2012.

# THE GOLDEN HOUR



Schrager, J. J., Branson, R. D., & Johannigman, J. A. (2012). Lessons from the tip of the spear: medical advancements from Iraq and Afghanistan. *Respiratory care*, 57(8), 1305-1313. 13

# Groin Injuries



<http://www.dodlive.mil/index.php/2011/08/war-story-warfighter-reveals-groin-armor-arrives-on-front-line-US-Army-Soldier-Groin-Protection> 14

# Mine-Resistant, Ambush-Protected (MRAP)



Curtis, A. B. (2014). *Running the Pentagon Right: How to Get the Troops What They Need*. *Foreign Aff.*, 34, 201. 15



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# CFI BAMC: San Antonio



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# Naval Medical Center San Diego's Comprehensive Combat and Complex Casualty Care (C5) facility



SAN DIEGO (Nov. 12, 2010) Marine Sgt. Julian Torres. (U.S. Navy photo by Michael T. Wiener/Released) 18

## Advances in Military Wound Care

- U.S. Department of Defense's Committee on Tactical Combat Casualty Care (CoTCCC) updated its guideline recommendations to include Hem Con's ChitoGauze hemostatic chitosan-coated gauze product (2014).
- Pocket-sized imaging devices like the ultrasound technology initially developed for military deployment and are being used in emergency rooms
- Resusix, a spray dried pooled plasma replaces lost blood on the battlefield.
  - stored in two pouches, one containing powder and the other reconstitution fluid. When the seal is broken the two mix together and can then be delivered to the wound.

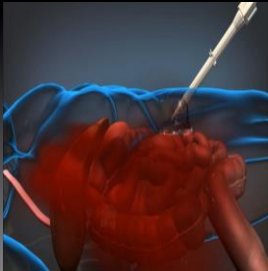
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## Advances in Military Wound Care

- Versajet (TM) "hydro-surgery" Debridement
- Silver Containing wound plasters
- Topical Negative Pressure
- Extra cellular Matrix (collagen, Elastin and Fibrinogen) a regrowth lattice
- Procellera® Antimicrobial wound dressing microcurrent technology
- Enluxtra HumiflberT " Wound Dressings are intended as an effective barrier to reduce microbial penetration through the dressing.

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## The Defense Advanced Research Projects Agency



The foam-based product developed by Arsenal Medical for DARPA can be injected into a wounded servicemember on the battlefield to slow blood loss until the patient can be transported to an appropriate medical facility. DARPA recently awarded a \$15.5 million Phase II contract to Arsenal Medical to continue development of the treatment system and support regulatory submission. DARPA anticipates continuing the Wound Stasis program through at least FDA approval of a prototype device.

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## Endo Prosthesis, Robotics, Exoskeletons & Orthotics

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## Intrepid Dynamic Exoskeletal Orthosis IDEO



Haight, D. J., Esposito, E. R., & Wilken, J. M. (2015). Biomechanics of Upright Walking Using Custom Ankle-foot Orthoses of Three Different Stiffnesses. *Gait & Posture*.

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## Master Sergeant Leroy Petry, Medal of Honor Jul 12, 2011



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**FROM IDEA TO MARKET IN EIGHT YEARS, DARPA-FUNDED DEKA ARM SYSTEM EARNS FDA APPROVAL**  
 May 09, 2014

**Army Sgt. Jerrod Fields**

An Army World Class Athlete Program sprinter and Paralympic hopeful, works out at the U.S. Olympic Training Center in Chula Vista, Calif. A below-the-knee amputee, Fields won a gold medal in the 100 meters with a time of 12.15 seconds at the Endeavor Games in Edmond, Okla., on June 13, 2009.

Messinger, S. D. (2013). Sports, Disability, and the Reframing of the Post-injury Soldier. In *Reframing Disability and Quality of Life* (pp. 163-178). Springer Netherlands.

**Endo Prosthesis**

<http://www.jsrf.org/images/Osteointegration%20figures%201-11%20small%20Amputation/figures.jpg>

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**Hand/Arm Transplant Surgery for Wounded Warrior:**  
 Dr. W. P. Andrew Lee, Johns Hopkins University

Arm Transplant

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**SGT. Brendan Marracco & W.P. Andrew Lee, M.D.,**  
 Chairman of the Department of Plastic Surgery and Reconstructive Surgery, Johns Hopkins Medicine

"Let us strive on to finish the work we are in; to bind up the nation's wounds; to care for him who shall have borne the battle and for his widow and his orphan; to do all which may achieve and cherish a just and lasting peace among ourselves, and with all nations."

Abraham Lincoln  
 16th U.S. President

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