The “why”...
...the “Why Not”
...and always keeping the “End State” in mind

Why we are really here today!
DISCLAIMER

• The opinions expressed are those of myself and do not represent the views of USU or the DoD

• I am not a trauma surgeon nor a critical care specialist nor a first responder…

• But…I was the on-scene medical director for the Khobar Towers Saudi Arabia Bombing…US Central Command senior medical advisor…Air Mobility Command senior medical advisor…Chairman of the Joint Chiefs of Staff senior medical advisor…Director Defense Health Agency

• But, most important…I listened to the trauma mafia*  
*Trauma Mafia: an endearing term referring to pre-hospital/enroute care/hospital professionals
Learning Objectives

• Understand the Military Health System’s Full Spectrum of Heath Care Support to the Warfighter
• Know the resourcing requirements to support
• Describe the Military Heath Systems leadership transformation required to transform “silos” of excellence to a “continuum” of excellence
• Examine “Lessons Learning”: Challenges facing our Wounded Warriors
“Agenda

• “Continuum of Care”

  • Enroute Patient Care from: Force Health Protection to Combat Casualty Care to Forward Resuscitative Care to Theater Hospital Care to Definitive Care

  • Integrated “Joint/Coalition” System of Systems

  • Concept to maintain equal or greater level/quality of care at each level of movement

  • Destination: World Class NATO/Military/VA/Civilian Healthcare System

• Lessons “Learning”
Mission of the Military Health System
(operative word is “system”)

To provide Combatant Commands & Service Components with:

A Medically Ready Force
(lean mean fighting machine)

&

A Ready Medical Force
(lean mean saving lives machine)
BLUF: Medical Support to the Combatant Commands

“Our Referral Network!”
Full Spectrum Healthcare

- Force Health Protection
- Tactical Combat Causality Care (TCCC)
- CASEVAC/MEDEVAC
- Forward Surgical Care
- MEDEVAC
- Expeditionary Theater Hospital Care
- Aeromedical Evacuation (AE)
- Critical Care Air Transport Teams (CCATT)
- “Joint Theater Support Teams”
  - Joint Theater Trauma System
  - Joint Theater Medical Information Program/Electronic Health Record
  - Telemedicine/Teleradiology
  - Joint Logistics
  - Joint Blood Program
- Destination: World Class Military/Coalition/VA/Civilian Healthcare System
Translates To...

• Lowest Disease Non-Battle Injury (DNBI) rates in recent recorded conflict

• Lowest Lethality Rates in recorded conflict
  • WWII 30%
  • Vietnam/Gulf War 24%
  • OEF/OIF <10%
AIR & SEA DISTANCES

AIR
7,000 MI
24 HOURS

SEA
8,600 MI
20+ DAYS

SEA
12,000 MI
26+ DAYS
Continuous En-route Care

Historical Route From Injury to Definitive Care

- **CASUALTY EVAC**
  - Evac Policy - 1 Day
  - Battalion Aid Station “Level 1”

- **TACTICAL EVAC**
  - Evac Policy - 7 Days
  - Field Hospital “Level 2”

- **STRATEGIC EVAC**
  - Evac Policy - 15 Days
  - In Theater Hospital “Level 3”

Definitive Care “Level 4”

Evacuation Policies:
- **TACTICAL EVAC**
  - 1 Day
- **STRATEGIC EVAC**
  - 15 Days
  - 15 Days

- **Evacuation Route**
  - Continuous En-route Care
Continuous En-route Care: Stable...Stabilized...Stabilizing

- **CASEVAC/MEDEVAC**: 1 Hour
- **TACTICAL MEDEVAC/AE**: 1-24 Hours
- **TACTICAL/STRATEGIC AE**: 24-72 Hours

**Key Locations**:
- **US Medical Center**
- **Overseas Medical Center ASF**
- **Theater Hospital CASF**
- **Theater Hospital Care**
- **Definitive Care**
- **First Responder Care**
- **Battalion Aid Station**
- **Forward Resuscitative Care**

**Care Levels**:
- **Continuous En-route Care**: Stabilizing...Stabilized...Stable...
Force Health Protection
Begins BEFORE You Step to the Jet!

- Deployment Medical Guidance
- Pre/Post Deployment Health Assessments
- Immunizations
- Chemoprophylaxis
- Occupational Environmental Health Surveillance
$T+ 00:00$

- HMMV is struck & disabled
First Responder Care: Tactical Combat Causality Care

“Correct Intervention At The Correct Time In The Continuum Of Combat Care!”

- Care Under Fire
  - Combat Application Tourniquet (CAT)
  - Hemostatic Dressing

- Tactical Field Care
  - Hypothermia Prevention
  - Combat Pill Pack: Antibiotics/ Pain Control

- Combat Casualty Evac Care
- Rapid Casualty Assessment (ABCs)
- Control Hemorrhage (CABs)
- Treat penetrating chest trauma
- Maintain airway/package for transport
MEDEVAC & Tactical Operations Center
$T+ 00:25$

- Taken to LV II Forward Surgical Care

- Arrival B/P 80 systolic

- Undergoes exploratory laparotomy:
  - Left Nephrectomy
  - Splenectomy
  - Packing of abdomen
  - 8 units PRBC’s
  - B/P 90’s systolic
Level II: Forward Surgical/Resuscitative Care

Forward Surgical Teams  Shock Trauma Platoons
$T+ 03:00$

- Arrives LV III Theater Hospital
  - Cold
  - Coagulopathic
  - Acidotic
  - Taken straight to OR
Level II/III: Theater Expeditionary Hospitals
Injury Cause Trends: Percentage of Total by Cause

- EXPLOSIVE DEVICE: 51.1%
- GSW: 25.0%
- MVC: 8.7%
- OTHER: 15.1%
THE “POWER” OF COALITION MEDICAL!
T+ 03:00 to T + 06:00

- Re-explored
- Packed, surgical control gained
- Urgent blood drive for AB+ blood
- Patient warmed to 38 degrees
T+ 06:00

- Transported to ICU
- CT scan of spine
- Ongoing DCR/DCS
- “Urgent” evacuation request placed
T+ 10:00

- C-17 arrives from Germany
- Cargo unloaded

- CCATT team alerted
- Patient prepared for transport
Aeromedical Evacuation

Cargo In…

…Patients Out!
En Route Patient Staging System (ERPSS)

- ERPSS-10 bed
  - Mobile 24hr staging at tactical airheads
  - Rapid response staging

- ERPSS – 50/100 bed
  - 24hr staging at strategic airheads
  - Support to Theater Hospital
  - Transport to AE aircraft
Tactical Aeromedical Evacuation (AE): Intra-theater

Hub & Spoke
• C-130/NATO
• Opportune A/C
Strategic AE: Inter-theater

GE

GE

UK/GE
Global Patient Movement

- CENTCOM
- EUCOM
- NORTHCOM
- SOUTHCOM
- PACOM

Patient Movement Requests

- 720
- 843
- 877
- 804
- 884
- 896
- 878
- 946
- 865
- 881
- 865
- 802
- 977

Patient Movement Requests Distribution:

- CENTCOM: 720
- EUCOM: 843
- NORTHCOM: 877
- SOUTHCOM: 804
- PACOM: 884
- Total: 4,455
Aeromedical Evacuation: Lifeline Home

Continuing or increasing levels of care... from point of injury to resuscitation to definitive care!
Critical Care Air Transport (CCAT)

“FLYING ICUs”
$T+ 10:00$

- CCATT arrives at ICU
- CCATT moves patient to AMBUS to flight line
- Patient loaded for flight
‘Stabilized…stabilizing’ AE Pt Transportation

- Secured airway
- Shock treated/Hemorrhage controlled
- Fractures Immobilized/splinted
- Damage control surgery
- Initial control of contamination
- Damage Control Resuscitation: prevent “lethal triad” acidosis, coagulopathy and hypothermia
- Subsequent re-exploration & definitive repair
T+ 12:00

- Patient loaded for flight
- 7 hour mission to Germany
- AMBUS transfer to Landstuhl Regional Medical Center, Germany
T+ 24:00

- Taken to OR
- Re-explored/wash outs
$T + 36:00$

• Patient transferred to WRNMMC with CCATT
$T + 4,500:00$ hrs

Joint Trauma System...got him there!
What have we learned...learning
PTSD, mTBI, “other” MH Diagnosis

Yesterday’s Understanding

PTSD: Post Traumatic Stress Disorder
mTBI: Mild Traumatic Brain Injury
MH: Mental Health
PTSD, mTBI, “other” MH Diagnosis
Today’s Understanding

Chronic Pain/Substance Abuse/Other MH dx

PTSD

mTBI

PTSD: Post Traumatic Stress Disorder
mTBI: Mild Traumatic Brain Injury
MH: Mental Health
Prevalence of Chronic Pain, PTSD & TBI in a sample of 340 polytrauma OEF/OIF veterans

- **Chronic Pain**: 81.5%
- **PTSD**: 68.2%
- **TBI**: 66.8%

The numbers inside the diagram represent the intersection percentages:
- 42.1%
- 12.6%
- 5.3%
- 6.8%

Partnerships: DoD, VA, NIH, academic centers, public/private organizations, NCAA, NFL
Value of Joint Trauma System: Transformation of Combat Casualty Care

Wartime US Lethality Rate (%)

Joint Trauma System
"continuum of excellence"

Individual Services
"silos of excellence"

Body Armor/Tactical Combat Casualty Care/
Damage Control Surgery & Resuscitation/CCATT
Continuum of Care: “Silos” of Excellence

Stable patients...

Pre-Hospital

Battalion Aid Station “Level 1”

Enroute Care: MEDEVAC & AE

CASUALTY EVAC - Evac Policy - 1 Day

TACTICAL EVAC - Evac Policy - 7 Days

In Theater Hospital “Level 3”

Field Hospital “Level 2”

Definitive Care “Level 4”

STRATEGIC EVAC - Evac Policy - 15 Days

Hospital: Damage Control Surgery
JTS Continuum of Care: “Continuum” of Excellence

Stable…Stabilized…Stabilizing Patients

CASEVAC/MEDEVAC
1 day = 1 Hour

TACTICAL MEDEVAC/AE
7 days = 1-24 Hours

TACTICAL/STRATEGIC AE
15 days = 24-72 Hours

CSH/EMEDS/EMF ERPSS

Theater Hospital ERPSS

Battalion Aid Station

Forward Resuscitative Care

First Responder Care

Theater Hospital Care

Definitive Care

Overseas Medical Center ERPSS

US Medical Center

Continuous Damage Control Resuscitation
Joint Trauma System

Army & AF trauma community

Navy trauma community

Civilian trauma community
Continuum of Care...Continuum of Excellence
JTTS/JTS World-Wide Grand Rounds: 08:00 EST Thursday
Building a Unified Civilian-Military Trauma System

“Silos” of Excellence vs “Continuum” of Excellence
Air Force & civilian surgeons worked hand-in-hand through the night to treat patients’ visible wounds in the operating rooms… while also addressing invisible wounds at the bedside.
Continued Advances in Tactical Combat Casualty Care/Damage Control Surgery & Resuscitation/Enroute Care requires a Continuous Learning Organizational Approach

Evolution of Knowledge Skill Currency Across Conflicts
### Major Limb Amputations

<table>
<thead>
<tr>
<th>Total number of OIF/OEF amputees</th>
<th>over 1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transtibial</td>
<td>27%</td>
</tr>
<tr>
<td>Transfemoral</td>
<td>29%</td>
</tr>
<tr>
<td>Upper Extremity Loss</td>
<td>18%</td>
</tr>
<tr>
<td>Multiple Limb Loss</td>
<td>26%</td>
</tr>
</tbody>
</table>
Polytrauma: Complex Co-morbid Challenges

• Brain Injury
• Spinal Cord Injury
• Limb Trauma/Amputation
• Facial Trauma
• Peripheral Nerve Injury
• Internal Organ Damage
• Pain Management
• Burns
• Infection
• Sensory Loss (Vision/Hearing)
Amputee Care: Innovations

• Early, Comprehensive Rehabilitation
  • Military Advanced Rehabilitation Centers (ARCs)
    • Walter Reed National Military Medical Center in Bethesda, MD/Center for the Intrepid (CFI) in San Antonio, TX/Comprehensive Combat & Complex Casualty Care San Diego, CA
  • Veterans Administration PolyTrauma Rehabilitation Centers (PRCs)
    • Richmond/Tampa/Minneapolis/Palo Alto/San Antonio

• Specialized interdisciplinary teams composed of:
  • rehabilitation physicians, therapists, surgical and medical/nursing specialists, prosthetists, orthotists, nurses, social workers, pain and behavioral/mental health specialists, nutrition, speech/language pathology, rehabilitation engineering, assistive technology, peer support, vocational rehabilitation, recreation therapy, case management, and social work.

• Advanced Technology
  • Microprocessor Variable Dampening Prosthetic Knees
  • Powered prosthetics
  • Enhanced prosthetic sockets
  • Robotic hands/arms
  • Advanced human machine interfaces
  • Near future: direct skeletal attachment/osseointegration

• Technological advances are only one component of a comprehensive and holistic approach to caring for service members with limb loss
• Early interdisciplinary rehabilitation coordination and involvement in military ARC’s and VA Polytrauma Centers is critical to success!
• Create Centers of Excellence

• Incorporate Rehabilitation Principles

• Limit Convalescent Leave

• Introduce Recreational/ Motivational Activities

• *Provide Holistic Care*

• Education/Training/Research
TABLE OF CONTENTS

4.2 Build a Full Spectrum of Best Practices for the Continuum of Acute and Chronic Pain, Based on a Foundation of Best Available Evidence
4.2.1 Complementary and Integrative Pain Treatment Medicine
4.2.2 Orthopedic Manipulation
4.2.3 Primary Care Pain Management
4.2.4 Stepwise Care Model
4.2.5 Multidisciplinary Action Plan
4.3 Focus on the Warrior and Family - Sustaining the Force
4.3.1 Warrior and Family Care
4.3.2 Simulated Pain and Pharmacy Resources
4.3.3 WTC Pain Survey Collaboration
4.4 Synchronize a Culture of Pain Awareness, Education, and Proactive Intervention
4.4.1 A Unified Approach to Content, Education, and Training
4.4.2 Integration of Pain Management Recommendations
4.4.3 Pain Education Campaign Plan
4.4.4 Substance Pain Management Capabilities
4.4.5 Interdisciplinary Pain Management Departments
4.4.6 Initially in the Military Leadership
4.4.7 Central Pain Management Advisory Board for DoD and VHA

V. THE WAY AHEAD

APPENDICES
Appendix A: Task Force Recommendations
Appendix B: Supplement to Findings and Recommendations
Appendix C: Task Force Charter
Appendix D: Task Force Stakeholders
Appendix E: MTF Pain Data Cell
Appendix F: Sites Visited by Task Force
Appendix G: Subject Matter Expert Briefings
Appendix H: Acronyms
Appendix I: References
4.2.2 Osteopathic Manipulation

Objective: Leverage embedded osteopathic and physical therapy resources in the provision of manipulation therapies for musculoskeletal pain.

Manual medicine or manipulation is well accepted by patients, has proven successful for treating many musculoskeletal pain syndromes, and is well suited for integration into the primary care and psychiatry workflows. The goal of manual medicine is to restore the entire body to a state of homeostasis. Manual medicine employs palpation using the providers’ hands to detect sources of pain and dysfunction within the skin, fascia, muscles, ligaments, and tendons. Once these areas of dysfunction are identified, manual medicine should be used to decrease muscle spasms, neural facilitation, improve local circulation of blood and lymph, improve range of motion, and decrease pain.

Recommendation 4.2.2.1
Support osteopathic manipulation in staff clinics.

Recommendation 4.2.2.2
Survey Active Duty Osteopathic Physicians and manually trained Physical Therapists to understand the uses, practices, and barriers of manual medicine.

Recommendation 4.2.2.3
Implement and support Osteopathic Manipulation Graduate Medical Education during primary care and psychiatry residency programs to utilize and continue developing current Army resources.

Recommendation 4.2.2.4
Implement and encourage the use of osteopathic manipulation (or manual medicine) in theater.

Recommendation 4.2.2.5
Incorporate osteopathic manipulation therapy referrals into case management in WTUs.

Recommendation 4.2.2.6
Improve metrics, such as RVUs, which are used to measure the success of providers in treating patients but do not actually measure patient improvement.
“Great Ideas” as a Function of Time

**World War I**
- IV fluids
- Blood transfusions
- Motorized ambulances
- Topical antisepsis

**World War II**
- Whole blood/plasma available
- Specialty-specific surgical groups
- Antibiotics
- Fixed wing aeromedical evacuation

**Korean Conflict**
- Improved fluid resuscitation
- Forward availability of definitive surgery
- Helicopters for patient evac/transport
- Primary repair/grafts for vascular injury

**Vietnam**
- Improved use of helicopters
- Improved laboratory support
- Portable radiology equipment
- Mechanical ventilators in theater

**Desert Shield/Storm**
- Burn team augmentation of evacuation hospitals to provide theater-wide burn care
- Intercontinental aeromedical transport of burn patients

**GWOT/OCO**
- Military trauma system (JTTS/JTTR)
- Improved tourniquets
- Hemostatic agents
- Common use of external fixators
- “Damage control” resuscitation
- “Damage control” surgery
SUMMARY: CONTINUUM OF CARE
INTEGRATED “JOINT/COALITION/CIVILIAN” SYSTEMS OF SYSTEMS
There’s No Coming Home….
...without all of you!
Back-Up
“TEAM MEDICS”

VA

DoD

COMMUNITY