Trauma and Stress Disorders in the US Military

Learning more about PTSD, Suicide and TBI

Robert J. Ursano, M.D.
Professor of Psychiatry and Neuroscience
Director
Center for the Study of Traumatic Stress
Dept of Psychiatry
Uniformed Services University

Session title: Trauma, Suicide and Resilience: Lessons from War for Civilian
Disclaimer Statement

The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense.
Sharing Knowledge and Reminders

• War and disaster share complex mental outcomes
• Amount of trauma matters
• Who When Where
• Suicide attempts are a better target for intervention
• Suicide ideation/attempts/suicide are all different
• TBI is more common than we knew
• Treat trajectories and illness not only disease
• Predicting risk can allow us to target interventions: precision medicine/treatment/intervention (not “personalized medicine”...yet
Trauma and Disasters

Human Made
- Industrial Accident
- War
- Terrorism

Natural
- Hurricane
- Epidemic
Mental Health Responses to Trauma, Disasters and Public Health Emergencies: Resilience is most common

- PTSD
- Depression
- Complex Grief

- Sense of vulnerability
- Change in Sleep
- Irritability, distraction
- Belief in Exposure
- MUPS/MIPS
- Isolation

Distress Responses

Psychiatric Illness

Health Risk Behaviors

- Smoking
- Alcohol
- Over dedication
PTSD

• IOM estimates 100,000 to 500,000 servicemembers with PTSD related to serving in Iraq/Afghanistan (4-20%) (2013 IOM)

• 2.6 million served 2001-2014 were deployed to Afghanistan in support of Operation Enduring Freedom (OEF) and to Iraq in support of Operation Iraqi Freedom (OIF) and Operation New Dawn (Institute of Medicine, 2014)

• estimated that 5% of active duty servicemembers are receiving treatment for PTSD (2012 IOM)
Figure 2. Statistical parametric maps of 3 different subtractions in the posttraumatic stress disorder (PTSD) group (n=7 in A and B; n=6 in C). The displayed images are transverse slices parallel to the anterior commissure–posterior commissure plane; the distance from the AC-PC plane is displayed (in millimeters) below each slice. The top and bottom of each slice corresponds to anterior and posterior brain regions, respectively. Left and right are reversed, as displayed. The z score associated with the focus of activation in each subtraction is displayed at the top of each Sokoloff color scale. The images show foci of activation with z scores above 3.0 in anterior cingulate gyrus (A), Broca’s area (B) (decreased rCBF), and amygdala (C) in the PTSD group. In the control group, corresponding subtractions revealed no foci of activation with z scores above 3.0 in these regions.
Back Story | **HOW MANY GENES IN A CHICKEN?**

Though simple organisms generally have relatively small genomes, gene number is not necessarily correlated to complexity. Here are a few different organisms, along with their current estimated gene counts.

- Influenza: 11 genes
- E. coli: 4,149 genes
- Fruit fly: 14,889 genes
- Chicken: 16,736 genes
- Human: 22,333 genes
- Grape: 30,434 genes
Figure 3. Traumatic stress responses over time. Line 1 represents acute stress symptoms that resolve with time; 2 depicts ASD that also resolves; 3 is ASD that progresses to PTSD; and 4 shows delayed onset PTSD.
# Treatment: Across The Domains of Illness

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<tr>
<th>Disorder</th>
<th>PTSD</th>
<th>MI</th>
<th>Mult.Scler</th>
<th>Back Pain</th>
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<td>Self Repair</td>
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<td>Symptoms</td>
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<td>Depression</td>
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<td>Conditions</td>
<td>Subst Abuse</td>
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<td>Trajectory- Prev of Relapse/Chro</td>
<td>Acute, Chronic, Delayed</td>
<td>Life Style</td>
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<td>Recoverying</td>
<td>Recoverying</td>
<td>Changes</td>
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What is PTSD?

1) The inability to “digest” early stress symptoms, e.g. impaired “repair” or “return to stasis”

2) Altered “set point”

3) The “glue” that makes the symptoms “stay” or “cluster together”
Walking beside Zambesi,
Congo felt very happy.
“I have a super memory,”
he said to himself.
“And I will always remember
what to forget.”

McNulty, F The Elephant who couldn’t forget., Harper and Row
“Other trauma disorder...”
Suicidal Thoughts and Behavior in the Past Year among Adults Aged 18 or Older: 2008

8.3 Million Adults Had Serious Thoughts of Committing Suicide

2.3 Million Made Suicide Plans

1.1 Million Attempted Suicide

0.9 Million Made Plans and Attempted Suicide

0.2 Million Made No Plans and Attempted Suicide

(SAMHSA, 2008)
Suicide Ideation

WHO Study: 108,664 respondents from 21 countries

A wide range of mental disorders increased the odds of experiencing suicide ideation.

But among those with ideation, who will attempt?!
ARMY
STARRS
Army Study to Assess Risk and Resilience in Servicemembers
U.S. Army Suicide Deaths (HADS 2004-2009)

Regular Army suicide deaths per 100,000 person-years of Active duty Army service (12-month moving average)

Schoenbaum et al. (2014). *JAMA Psychiatry*
And for the Army as a whole.... (new soldiers)

- 13.9% (14.1%) lifetime suicidal ideation
- 5.3% (2.3%) lifetime suicide plans
- 2.4% (1.9%) lifetime suicide attempts

- More than half of the transitions from ideation to attempt occurred within a year

Nock et al. (2014). *JAMA Psychiatry*
Suicide Rates
(Enlisted Regular Army, 2004-2009)

CRUDE RATES OF SUICIDE BY DEPLOYMENT HISTORY AMONG ENLISTED, REGULAR ARMY SOLDIERS IN THE ARMY STARRS 2004–2009 HADS

CRUDE RATES OF SUICIDE ATTEMPT BY DEPLOYMENT HISTORY AMONG ENLISTED, REGULAR ARMY SOLDIERS IN THE ARMY STARRS 2004–2009 HISTORICAL ADMINISTRATIVE DATA (HADS)

Gilman, et al. Psychological Medicine, 2014
WHEN: ... Suicide Attempt Risk by Time in Service (HADS 2004-2009)

Ursano et al. (2015). JAMA Psychiatry
Overall: Combat Arms & Combat Medics had higher odds of S.A. (1.2, 1.4), & Special Forces had lower odds (0.3), than other MOSs. MOS associated with S.A. in first 10 years of service, but not beyond.

First year of service: Combat Medics had higher odds of S.A. than Combat Arms & other occupations.

Deployment: Combat Arms & Combat Medics had higher odds of S.A. than other occupations among those never deployed and those previously deployed. Combat Medics also had higher odds of S.A. among deployed.

Military occupation can inform the understanding of S.A. risk.

Ursano, et al. (2017) BMC Psychiatry
.....And...
ANNUAL NUMBER OF TBIs

Estimated Average Annual Number of Traumatic Brain Injury-Related Emergency Department Visits, Hospitalizations, and Deaths, United States, 2002–2006

52,000 Deaths
275,000 Hospitalizations
1,365,000 Emergency Department Visits
???, Receiving Other Medical Care or No Care*

An estimated 1.7 million TBIs occur in the United States annually.

Of the 1.7 million TBIs occurring each year in the United States, 80.7% were emergency department visits, 16.3% were hospitalizations, and 3.0% were deaths.

* Data for this category are not included in this report. See "Limitations" in Appendix B for more information.

Relationship of Brain Regions Implicated in PTSD to Regions Vulnerable to TBI

Stein MB & McAllister TW. *Am J Psychiatry* 2009; 166:768-776
U.S. Army: Age at First TBI (AAS Q2-4 2011)

Stein (2012) presented at ACNP Annual Meeting
### Table 3: Multivariate model predicting suicidality¹

<table>
<thead>
<tr>
<th>Antecedent TBI¹</th>
<th>Lifetime Suicide Ideation OR [95% CI]</th>
<th>Lifetime Suicide Plan OR [95% CI]</th>
<th>Lifetime Suicide Attempt OR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antecedent TBI² (full model)</td>
<td>1.4 [1.2-1.6]</td>
<td>1.6 [1.1-2.1]</td>
<td>1.3 [0.9-1.8]</td>
</tr>
</tbody>
</table>

¹Multivariate model predicting suicidality outcomes with TBI (0,1,2) controlling for all demographics and interaction between "not entered army yet" and "birth place"; controlling for years since ideation for outcomes among ideators

²As above and controlling for mental disorders
Hay Stacks...
Concentration of Risk

Risk Models Can Help Lower Army Suicide Rate
Example: Non-Deployed Regular Army Soldiers with Psychiatric Diagnosis (Dx) and/or Psychotropic Prescription (Rx) in the Previous 3 Months, (2004-2009)

- With Dx and/or Rx
  - 17% of non-deployed Soldiers
  - Top 10%
    - Apply suicide risk prediction model

- Bottom 90% of predicted risk in non-deployed Soldiers with Dx/Rx
  - ~6,300 Soldiers
  - 100 suicides
  - 265 / 100,000 person-years

- All Non-Deployed with Dx/Rx:
  - ~63,000 Soldiers
  - 215 suicides
  - 57 / 100,000 person-years

- Without Dx/Rx
  - 83% of non-deployed Soldiers

- All Non-Deployed Soldiers:
  - ~363,000 Soldiers at any point in time
  - 411 suicides
  - 19 / 100,000 person-years

- Top 10% of Predicted Risk:
  - ~3,150 Soldiers
  - 68 suicides
  - 355 / 100,000 person-years

- Top 5% of Predicted Risk:
  - An intervention that lowers rate in high-risk subgroup to 57 / 100,000 person-years

- Would prevent ~13 suicides / year. Reduces suicide rate in ALL non-deployed Soldiers from 19 to 15 / 100,000 person-years
- Would prevent ~9 suicides / year. Reduces suicide rate in ALL non-deployed Soldiers from 19 to 16 / 100,000 person-years
Sharing Knowledge and Reminders

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Session

Trauma, Suicide and Resilience:
Lessons from War for Civilian Care
New U.S. Army Soldiers (NSS 2011-2012, N=38237)

- At enlistment prevalence estimates:
  - 14.1% reported lifetime suicidal ideation
  - 2.3% reported lifetime suicide plans
  - 1.9% reported lifetime suicide attempts

Ursano et al. (2015). *Depression and Anxiety*
Risk of Suicide Attempt (SA) among Soldiers in Army Units with a History of Suicide Attempts (HADS 2004-2009)

- SA risk increased if 1 S.A. in unit in past yr
- Odds increased with # of SAs in unit (OR=1.4 with 1 SA; OR=2.3 with 5+ SAs)
- Association true in combat arms & other MOS
- Highest risk in small units (1-40 Soldiers)
- If risk reduced to 0 SAs in unit in past yr, number of SAs would decrease 18.2%

Conclusion:
- Units with a history of SAs are important targets for preventive interventions

Study included all SAs in enlisted Regular Army Soldiers 2004-2009 (n=9,650) and an equal-probability sample of control person-months (n=153,528)

Ursano, et al. (2017) JAMA Psychiatry
Those with no previous psychiatric illness are at risk

Oklahoma City near Murrah B1g (DIS study)

USAF POWs returning from Vietnam

Twin studies of Vietnam Combat Veterans