VISN 19 MIRECC Suicide Prevention Research Programs

Suicide and Traumatic Brain Injury

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“I think it took awhile before I realized and then when I started thinking about things and realizing that I was going to be like this for the rest of my life, it gives me a really down feeling and it makes me think like—why should I be around like this for the rest of my life?”

- VA Patient/TBI Survivor

Brenner et al . 2010

TBI and Suicide - Background

TBI and Suicidal Ideation: Post Acute

23% of sample endorsed clinically significant suicidal ideation

Simpson & Tate 2002

Community sample re: recent suicidal thoughts – 3.5%

Kienhorst et al. 1990

TBI and Suicide Attempts

- In a community sample, those with TBI reported higher frequency of suicide attempts than those without TBI

  (8.1% vs. 1.9%)

  – Even after adjusting for sociodemographic factors, quality of life variables, and presence of co-existing psychiatric disorder

Silver et al . 2001

Clinical Features of Suicide Attempts After Traumatic Brain Injury

- 45 clients (n=172) had a lifetime of 80 suicide attempts
- 70% of the attempts occurred post-injury
- 48.3% of the clients who made a post-injury attempt went on to make at least one further attempt
  - Medical attention provided in 60.7% of attempts

Simpson & Tate 2005

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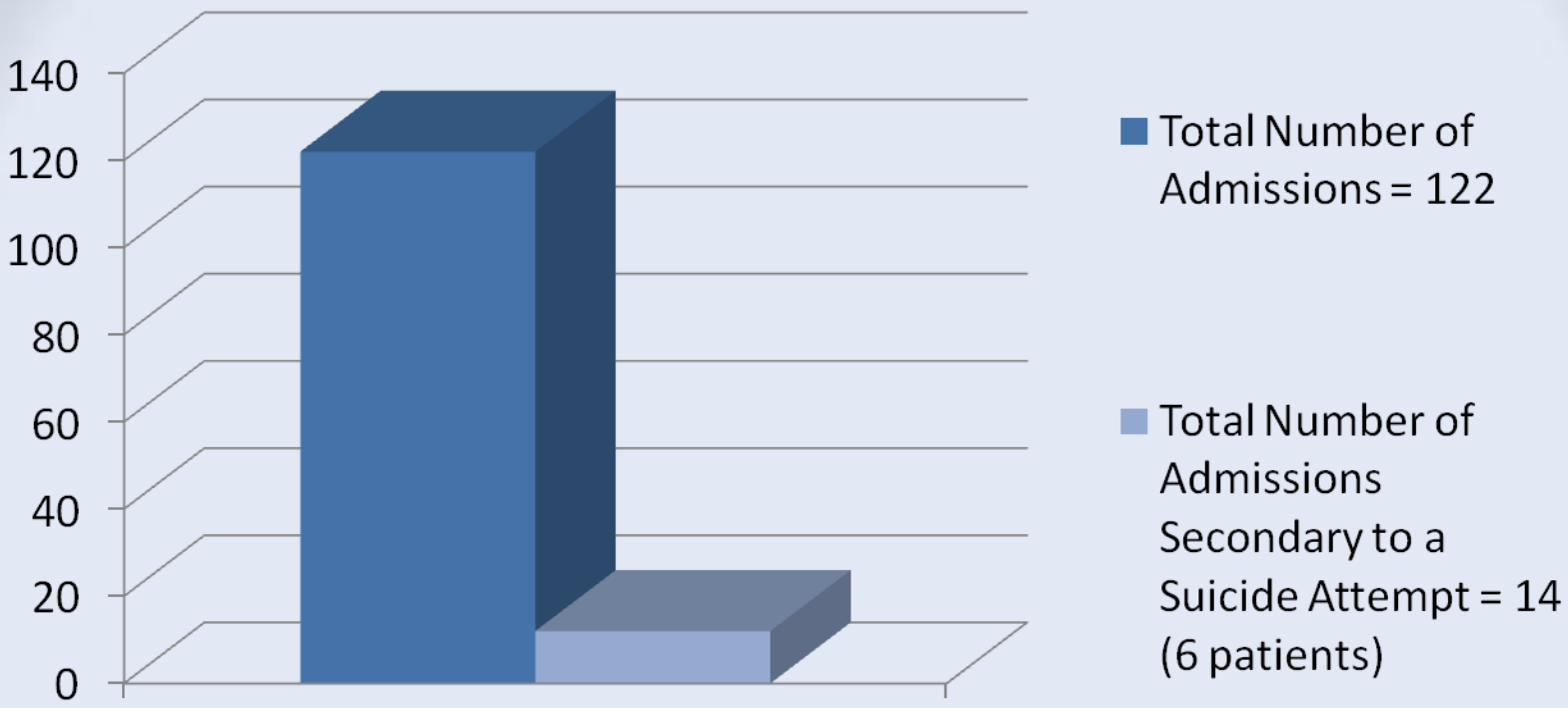
Suicidality and Psychiatric Admission – VA TBI Survivors

- 22 Subjects
- Total Number of Admissions: 114
  - Median Number of Admissions: 3
  - Range of Admissions: 1-20

Gutierrez, Brenner, Huggins 2008

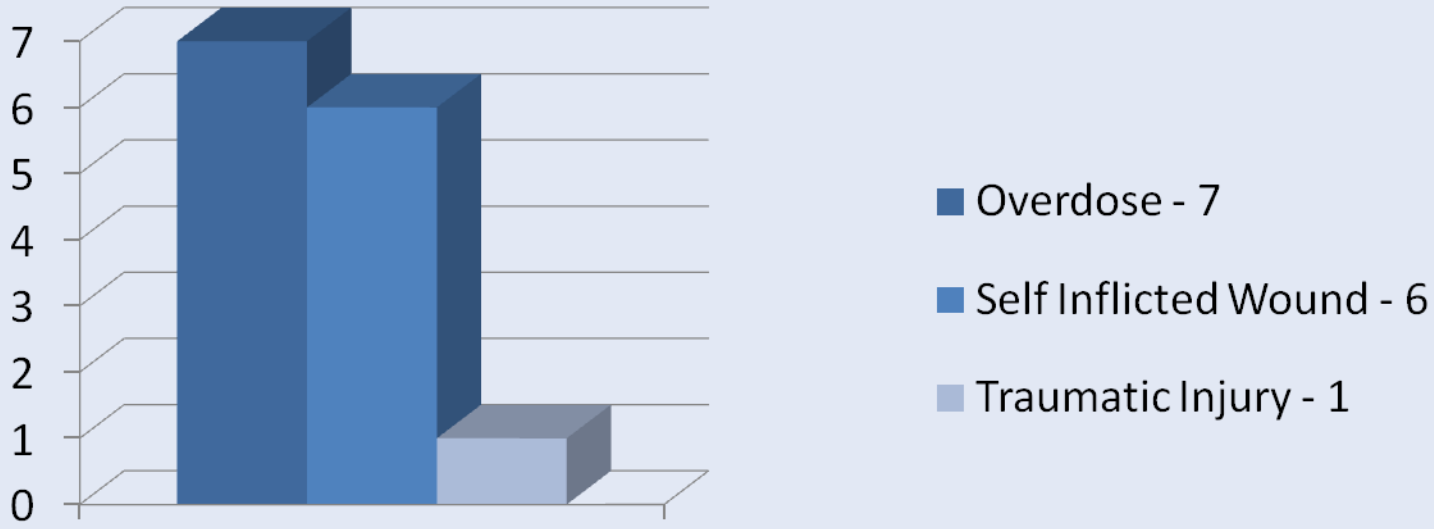
Number of Admissions Secondary to a Suicide Attempt



11% of total admissions
Number of attempts 1-5
Median - 2

Gutierrez, Brenner, Huggins 2008

Attempt Method



Gutierrez, Brenner, Huggins 2008

TBI and Death By Suicide

- Teasdale and Engberg (2001) looked at hospital admissions
  - Individuals with concussions (n=126,114)
  - Individuals with cranial fracture (n=7,560)
  - Individuals with cerebral contusion or intracranial hemorrhage (n=11,766)

"Standardized mortality rates, stratified by sex and age, showed that the incidence of suicide among the three groups was increased relative to the general population (3.0, 2.7, 4.1 respectively)."

TBI and Death By Suicide: Veterans

To date, few studies have examined this issue among United States military veterans

Traumatic Brain Injury and Suicide in Veterans Health Administration Patients

VA Office of Mental Health Services
VISN 19 Mental Illness Research Education and Clinical Center,
Serious Mental Illness Treatment Research and Evaluation Center,
Center of Excellence, Canandaigua, NY

Qualitative Analysis of Suicide Precipitating Events, Protective Factors and Prevention Strategies among Veterans with Traumatic Brain Injury

Brenner, L., Homaifar, B., Wolfman, J., Kemp, J., & Adler, L., Qualitative Analysis of Suicide Precipitating Events, Protective Factors and Prevention Strategies among Veterans with Traumatic Brain Injury, Rehabilitation Psychology.

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Emotional and Psychiatric Disturbances and Suicidality

- I got depressed about a lot of things and figured my wife could use a $400,000 tax-free life insurance plan a lot better than….I went jogging one morning, and was feeling this bad, and I said "well, it's going to be easy for me to slip and fall in front of this next truck that goes by…"

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Loss of Sense of Self and Suicidality

- Veterans spoke about a shift in their self-concepts post-injury, which was frequently associated with a sense of loss
  - "…when you have a brain trauma…it's kind of like two different people that split…it’s kind of like a split personality. You have the person that’s still walking around but then you have the other person who’s the brain trauma."

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Cognitive Impairment and Suicidality

- “I knew what I wanted to say although I'd get into a thought about half-way though and it would just dissolve into my brain. I wouldn't know where it was, what it was and five minutes later I couldn't even remember that I had a thought. And that added to a lot of frustration going on….and you know because of the condition a couple of days later you can't even remember that you were frustrated.”

- “I get to the point where I fight with my memory and other things…and it’s not worth it.”

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Suicide, Traumatic Brain Injury, and Executive Functioning

Lisa Brenner, Ph.D.

TBI and Executive Functioning

- Injuries involving the frontal lobes and related sub-cortical structures often result in executive dysfunction (McDonald et al, 2002)

- Common and interrelated sequelae associated with such organic injury include decreased decision making ability and increased impulsivity and aggression (Dyer et al, 2006; Kim, 2002; Marson et al, 2005; Salmond & Sahakian, 2005)

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PTSD and Executive Functioning

- Although some researchers have noted small to no differences in neuropsychological performance between individuals with and without PTSD (Crowell et al, 2002; Danckwerts & Leathem, 2003; Twamley, Hami & Stein, 2004)
- Others have identified impairments in sustained executive function and memory (Bremner et al, 1995; Yehuda et al, 1995; Vasterling et al, 2002; Samuelson et al, 2006)
- Consistent with such findings, when administered laboratory-based cognitive neuroscience tests, the executive deficits most commonly reported in PTSD are related to inhibitory function and memory (e.g. Bremner et al, 2004; Mackiewicz, Orcutt, & Banich, submitted; DePrince & Freyd, 2004)
- Others have reported deficits inhibition in the motor domain (Falconer et al, 2008)

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Suicide and Executive Functioning

- In populations of individuals with no neurologic history, researchers have linked executive dysfunction, as measured by performance on neuropsychological measures, to suicidal behavior (Dougherty et al 2004; Jollant et al, 2005; Mann et al, 1999)
  - Decision making (Iowa Gambling Test)
  - Laboratory measured impulsivity (Immediate and Delayed Memory Test)
  - Measures frequently used in clinical practice
    - Wisconsin Card Sorting Test

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TBI, Suicide, and Executive Functioning

- Evidence suggests that executive dysfunction, due in part to organic injury, is a risk factor for SDV in those with TBI
  - Those with a history of TBI had higher aggression and impulsivity factor scores (Mann et al , 1999)
  - Increased suicidal behavior in those with higher levels of aggression (Oquendo et al, 2004)
    - Aggression was identified as a risk factor for sustaining a TBI (only those with mild included in sample)
    - Those with TBI endorsed higher levels of aggression post-injury, thereby suggesting that this increase was at least in part related to their TBI

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Next Steps

- No studies identified which specifically explore elements of executive dysfunction and suicide in those with moderate to severe TBI
  - decision making, behavioral impulsivity, aggression, & concept formation
- Very little research has attempted to disentangle the effects of mild TBI from post-traumatic stress disorder
- There is scant knowledge regarding the co-occurring effects of TBI+PTSD on executive function
  - Standard neuropsychological testing methods are ineffective in distinguishing between these groups

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Executive Dysfunction and Suicide in Psychiatric Outpatients and Inpatients

VA Merit Review

Brenner, L.A., Homaifar, B.Y., Bahraini, N., Nagamoto, H., Harwood, J.E.F., & Huggins, J.

Funding Start Date 4/1/10

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Groups of Interest

		TBI Moderate/Severe	No TBI
Suicidal Behavior	Yes	Group 1 Moderate/severe TBI and History of suicidal behavior	Group 3 No TBI and History of suicidal behavior
	No	Group 2 Moderate/severe TBI and No history of suicidal behavior	Group 4 No TBI and No history of suicidal behavior

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Hypotheses and Aims

- **Primary Hypothesis:** The effect of suicidality on decision making (Iowa Gambling Test [IGT]) depends on whether subjects have a history of moderate/severe TBI or no history of TBI (i.e., the effect is different for different levels of TBI)
- **Secondary Hypothesis:** The effect of suicidality on impulsivity (Immediate and Delayed Memory Test [IMT/DMT]), aggression (State Trait Anger Expression Inventory [STAXI-2]) and concept formation (Wisconsin Card Sorting Test [WCST]) depends on the level of TBI (no history or history of moderate/severe TBI)
- **Exploratory Aims:** 1) The scores observed for the IGT will be modeled for each of the four groups to assess patterns of decision making. 2) The relationship between performance on measures of executive functioning (IGT, WCST, IMT/DMT, STAXI-2) and psychological distress (The Outcome Questionnaire-45 [OQ-45]) will be assessed

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Knowledge to be Gained

- Findings from this study would:
  - Contribute to clinicians' ability to identify Veterans with TBI who are at risk for suicidal behavior
  - Create a foundation on which to base further research regarding the relationships between cognition, emotional distress, and suicidality in TBI survivors
- Highlighting potential vulnerabilities would also allow for the design of evaluation tools and interventions aimed at addressing the needs of both Veterans Affairs clinicians and Veterans with a history of TBI

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Dysfunction and Self-Harm Behavior: An Examination of Veterans with Traumatic Brain Injury, Post Traumatic Stress Disorder, or Both

Colorado Traumatic Brain Injury Trust Fund

Banich, M., Brenner, L.A., Depue, B., Nagamoto, H., Olson-Madden, J.

Funding Start Date 4/1/10

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Groups of Interest

		Deployment -Related Mild TBI	
		Yes	No
Deployment - Related PTSD	Yes	Group 1 Mild TBI and PTSD	Group 3 No Mild TBI and PTSD
	No	Group 2 Mild TBI and no PTSD	Group 4 No Mild TBI and No PTSD

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Aims

- **Primary Aim**: To determine whether tasks taken from cognitive neuroscience can detect deficits in inhibitory aspects of executive function that will distinguish between individuals with mild TBI, PTSD, mild TBI+PTSD, and controls

- **Secondary Aim**: To link measures of inhibitory aspects of executive function to suicidal behaviors

- **Exploratory Aim**: To determine whether measures of brain anatomy can provide additional information beyond that of the behavioral measures regarding group membership

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Hypotheses

- Across three tasks (Go/No-Go task , Think/No-Think Task, Iowa Gambling Test) we predict that each group will show a specific pattern of performance relative to controls
  - Although PTSD and mild TBI may both show poor performance on motor and memory inhibition, only mild TBI will also show deficits on motor responding and re-remembering
  - Whereas mild TBI will be associated with poorer performance on the Iowa Gambling Test, PTSD will not
  - The combined group will be characterized by poor performance on all measures
  - The pattern across these three tasks will be superior in distinguishing between the groups than 3 standard neuropsychological tests (Booklet Category Test, Stroop, PASAT)

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Knowledge to be Gained

- Findings may provide tools to help clinicians distinguish between individuals with mild TBI, PTSD, or mild TBI+PTSD
- This project has the potential for linking executive dysfunction:
  - In populations of interest to their brain bases
  - To suicidal behavior
- Information obtained in this study may be useful in designing treatments for individuals with these disorders

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Thank you

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