

# Traumatic Brain Injury in the Criminal Justice Population

**JUSTICE** ★ **CENTER**  
THE COUNCIL OF STATE GOVERNMENTS  
*Collaborative Approaches to Public Safety*

# Presenters

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*Parts of this training were developed as a part of the Maricopa County Justice & Mental Health Collaboration Project.*

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Medical Director, Correctional Health Services

NYC Department of Health and Mental Hygiene

# Today's Presentation

What is TBI

TBI and Behavior

TBI in Criminal Justice Populations

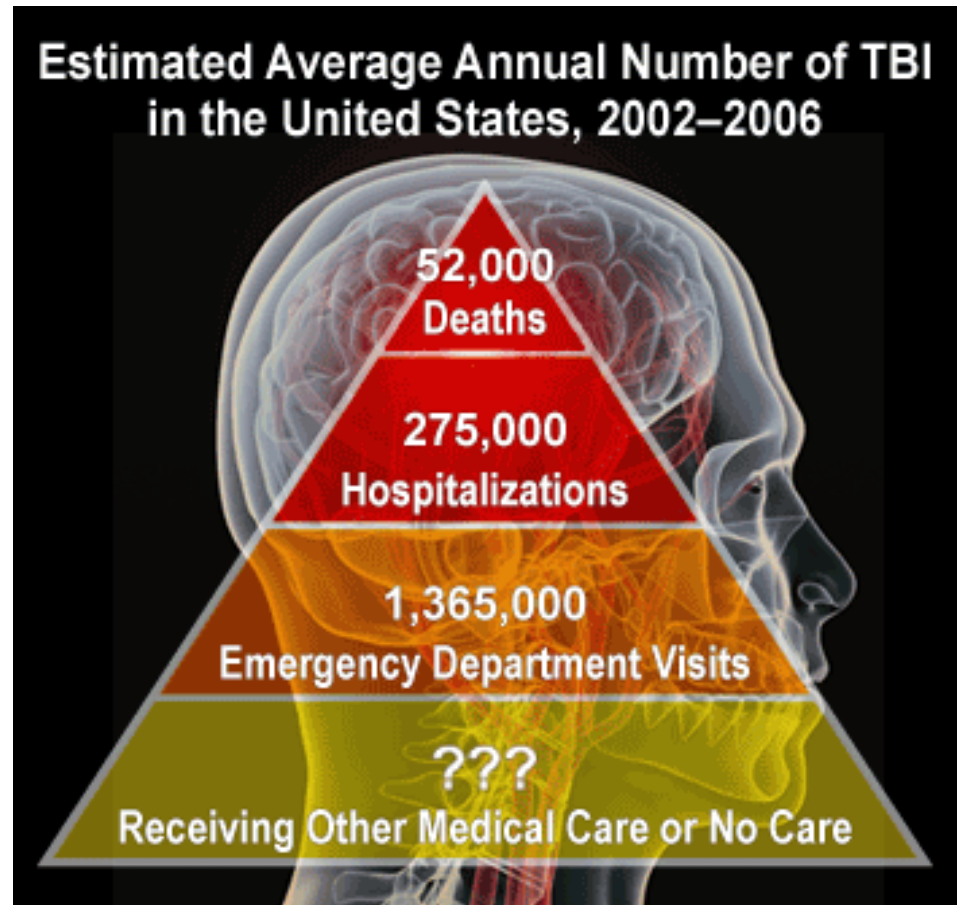
Implications for Supervision and Rehabilitation

# Prevalence

- **In the United States...**
  - At least 3 TBIs occur every minute.
  - 15.3 million people live with TBI-related disability
  - TBIs cost Americans \$76.5 billion in medical care, rehabilitation, and loss of work every year

# According to the CDC...

A traumatic brain injury (TBI) is caused by a blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. Not all blows or jolts to the head result in a TBI. The severity of a TBI may range from “mild,” i.e., a brief change in mental status or consciousness to “severe,” i.e., an extended period of unconsciousness or amnesia after the injury.



# Traumatic Brain Injury

- Leading cause of death and disability in children.
- 400,000 brain injuries in children under 15 every year.
- More than half of TBIs occur before age 25.

Source: CDC, 2001

# Types of Brain Injury

Congenital Brain Injury

Acquired Brain Injury

Traumatic  
Brain Injury

Non-traumatic  
Brain Injury

Closed  
Head Injury

Open  
Head Injury

Source: Savage, 1991

# Defining Severity

## Measures

- Glasgow Coma Scale (GCS)
  - Eye opening
  - Motor response
  - Verbal Response
- Loss of Consciousness (LOC)
- CT Scan

## Mild:

- Altered or Loss of Consciousness <30 min. with normal CT  
and/or
- MRI GCS 13-15 PTA < 24 hours

## Moderate:

- LOC < 6 hours with abnormal CT  
and/or
- MRI GCS 9-12 PTA <7days

## Severe:

- LOC > 6 hours with abnormal CT  
and/or
- MRI GCS<9 PTA>7 days



# TBI Severity

## Mild 85%

- Seen in ER or MD office
- Often unreported or undiagnosed
- 15% of these will continue to have chronic problems
- The majority of pediatric TBIs are mild, especially in children ages 5 to 14

## Moderate/Severe 15%

- Hospitalized
- Rehabilitation

Sources: Asarnow, et al., 1995; DiScala, Osberg, & Savage, 1997; Kraus, 1995

# TBI Severity and Recovery

- Most people with mild TBI make a complete recovery (80% to 90%)
- “Miserable minority” have chronic disability
- Recovery typically takes place in weeks or months (if at all)

Source: Ruff et al., 1996

# Ideal Brain Injury Rehabilitation

- Physical Therapy
- Occupational Therapy
- Speech Therapy/Cognitive Retraining
- Neuropsychology
- Neuro-psychiatry
- Social Work
- Recreational Therapy
- Physiatry
- Neurology

# Physical Effects of TBI

- Impaired Mobility
- Impaired Sensory Experiences - overstimulation
- Seizure disorders – alterations in brain functioning between seizures - may introduce a variety of psychiatric dimensions.
- Fatigability – physical and mental
- Chronic Pain
- Headaches
- Sleep Disorders (especially important during adolescence. Sleep – critical for adolescent brain development and brain function. Sleep or lack of it can effect new learning and memory.)
- Dizziness

# Cognitive Effects of TBI

- Reduction in abstract reasoning capacity
- Difficulty grasping the main point of a discussion
- Difficulty applying points of interest to one's life
- Reductions in complex information processing skills
- Impaired attention and concentration
- Heightened distractibility
- Difficulty with new learning and short term memory
- Increased mental fatigue
- Subtle communication problems (e.g. tangentially)
- Judgment problems
- Visual-spatial impairments, including trouble with directions, mechanical tasks, or visual field defects
- Low fatigue thresholds
- Problems with planning and organizing
- Initiation deficits
- Confusion and perplexity
- Problems with flexibility of thinking
- Basic intellectual deficits as measured by IQ
- Slowness in thinking and performance

# Emotional/Behavioral Effects of TBI

- Disinhibition
- Suspiciousness
- Impulsivity
- Lack of awareness of deficit and unrealistic appraisal
- Reductions in or lack of the capacity for empathy; inability to experience emotions
- Childlike emotional reactions or behavior
- Uncontrolled laughing or crying; mood swings (emotional lability)
- Preoccupation with one's own concerns (egocentrism)
- Poor social judgment
- Rage reactions
- Euphoria
- "Flat" affect
- Agitation
- Reduced or altered sense of humor
- Low frustration tolerance
- Misperception of other people's facial expressions/intentions; inability to perceive emotions
- Hyper-sexuality or hypo-sexuality
- Catastrophic emotional reactions

# Higher Prevalence of TBI in Justice Involved Populations

- Prevalence of TBI in prisoners is as high as 60%
- Childhood TBI is predictive of future offending behavior
  - Defined 3 groups who sustained childhood injuries age 0-17, at least 5 years ago
    - Moderate/Severe TBI group
    - Mild TBI group
    - Orthopedic control group (sustained fractured limbs without TBI)
  - Moderate/Severe TBI group were more likely to have a history of
    - Offending behavior
    - Arrest
    - Conviction
    - Petty Crime

Source: McKinlay et al., 2013

# Associated With Infraction in Prison

- Prospective Cohort Study, Shiroma et al 2010
  - Defined individuals with medically attended TBI as ED or hospital discharges with TBI ICD-9s
  - Those without TBI were older, more likely to be black, had a higher proportion of violent offence convictions, had longer sentences, and had served more time
  - Overall prevalence of a history of medically attended TBI while incarcerated was 1.19% in males and 0.93% in females



# Associated With Infraction in Prison

- TBI cohort had higher rates of infractions per year (1.81 vs 1.57)
- Controlled for age, violent crime conviction, prior criminal history, security level, sentence length
- Found an increased rate of infraction for males (32% more) and non-significant increased rate for females (8%)

*Still, causality has not been established*

Source: Shiroma et al., 2010

# Male/Female Violence and TBI

- Among male prisoners, history of TBI is strongly associated with perpetration of violence and other kinds of violence
- Women inmates who are convicted of a violent crime are more likely to have sustained a pre crime TBI and/or some other form of physical abuse

Sources: Cohen RA, et al. 1999;  
Brewer SK, Burgess AW, Shults J, 2004



# TBI and Intimate Partner Violence

- Women prisoners report significant histories of domestic violence. Between 57 and 75% of imprisoned women experienced physical, psychological and/or sexual violence before prison.
- BRAINS and Domestic Violence Project



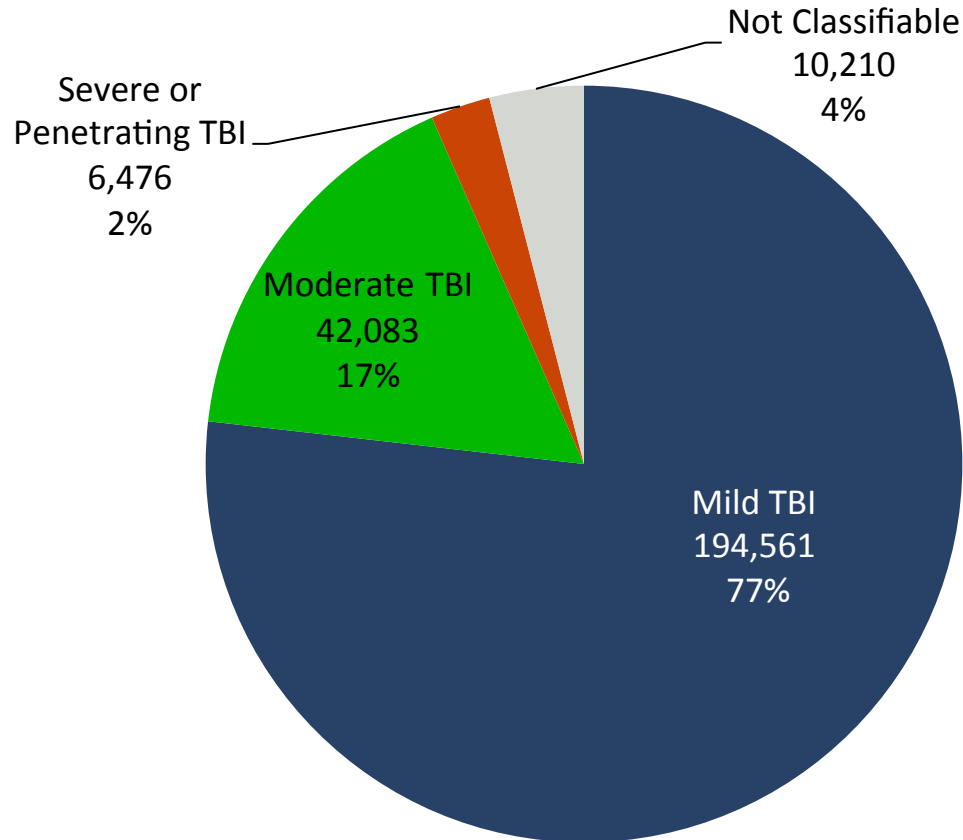
# Homelessness

Homelessness has been found to be related to both head injury and prior imprisonment

- Lack of appropriate care following TBI
- Street related violence
- Foster care
- Street Living
- Modes of transport

Source: Kushel MB, et al. 2005

# U.S. Military Casualty Statistics - TBI: Operation New Dawn, Operation Iraqi Freedom, and Operation Enduring Freedom 2000-2012



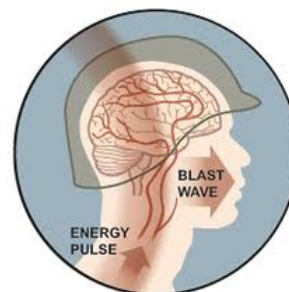
Source: Congressional Research Service, 2013;

Original chart created by Dr. Micheal Carino, Army Office of the Surgeon General, 2012

# Veterans and TBI

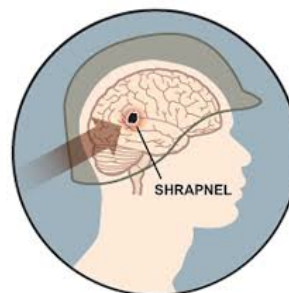
## Types of Blast Injuries

- Blasts account for 2/3 of combat injuries in Operation Iraqi Freedom and Operation Enduring Freedom
- 1 in 5 U.S. soldiers from Iraq and Afghanistan return with a mild TBI
- Among veterans, high association of mild TBI and PTSD



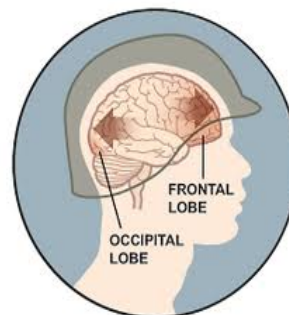
### Primary Blast Injury

Direct injury from blast overpressure waves, shock waves



### Secondary Blast Injury

Energized fragments propelled by the explosion impact head



### Tertiary Blast Injury

Individuals thrown by the blast and collide with objects or structures

Source: Elder, GA and Cristian, A, 2009;  
BrainlineMilitary2009; Photo credit: Graphic by Al  
Granberg, Krista Kjellman-Schmidt, and ProPublica

# Substance Abuse Disorders

- Before their injury, people who sustain a TBI are twice as likely as others in the community to have issues with substance abuse – the use may have led to the injury
- Some studies suggest that use may get worse 2 to 5 years post injury
- Prisoners self reported health indicate those with one or more head injuries have significantly higher levels of alcohol and/or drug use during the year preceding their incarceration

Source: Allen D.N., and Landis, R.K., 1998

# Behavioral Health and TBI

- 73% of women in state prison have been diagnosed with a mental health problem
- Research is showing that there is a high prevalence of individuals reporting TBI with co-occurring substance disorder and severe mental illness, one study reports up to 72%
- Symptoms like paranoia, obsessional disorder, depression
- PTSD



# Impact on Behavior in Corrections

| TBI Consequences                     | Functional Impact on Behavior  |
|--------------------------------------|--|
| Attention Deficits                   | Difficulty focusing on or responding to required tasks or directions |
| Memory Deficits                      | Difficulty to understanding or remembering rules or directions       |
| Irritability or Anger                | Incidents with other inmate or correctional officers                 |
| Slowed Verbal and Physical Responses | May seem uncooperative   |
| Uninhibited or Impulsive Behavior    | Problems controlling anger and unacceptable sexual behaviors         |

# Screening and Assessment

- Screening
  - Several instruments
    - TBIQ – about 15 minutes to administer, validated in correctional populations, may be longer if multiple positives
    - OSU TBI-ID- about 5 minutes to administer
    - HELPS TBI – about 5 minutes to administer
  - Drawbacks
    - Time consuming, especially with several positives
    - Unclear how a positive for an individual should inform care, given the high prevalence across the board
  - Rikers strategy
    1. Screen a small sample to establish high prevalence
    2. Consider population level interventions
    3. Decided against implementation of system-wide intake screening

# What can we do in jail?

- Assess prevalence (incoming adolescent patients)
  - TBIQ\*
  - Screening (head injuries)
  - Injury detail (mechanism, amnesia)
  - Symptom checklist
- Assess incidence
  - Injury surveillance

Source: Diamond PM et al. J Head Trauma Rehabil. 2007 Nov-Dec;22(6):330-8.



# Prevalence of TBI Among Newly Admitted Adolescents

|                                 | No injury or 1 minimal injury but no altered state | Multiple minimal | TBI (≥ 1 injury with altered mental state) | Total |
|---------------------------------|--|------------------|--|-------|
| <b>N</b>                        | 125  | 68               | 191  | 384   |
| <b>Male</b>                     | 98   | 52               | 149 (50%)                                  | 300   |
| <b>Female</b>                   | 27   | 16               | 41 (48.8%)                                 | 84    |
| <b>Age (mean)</b>               | 17.1   | 17.2             | 17.2                                       | 17.2  |
| <b>M status</b>                 | 5.6%   | 10.3%            | 15.2%**                                    | 11.2% |
| <b>N of reported injuries</b>   | .72  | 3.5              | 5.4**                                      | 3.5   |
| <b>Assault related injuries</b> | 20.0%  | 70.6%**          | 68.1%**                                    | 53.0% |
| <b>TSSI***</b>                  | 1.01   | 1.26             | 1.70**                                     | 1.40  |
| <b>TSFI****</b>                 | 0.96   | 1.43             | 2.07**                                     | 1.59  |

Table note: differences among categories determined by One Way ANOVA, Post Hoc Tukey

\*P<0.05

\*\* P<0.01

\*\*\* F(2,381) = 25.26, p<.001

\*\*\*\* F(2,380) =37.68, p<.001

TSSI: Total Symptom Severity Index. TSFI: Total Symptom Frequency Inventory



# Overall Prevalence

- 384 screened patients
- Overall prevalence of TBI 49.5% (44.5%-54.5%)
- 63.9% had more than 1 arrest
- 56.1% of the no injury/minimal was a recidivist (Nov. 2008 – Sept. 2013)
- 71.7% of the multiple minimal was a recidivist
- 66.7% of the TBI group was a recidivist



# Incidence-Rikers Injury Report Template

**eClinicalWorks 8.0** S O D O R O T 2 L O M O

Admir Practice

test, Labs , 36 Y, M Sel Info Hub

NYSID:123 BookCase:55550000 Facility:RMSC H/A:111

Allergies Billing Alert

Wt 09/26/11: 145 lbs. Appt(L): 09/06/11 Language: Spanish Translator: No

Heat Sensitive: Yes Chemical Agent: Yes Stun Shield: Yes M Designation: No Adm Date: D/C Date:

CLICK TO EDIT SECURE NOTES ADV DIRECTIVE

Medical Summary | CDSS | Labs | DI | Procedures | Growth Chart | Immunization | Encounters | Patient Docs | Flowsheets | Notes

SF Rel Default Encounters 09/06/2011

**NYSID: 123 BookCase: 55550000 Facility Code: RMSC Housing Area: 111**  
**Patient: test, Labs DOB: 02/09/1975 Age: 36 Y Sex: Male**  
**Phone: 999-999-9999 Primary Insurance:**  
**Address: 22 bway and seaway, New york, NY-10007**  
**Lab Req No: 166136.1840461 Chart No: 166136**  
**Provider: Provider1 Encounter Date: 09/06/2011**

Appointment Facility: George

**Subjective:**  
**Chief Complaint(s):**  
**HPI:**  
 TEMPLATES  
 Rikers Injury Report.  
 Rikers Injury Report  
 General  
 Injury Report #: /,  
 Event Location: /,  
 Intentionality: /,  
 Cause: /.

**Current Medication:**

**General**

Injury Report #: 123456

Event Location:

Housing Area  
 Mess Hall  
 Showers  
 Recreation space  
 Intake/Holding pen

Ok Cancel Next

Overview DRTL History CDSS CHS Labs|DI

test, Labs 36 Y, M

Advance Directive

Problem List

- 527.3 Abscess
- 250.00 Diabetes mellitus type II
- 042 HIV infection, symptomatic
- 780.52 Insomnia
- 799.9 Diagnosis deferred
- 765.23 25-26 completed weeks of gestation
- 637.92 AB NOS UNCOMPLICAT-COMP
- 637.91 AB NOS UNCOMPLICAT-INC
- 794.31 Abnormal electrocardiogram [ECG] [EKG]
- 493.90 ASTHMA NOS
- 401.9 Hypertension

Current Medications Stop Date

- Abilify 20 mg Tablet 09/20/2011
- Chlordiazepoxide HCl 25 MG Capsule
- Haldol Decanoate 100 MG/ML Solution

Print Fax Record Lock

NYC Health

# Concussion/mTBI Questions

## Reason for Appointment

1. Injury report#784

## History of Present Illness

### TEMPLATES:

Pt involved in a fight this evening and claims no inj, denies nausea, vomiting, LOC.

### Injury Report:

#### General

Injury Report #: 784 /

Event Location: *Housing Area* /

Intentionality: *Intentional* /

Cause: *inmate-on-inmate fight* /

Verified Injury: *Denies injury (and no visible injury)* /

Did the patient have a blow to the head? *No* /

Did the patient ever lose consciousness? *No* /

Was the patient ever dazed and confused after injury? *No* /

## Vital Signs



# TBI and Other Injuries. NYC Jails

## June 1, 2012 – September 30, 2013 (16 Months)

|                    | Injuries | Head Injuries | Risk per 1000 days | RR head injury       | TBI Injury        | Risk per 1000 days | RR TBI |
|--------------------|----------|---------------|--------------------|----------------------|-------------------|--------------------|--------|
| <b>ADULTS</b>      | 20,317   | 2,761 (13.6%) | .389               | Ref                  | 530 (2.6%, 19.2%) | .0747              | Ref    |
| <b>ADOLESCENTS</b> | 4,284    | 371 (8.6%)    | .596               | 1.53*<br>(1.37-1.70) | 53 (1.2%, 14.3%)  | .0851              | 1.13   |
| <b>TOTAL</b>       | 24,601   | 3,132 (12.7%) | .405               | -                    | 583 (2.3%, 18.6)  | .0755              | -      |





# Incidence of TBI in NYC Jails

|                                    | TBI per 100,000 Person Years | Methodology   |
|------------------------------------|------------------------------|---|
| Sports Related <sup>2</sup>        | 31.5                         | ED Encounters   |
| 2004 review <sup>3</sup>           | 100-300                      | Hospital Treated  |
| 2004 review <sup>3</sup>           | 600+                         | Estimate of Total, Accounting for Cases Not Seeking Hospital Care |
| New Zealand Community <sup>1</sup> | 790                          | ED and Others   |
| NYC Jails Adolescents              | 3107                         | Active Surveillance   |
| NYC Jails Total                    | 2756                         | Active Surveillance   |

27/53 (50.9%) adolescent TBI were seen in ED or by on-island ED doctor

1. Feigin VL, et al. Lancet Neurol. 2013 Jan;12(1):53-64.
2. Selassie AW et al. 2013 Sep 20. doi:pii: S1047-2797(13)00318-9.
3. J. David Cassidy et al. J Rehabil Med 2004; Suppl. 43: 28–60

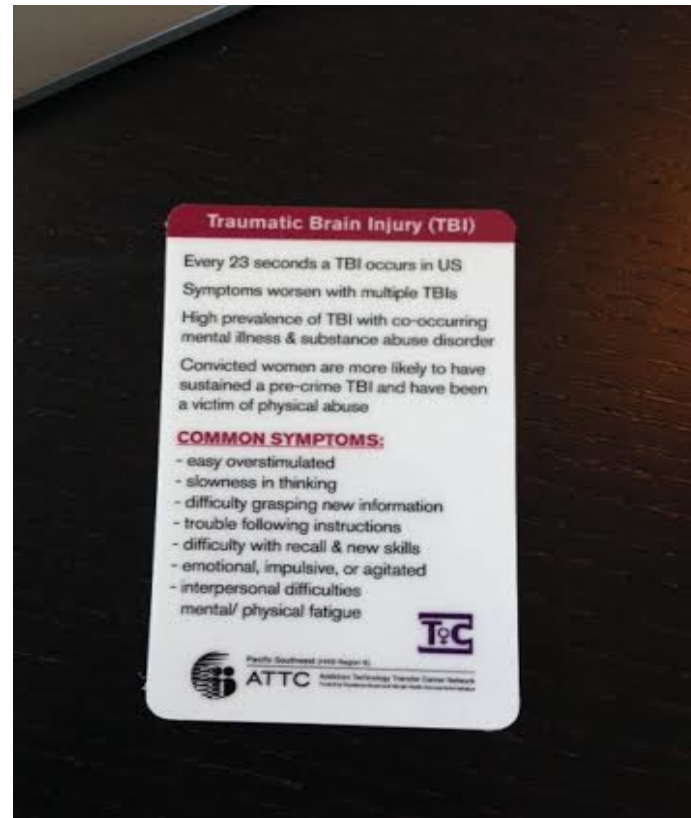
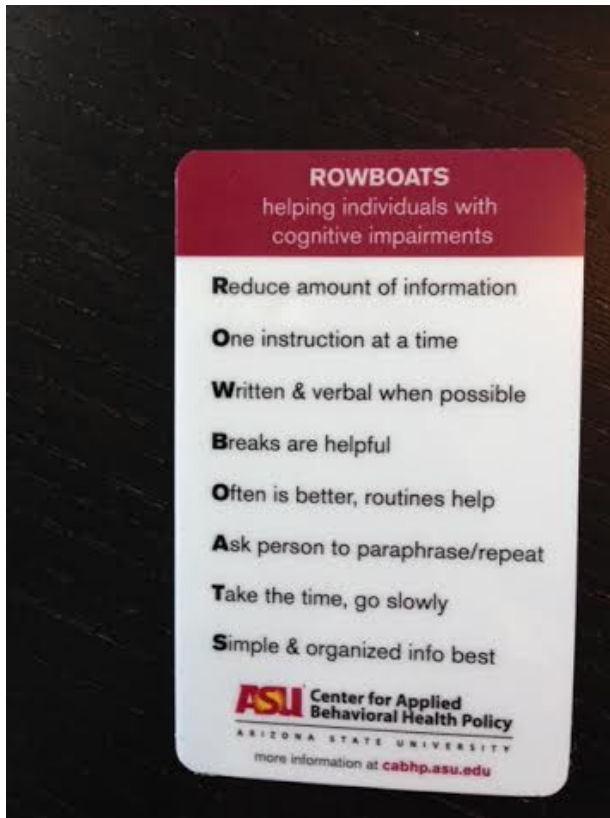


# What Can We Do in Corrections?

- Provide acute care
  - Safe rooms
- Educate correctional staff
- Educate medical and mental health staff
- Provide programming to educate patients/begin group treatment
  - Our focus group experience
- Screening?
- Complexity of conferring special status
- Legal involvement?



# ROWBOATS Tip Card

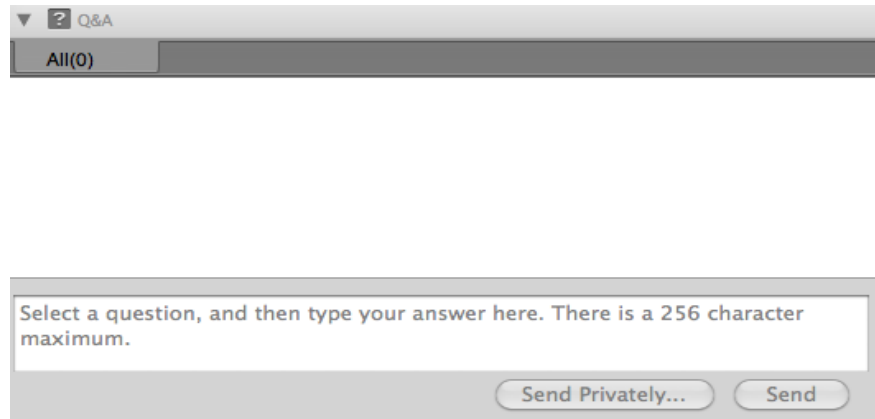


# Minnesota Project

- 2006 Minnesota was awarded a State TBI Implementation Partnership Grant which is being conducted as an interagency effort entirely through the Minnesota DOC.
- *TBI in MN Correctional Facilities: Strategies for Successful Return to Community*, a three year project administered by US Department of Health & Human Services, Maternal & Child Health Bureau, Health Resources & Services Administration (HRSA)

# Question and Answer Session

Please type your questions into the Q&A box at the lower right hand side of the screen.



The screenshot shows a Q&A interface. At the top, there is a header with a question mark icon and the text "Q&A". Below the header is a tab labeled "All(0)". The main area is a large, empty text input field. At the bottom of the input field, there is a small text box containing the instruction: "Select a question, and then type your answer here. There is a 256 character maximum." Below the input field are two buttons: "Send Privately..." and "Send".

Find us online at <http://csgjusticecenter.org/mental-health/>

The screenshot shows a Windows Internet Explorer browser window displaying the website <http://www.consensusproject.org/>. The browser's address bar and menu bar are visible at the top. The website header features the Justice Center logo, navigation tabs for 'Criminal Justice' and 'Mental Health', and a 'CONSENSUS PROJECT' label. A 'Log in or Register' button is present. A search bar is located in the top right. The main content area includes a large image of classical columns with a text overlay: 'The Justice Center's Criminal Justice/Mental Health Consensus Project is an unprecedented, national effort to help local, state, and federal policymakers and criminal justice and mental health professionals improve the response to people with mental illnesses who come into contact with the criminal justice system.' Below this are sections for 'ANNOUNCEMENTS, EVENTS, & PRESS RELEASES' and 'MEDIA CLIPS'. The announcements section features a post from October 29 about a webinar on Medicaid access. The media clips section lists articles from fox13now.com and Macon telegraph. On the right side, there are two boxes: 'THE LATEST from the Justice Center' with links to content submissions and probation initiatives, and 'MATERIALS AND VIDEOS FROM TRAINING EVENT NOW AVAILABLE ONLINE' with a poster for 'Smart Responses in Tough Times'.

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- Local Programs Database
- Justice Center Publications
- Other Justice Center Projects

**THE LATEST**  
from the Justice Center

- [Justice Center Invites Content Submissions for Updated Consensus Project Web Site](#)
- [CSG Justice Center Releases Essential Elements of Specialized Probation Initiatives](#)

**MATERIALS AND VIDEOS FROM TRAINING EVENT NOW AVAILABLE ONLINE**

**ANNOUNCEMENTS, EVENTS, & PRESS RELEASES**

Justice Center Welcomes New Reentry and Substance Abuse & Addictions Project Directors

The CSG Justice Center is pleased to welcome two new project directors to our team: Le'Ann Duran and Alexa Eggleston. The announcement can be read on the [Justice Center](#) website.

**Oct 29** 10/29 Webinar: Ensuring Access to Medicaid for Individuals with Mental Illnesses Reentering Their Communities

The Council of State Governments (CSG) Justice Center is pleased to announce its sixth webinar in the Justice and Mental Health Collaboration Program Series, sponsored by the Bureau of Justice Assistance.

**MEDIA CLIPS**

[fox13now.com \(Utah\) – Police Get Specialized Training On Mental Illness Issues](#)

10/10/09 – Increasingly, UT police are finding themselves in a situation involving someone who is diagnosed with a mental illness. Handling these potential confrontations often takes specialized training and responses.

[Macon telegraph \(Georgia\) – Bibb mental-health court graduates claim new lease on life](#)

**Smart Responses in Tough Times:**  
Authorizing Better Outcomes for People with Mental Illnesses Involved in the Criminal Justice System.

EJA National Technical Assistance and Training Event  
July 16-17, 2009  
Omni Shoreham Hotel, Washington D.C.

**Thank You!**

**The webinar recording and PowerPoint presentation will be available at <http://csgjusticecenter.org/mental-health/webinars-and-video/> within a few days**

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