Identifying and Treating the TBI-related ‘Superfecta’ in Justice Settings
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Disclosure

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The Safety Net
• Cost burden of moderate/severe TBI is more than $5 million per lifetime (Bilmes & Stiglitz, 2006)
• Risk of unemployment is six times that of the general population
  • 60% unemployed after one year (Doctor, et al., 2005), 55% at 5 years (CDC, 2016)
• 1 year morbidity
  • Epilepsy 50x risk
  • Disturbed Sleep 45% - 90%
  • Pituitary Disorder 30%
  • Depression 30-81%
• 5 year outcomes
  • Symptoms worsen 30%
  • Regard themselves as disabled 57%
  • Reliant on others for ADL 33%
  • Death 22% (TBIMS for inpatient services for moderate/severe injury)
Figure 1. Current TBI System of Care.

Current TBI System of Care to Community

1. Eligibility Criteria
   - Skilled Nursing Facility (SNF) Subacute Rehabilitation
     • Has skilled needs. Nursing, PT, OT, ST, and respiratory.
     • Can benefit from same therapy, but slow to recover.
     • LOS AVES: 30-90 days
     • Private insurance, Medicare/Medicaid, Workers Compensation - based on medical necessity

2. Eligibility Criteria
   - LTAC/Long-Term Acute Care
     • Medically stable
     • In need of nursing, PT, OT, ST, Respiratory
     • Home bound
     • Slow to recover & cannot tolerate 3 hours of therapy per day.
     • Private insurance, Medicaid, Medicare, WC - based on medical necessity
     • LOS - based on benefits allowed & medical necessity

3. Eligibility Criteria
   - Home Health
     • Medically stable
     • Home bound
     • Home care needs. Nursing, PT, OT, ST, Respiratory

4. Eligibility Criteria
   - Comprehensive Integrated Inpatient Brain Injury Rehabilitation Hospital
     • Medically stable
     • Can benefit from 3-6 hours of therapy a day
     • Have a support system for discharge.
     • LOS AVES: 30-90 days
     • Private insurance, Medicare, Medicaid, Workers Compensation - based on medical necessity

5. Eligibility Criteria
   - Home with Family with Day Treatment or Home/Community Based Services
     • Day Treatment/Community Based Services
     • Medically stable
     • Can tolerate 5-6 hours of therapy 3 times a week.
     • Needs community reintegration - RT, PT
     • Some private insurance, workers compensation
     • LOS - based on benefits allowed & medical necessity

6. Eligibility Criteria
   - Post-Acute Residential Transitional Rehabilitation
     • Day Treatment/Community Based Services
     • Medically stable
     • Can tolerate 5-6 hours of therapy 3 times a week.
     • Private insurance, Medicare, Medicaid, WC - based on benefits allowed & medical necessity

7. Eligibility Criteria
   - Post-Acute Residential
     • 24/7 Care and therapy monitoring for behavioral, cognitive and physical limitations
     • Able to tolerate 5-6 hours of treatment
     • Needs community reintegration
     • Some private insurance or workers compensation funding only
     • LOS - based on benefits allowed & medical necessity

8. Eligibility Criteria
   - Neurobehavioral
     • 24/7 Care for emotional/behavioral symptoms - hitting, biting, yelling, etc.
     • Some private insurance or workers compensation, some state waiver programs
     • LOS - based on benefits allowed. Usually no benefit, but can be negotiated with a payer

Boxes indicate general eligibility criteria, service provision requirements and typical length of stay (LOS) for specified setting.
Figure 3. Continuum of Care (adapted from the Rocky Mountain Regional Brain Injury Systems)

**Acute Care**
- Emergency evaluation
- Intensive care unit
- Specialty neurotrauma polytrauma
- Long term care

**Post-Acute Care**
- Home with family (with outpatient/day treatment or home and community-based services)
- Independent living
  - Supported living program group homes
  - Supported living program apartment
  - Home with family and some services
  - Nursing care facility
- Comprehesive integrated inpatient brain injury rehabilitation hospital/skilled nursing facility
- Post-acute residential transitional rehabilitation
- Sub-acute rehabilitation

**Public Sector Funding—Medicare**
**Public Sector Funding—Medicaid**
**Private Sector Funding—Health Insurance**
**Private Sector Funding—Liability, Worker’s Compensation, Automobile Insurance**

**Legend**
- Some Coverage
- Inadequate Coverage
Criminal Justice
• 3+ million people incarcerated in US
  • **40,147** adult offenders incarcerated in Canadian federal and provincial prisons

• Risks
  • Criminal history
  • History of institutionalization
  • Bankruptcy
  • Homelessness
  • Language barriers
  • Medical, mental illness or substance abuse comorbidities
  • Racial-ethnic minority group membership
    • *More than half of persons with TBI belong to four or more vulnerable groups*
Scope of the Problem

• Canada 2016
  • Men and women with a history of TBI were 1.5 times more likely to have a corrective services record (McIsaac, et al., 2016)

• France 2017
  • 31% of inmates report brain injury history

• UK 2014
  • 32% of young men reported more than 1 TBI with a loss of consciousness

  • 50% of young males, 49% of young females in NYC youth corrections
  • 65% of males and 73% females in County Jails
  • 87% adults report TBI over their lifetime
    • 36% reported TBI in the prior year
• Impacts correctional health services and offender management (Piccolino & Solberg, 2014)
  • Increased utilization of services while incarcerated (health and psychological)
  • Lower treatment completion rates and higher rates of disciplinary incidents
  • Lower ability to maintain rule-abiding behavior during incarceration
  • More prior incarcerations
  • Higher rates of recidivism
• Greater distress during incarceration
  • Severe depression and anxiety
  • Substance use disorders
  • Problematic anger
  • Suicidal ideation and/or attempts
Risk for TBI *DURING* Incarceration

- NYC jail 10,925 individuals (average daily census)
  - Electronic health record (EHR) was modified in June 2012 to include blows to the head, loss of consciousness, and being “dazed or confused.”
- TBI rate is 50x higher than ER and trauma centers
<table>
<thead>
<tr>
<th></th>
<th>Total jail census</th>
<th>Blow to the head</th>
<th>mTBI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Total</td>
<td>273,646</td>
<td>100.0%</td>
<td>10,286</td>
</tr>
<tr>
<td>Male gender</td>
<td>246,466</td>
<td>90.1%</td>
<td>9,696</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–17</td>
<td>7,496</td>
<td>2.7%</td>
<td>479</td>
</tr>
<tr>
<td>18–21</td>
<td>31,333</td>
<td>11.5%</td>
<td>1,937</td>
</tr>
<tr>
<td>22+</td>
<td>234,661</td>
<td>85.8%</td>
<td>7,559</td>
</tr>
<tr>
<td>Mental illness*</td>
<td>61,684</td>
<td>22.5%</td>
<td>6,714</td>
</tr>
<tr>
<td>Cause</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self injury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inmate-on-inmate fight</td>
<td>5,966</td>
<td>58.0%</td>
<td>641</td>
</tr>
<tr>
<td>Slip and fall</td>
<td>919</td>
<td>8.9%</td>
<td>211</td>
</tr>
<tr>
<td>Use of force by jail security staff</td>
<td>1,776</td>
<td>17.3%</td>
<td>341</td>
</tr>
<tr>
<td>Attack by unknown assailants</td>
<td>463</td>
<td>4.5%</td>
<td>95</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>644</td>
<td>6.0%</td>
<td>146</td>
</tr>
<tr>
<td>Resulted in hospital evaluation</td>
<td>1,182</td>
<td>14.1%</td>
<td>716</td>
</tr>
</tbody>
</table>
COLORADO TBI SCREENING PROJECT
Overview

• Colorado Brain Injury Program (now Mindsource)
  • Health Resources and Services Administration (HRSA) and Colorado Office of Behavioral Health (OBH)
  • 4 year project: 1,200 secondary screens to be completed (year 4)
• 26 partner sites
  • Denver County Jail Transition Unit; Denver County Jail RISE Unit; Boulder County Jail; Larimer County Jail; Adams County Veteran’s Court; Adams County Female Offender Program; Adams County SO Court; Denver District Problem-Solving Court; Denver Juvenile Probation; Adams County Sex Offender Court; Adams County DV Court; Division of Youth Corrections; Jefferson County Recovery Court; Boulder County JET

• **AIMS**
  1) Statewide screening (primary & secondary)
  2) Community referrals
  3) Education and capacity-building
Primary Screens

• Ohio State University Traumatic Brain Injury Identification Method (OSU-TBI-ID; Corrigan & Bogner, 2007)
  • Strong sensitivity to brain injury history in research with correctional samples (Bogner & Corrigan, 2009)

• Counts
  • Boulder County Jail: 208/373 (Jan 2015- August 2017) 55.8%
  • Denver County Jail RISE unit: 321/1091 (Jan 2015- Aug 2017) 29.4%
  • Larimer County Jail: 216/324 (Jan 2015 – Aug 2017) 66.7%
  • Adams County Probation: 95/195: (Jan 2015-Aug 2017) 48.7%
    • Denver Drug Court: 229/518 (Jan 2015-Aug 2017) 44.2%
  • Denver County Jail Transition Unit: 409/656: (Jan 2015-Aug 2017) 62.3%
  • Jefferson County Recovery Court: 41/61 (December 2016-Aug 2017) 67.2%
  • Boulder County JET: 84/122 (April 2017-Aug 2017) 68.9%
Secondary Screening

• TWO meetings—2 hour screening and 30 minute feedback
• TWO deliverables—1 report, 1 summary

• Timing
  • WEEK 1: Evaluation 2 hours (consent x 2)
  • WEEK 2: Report writing and supervision (1:1 and group), referral to community resources if applicable
  • WEEK 3: Feedback meeting (phone/in person), deliver report and summary, education for staff
Battery

- **Clinical Interview Automated Neuropsychological Assessment Metric (ANAM) Core Battery** (Reeves, Winter, Bleiberg, & Kane, 2007)
  - Library of computer-based assessments of cognitive domains including attention, concentration, reaction time, memory, processing speed, and decision-making with a very strong normative database
  - Sensitive to the deficits associated with brain injury (Kane, Roebuck-Spencer, Short, Kabat & Wilken, 2007)
- **NORMS**
  - 3400 high school and college athletes ages 12 to 24 years
  - 145 males and females ages 9 to 33 years from pediatric lupus study
  - 444 community dwelling adults ages 18 to 86 years
  - 107,500 active duty military personnel

- **Neuropsychological Assessment Battery Screening module** (NAB-SM; Stern & White, 2000)
  - Attention, Language, Memory, Spatial, and Executive Functions
  - Sensitive to the deficits associated with brain injury (Zgaljardic, & Temple, 2010)
  - **NORMS**
    - 1488 18-97 year old individuals

- **Effort tests**
  - 766 to date—**70% positive for Impairment**
### Severity of Injury

<table>
<thead>
<tr>
<th>Studies</th>
<th>Mild</th>
<th>Moderate / Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population * (CDC, 2003)</td>
<td>74%</td>
<td>26%</td>
</tr>
<tr>
<td>County Jail * (Slaughter, Fann, &amp; Ehde, 2003)</td>
<td>58%</td>
<td>29%</td>
</tr>
<tr>
<td>Colorado Project</td>
<td>48%</td>
<td>52%*</td>
</tr>
</tbody>
</table>

*80% of injuries reported required hospitalization at the time*
## Comorbid Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Bureau of Justice Statistics, 2006</th>
<th>DCJ Pilot Study</th>
<th>All data (2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental illness</td>
<td>64%</td>
<td>93%</td>
<td>78%</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>53%</td>
<td>93%</td>
<td>96%</td>
</tr>
<tr>
<td>Substance abuse with mental illness</td>
<td>76%</td>
<td>92%</td>
<td>92%</td>
</tr>
</tbody>
</table>
Demographic Data

• N=766 (10/23/17)
• Total with significant TBI history (53%)
• 66% males and 34% females; 55% Single
• 54% identified as White, 23% as Hispanic, 13% as Black or African American, and 12% as ‘other’
  • Colorado Census (2014) 88% White, 21% Hispanic, 5% Black or African American
• 15% Multilingual
• 9% Veterans
  • Colorado Census (2014) 7%
• 68% were due to assault*, 62% were due to motor vehicle accident, 59% were due to falls, and 18% were due to blasts
Vulnerabilities

• 63% of individuals reported being a victim of childhood violence
  • 10% General population (Safe Horizons, 2014)

• 65% reported victimization in adulthood
  • 2% General population (Bureau of Justice Statistics, 2014)

• 41% report at least one suicide attempt
  • 4% thoughts, 1% suicide plan (Emory University, 2014)

• 57% reported school suspension

• 96% of the population reported a history of substance abuse/misuse
  • 7% General Population (National Institute on Drug Abuse, 2013)

• 78% of individuals reported at least one mental health diagnosis (19%, NAMI, 2013)
  • 57% Mood disorders (7%, NAMI, 2013)
  • 34% Anxiety Disorders (18%, NAMI, 2013)
  • 13% Psychotic Disorders (1%, NAMI, 2013)
    • 57% take psychiatric medication
Female Offenders

• In the US—rates of incarceration for women have doubled every decade
  • 67% of justice involved women have a lifetime history of violence-related TBI
  • 38% of TBIs sustained by women in our population were violence-related
  • Women were 7.7 times more likely than men to experience violence-related multiple TBIs
  • Violently injured women are more likely to experience health problems and serve longer incarcerations

• CMAJO—Risk of winding up in a Canadian federal prison was 2.76 times higher for women with TBI than it was for uninjured women (McIsaac, et al., 2016)
The Silver Tsunami

• >1/3 of older inmates have positive PTSD screen

• Colorado data
  • Age range: 45-73 (n= 215/766 or 28%)
  • Unemployed before admission: 82%
  • Childhood Victim of Violence: 58%
  • Adult Victim of Violence: 67%
  • Suicide attempt: 34%
  • Moderate/Severe TBI 59%
  • Multiple Injuries 55%
  • Substance Abuse History: 96%
  • Age of first use: 15.6 (30+ years)
  • Psychiatric meds: 57%
  • Mental Illness: 75%
    • Anxiety Disorder/PTSD 54%
Community Services & Treatment
Treat the PROBLEM not the INJURY

• Inmates may be eligible for other support services after release
  • e.g., Colorado Brain Injury Program care coordination
• Psychotherapies can be adapted for neurocognitive deficits
  • Minimize environmental distractions
  • Written material/handouts where possible
  • Repetition of key points
• Non-electronic devices might include checklists, pictures or icons, photograph cues, post-it-notes, calendars, planners, and journals
• Therapies should be introduced with a simple rationale
324 individuals have been referred for care coordination to date
133 have been served
• 19 serving extended incarceration time
• 3 moved out of state
• 22 not interested in services
• 83 unable to reach
• 24 no follow through with application
• 1 death
• 41% vs. 13% total population using services
Long-term Outcomes

- Mayo-Portland Adaptability Inventory-4 (MPAI)
  - Physical, cognitive, emotional, behavioral, and social problems

- Jail-based Behavioral Health Services (JBBS) Data
  - Recidivism
  - Treatment initiation/completion

<table>
<thead>
<tr>
<th>24. Residence: Responsibilities of independent living and homemaking (each succeed, meet requirements)</th>
<th>0</th>
<th>Independent: Living without supervision or formal support</th>
<th>1</th>
<th>Living without supervision but often have concerns about safety or managing responsibilities</th>
<th>2</th>
<th>Require a little assistance or supervision from others (2-24% of the time)</th>
<th>3</th>
<th>Require moderate assistance or supervision from others (25-79% of the time)</th>
<th>4</th>
<th>Require extensive assistance or supervision from others (more than 79% of the time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. Transportation</td>
<td>0</td>
<td>Independent in all modes of transportation (including mass transit)</td>
<td>1</td>
<td>Independent in all modes of transportation, but others/are concerns about safety</td>
<td>2</td>
<td>Require a little assistance or supervision from others (2-24% of the time)</td>
<td>3</td>
<td>Require moderate assistance or supervision from others (25-79% of the time)</td>
<td>4</td>
<td>Require extensive assistance or supervision from others (more than 79% of the time)</td>
</tr>
<tr>
<td>28a. Paid Employment: Rate either 28a or 28b to reflect the primary desired social role: Does not rate both. Rate 28a if the primary social role is paid employment. If another social role is primary, rate only 28b. For both 28a and 28b, “support” means special help from another person with responsibilities (each succeed, meet requirements)</td>
<td>0</td>
<td>Full-time (more than 30 hours/week)</td>
<td>1</td>
<td>Part-time (1 to 30 hours/week)</td>
<td>2</td>
<td>Full-time or part-time with support</td>
<td>3</td>
<td>Part-time without support</td>
<td>4</td>
<td>Unemployed, employed 0-1 hour per week</td>
</tr>
<tr>
<td>28b. Other employment: Involved in constructive, role-appropriate activity other than paid employment. Check only one to indicate primary desired social role: Childbearing/caregiving, Homeemaker, no childbearing or caregiving, Student, Volunteer, Retired. (Check retired only if over age 60). If unemployed, retired and disabled and under age 60, indicate “Unemployed” for item 28a.</td>
<td>0</td>
<td>Full-time (more than 30 hours/week)</td>
<td>1</td>
<td>Part-time (1 to 30 hours/week)</td>
<td>2</td>
<td>Full-time or part-time with support</td>
<td>3</td>
<td>Part-time without support</td>
<td>4</td>
<td>Unemployed, employed 0-1 hour per week</td>
</tr>
<tr>
<td>29. Managing money and finances: Shopping, keeping a check book or other book account, managing personal income and investments, if independent with small purchases but not able to manage larger personal finances or investments, rate 3 or 4.</td>
<td>0</td>
<td>Independent, manages personal finances without supervision or assistance</td>
<td>1</td>
<td>Manage money independently for others, have concerns about larger financial decisions</td>
<td>2</td>
<td>Require a little help or supervision (2-24% of the time) with large financial decisions, no help with small purchases</td>
<td>3</td>
<td>Require moderate help or supervision (25-79% of the time) with large financial decisions, some help with small purchases</td>
<td>4</td>
<td>Require extensive help or supervision (more than 79% of the time) with large financial decisions, some help with small purchases</td>
</tr>
</tbody>
</table>
Education
• Development and implementation of TBI-specific training curricula for Denver County Jail mental health staff and DCJ civilian staff

• Developed and implemented a TBI-specific treatment group in Denver County Jail Men’s Mental Health Transition Unit (December, 2015)
  • Modules
    • Understanding TBI and Symptom Recognition
    • Memory Skills and Goal Setting
    • Emotional Regulation
    • Interpersonal Communication
  • Optional Modules
    • Anger/aggression Management
    • Impulsivity Management
    • Acceptance and Identity

• Web-based toolkit
CHALLENGES/LESSONS
• Fidelity to instrument (OSU-TBI-ID)
• Contact impossible after community release
• Consent problems with youth
  • Parents
  • CO Attorney General’s Office
• Sensitivity to impairment
  • Bleiberg model
  • Behavior and affective disturbances instead
• Partnerships
• Sustainability
Questions?
Thank you OBIA!