Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

PRESENTED BY:
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Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

Objectives

1) Define traumatic brain injury
2) Review the literature related to traumatic brain injury and homelessness
3) Share results from a recent study
St. Michael’s Hospital Head Injury Clinic

Who We Are:

- Manage and treat patients with TBI over the long term
- Largest clinic of its kind in Ontario
- Services more than 1400 patients annually

The Multi-Disciplinary Team:

- Neurorehabilitation specialist
- Physiatrist
- Neuropsychologist
- Neuro-otolaryngologist
- Psychiatrist
- Clinical nurse specialist/case manager
- Research personnel
SMH Head Injury Clinic: Services Offered

- Early identification of TBI patients most in need of highly specialized follow-up services
- Access to medical/diagnostic tests & other SMH specialists/clinics
- Co-ordination of specialized rehabilitation services
- Patient and family education and support
- Advocating on behalf of the patients (referring hospitals, community partners, insurers and lawyers)
- Neuropsychological assessments
- Evaluation and treatment of psychiatric symptoms post-TBI
- Testing and treatment of vestibular issues
What is Traumatic Brain Injury?

TBI is “caused by a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain”\textsuperscript{1}. The severity of injury may range from:

- \textit{“mild”:} a brief change in mental status or consciousness to
- \textit{“severe”:} an extended period of unconsciousness or amnesia.

Not all blows or jolts to the head result in a TBI.

\textsuperscript{1}National Center for Injury Prevention and Control. Traumatic Brain Injury. \textit{Centers for Disease Control and Prevention} [serial online] 2010
Some statistics related to TBI

- The leading cause of death and disability for Canadians under 45\(^1\)
- Incidence of all closed head injuries admitted to hospitals in Canada\(^2\):
  - 70.9 per 100,000 (conservative estimation);
  - 66% of admissions are males.

- 400 will die;
  - 1,500 will sustain a severe brain injury;
  - 1,500 will sustain a moderate brain injury;
  - 15,000 will sustain a mild brain injury.\(^3\)

- In Canada and USA, 2% of the population live with lifelong disabilities resulting from TBI\(^4\):
  - Approximately 1 in 4 adults with TBI are unable to return to work one year after injury because of physical and/or mental disabilities.

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\(^1\) National Center for Injury Prevention and Control. Traumatic Brain Injury. *Centers for Disease Control and Prevention* [serial online] 2010
\(^2\) Canadian Institute of Health Information. Ontario Trauma Registry Regional Reports: Hospital Injury Admissions, 1999/2000. 3-31-2001
\(^3\) www.obia.ca
Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

Substance use and TBI

- ⅓ - ½ of persons with TBI are intoxicated at the time of injury and/or show a pre-injury history of alcohol abuse\(^1\)

- 20% of people who do not have a substance use problem before the injury become vulnerable to substance use after an injury

- Use seems to increase during the post-acute period of a brain injury

- Using substances greatly increases the chances of a second injury\(^2\)

- Alcohol and other drugs have a more powerful effect following brain injury

- After a brain injury drinking alcohol or using other drugs can cause a seizure\(^3\)

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2. www.subi.ca
3. Ohio Valley Center, 1994
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Homelessness and TBI
NEEDS ASSESSMENT SURVEY

Completion and Demographics

- 23 Responses
- Average age = 42.5 years
- 70% female

- Average years working with homeless = 10.7 (range 1-25)

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift Supervisor (Homeless shelter)</td>
<td></td>
<td>13%</td>
</tr>
<tr>
<td>Counselor</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>Nurse</td>
<td></td>
<td>17%</td>
</tr>
<tr>
<td>Community Support Worker</td>
<td></td>
<td>26%</td>
</tr>
<tr>
<td>Outreach Worker</td>
<td></td>
<td>9%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Crisis Support</td>
<td></td>
<td>9%</td>
</tr>
<tr>
<td>Addictions</td>
<td></td>
<td>35%</td>
</tr>
<tr>
<td>Other, please specify...</td>
<td></td>
<td>26%</td>
</tr>
</tbody>
</table>
What percentage of your clients do you think have experienced a traumatic brain injury in the past?

<table>
<thead>
<tr>
<th>Response</th>
<th>Chart</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%-20%</td>
<td></td>
<td>43%</td>
<td>10</td>
</tr>
<tr>
<td>21%-40%</td>
<td></td>
<td>30%</td>
<td>7</td>
</tr>
<tr>
<td>41%-60%</td>
<td></td>
<td>17%</td>
<td>4</td>
</tr>
<tr>
<td>61%-80%</td>
<td></td>
<td>4%</td>
<td>1</td>
</tr>
<tr>
<td>81%-100%</td>
<td></td>
<td>4%</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Responses</strong></td>
<td></td>
<td><strong>23</strong></td>
<td></td>
</tr>
</tbody>
</table>
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A scoping review of the literature
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PubMed Search on May 23, 2013:

Substance Abuse and Homeless: 2107 publications

Traumatic Brain Injury and Homeless: 17 publications
Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

Traumatic brain injury among people who are homeless: a systematic review

Jane Topolovec-Vranic¹, Naomi Ennis², Angela Colantonio³, Michael D Cusimano⁴, Stephen W Hwang⁵, Pia Kontos⁶, Donna Ouchterlony⁷ and Vicky Stergiopoulos⁸

Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

Cognitive Deficits and Their Remediation in the Homeless

An Experience of Management of Homeless Neurosurgical Patients

The prevalence of traumatic brain injury in the homeless community in a UK city

Cognitive Function and Duration of Rooflessness in Entrants to a Hostel for Homeless Men
The effect of traumatic brain injury on the health of homeless people

Stephen W. Hwang MD MPH, Angela Colantonio PhD OT Reg, Shirley Chiu MA, George Tolomiczenko PhD MPH, Alex Kiss PhD, Laura Cowan BScN, Donald A. Redelmeier MD MSHSR, Wendy Levinson MD

CMAJ 2008;179(8):779-84
Little/no information is available regarding TBI in homeless women and youth, and what the presenting characteristics of TBI are in the homeless.
Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

<table>
<thead>
<tr>
<th>Citation</th>
<th>Retrieved from?</th>
<th>Source Type</th>
<th>Summary of Information provided</th>
</tr>
</thead>
</table>
| HCH Clinicians' Network, 2003             | National HCH Council website | Article in Healing Hands     | - Describes the cognitive disabilities faced by the homeless population  
- Includes a discussion of the prevalence of TBI and acquired brain injury among the homeless  
- Outlines practical strategies for case management.                                                                                                           |
|                                           |                         |                               |                                                                                                                                                                                                                             |
| HCH Clinicians’ Network, 2008             | National HCH Council website | Article in Healing Hands     | - Describes assessment tools that may be useful among the homeless  
- Provides strategies for caring for homeless affected by TBI                                                                                                       |
| Highley, 2008                             | National HCH Council website | Monograph in Healing Hands  | - Discusses: links between adverse childhood experiences, homelessness and TBI; failures to detect TBI among the homeless; prevalence of cognitive impairment among the homeless; implications for practice, administration and policy recommendations. |
| Carlson et al., 2008                      | National HCH Council website | Case study                  | - Portrays case of a homeless patient suffering from the outcomes of a TBI  
- Argue for an interdisciplinary approach to care  
- Recommendations for clinicians working with homeless individuals                                                                                              |
| National HCH Council, 2011                | National HCH Council website | Webinar                     | - Review of the literature  
- Diagnosis and treatment of TBI  
- General information on TBI                                                                                                                                        |
| Tatlock & Lepore, 2012                    | National HCH Council website | Information on upcoming workshop session | - Information on an educational workshop to teach participants basic information about TBI among the homeless                                                                 |
| Luchetti, 2007; 2008                      | National HCH Council website | Power-points (webinar) presented at previous conferences | - Summaries of the literature on TBI, cognitive impairment and developmental disability among the homeless                                                                                                                     |
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Recent research has uncovered high rates of traumatic brain injury and cognitive dysfunction in the homeless. Might these problems contribute to their plight? Norra MacReady investigates.
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Traumatic brain injuries often go undiagnosed, especially on the streets.

Inside

Witness for the revolution
Ken Hawkins on the life as a conflict zone journalist
Page 8

Lorettta Smith
A conversation with the county commissioner on the needs of her African American forum
Page 3

Vendor profile
Jason Lee is the new face in The Pearl
Page 5

For those who cannot afford free speech

A nonprofit, grassroots newspaper that assists people experiencing homelessness and poverty by creating flexible income opportunities. Through education, advocacy and personal expression, we are a catalyst for individual and social change.

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Aim: “To discuss and identify research gaps and priorities in order to develop a research agenda”.

ORGANIZATIONS REPRESENTED
CAMH, SUBI Project
CAST Canada
CHIRS
Covenant House
Housing Services Division, City of Hamilton
Lawson Health Research Institute
Ontario Neurotrauma Foundation
Portland State University
Seaton House
St. Michael’s Hospital
Street Health
Toronto ABI Network
Toronto Rehabilitation Institute
University of Colorado
University of Toronto
Women’s Residence, SSHA
What are the characteristics of TBI in the homeless population and how detrimental are TBIs to the functioning of individuals who are homeless?

How do gender, age, and culture intersect with regards to TBI among people who are homeless?

What are the different needs, protective factors and risk factors for TBI in the various subpopulations of people who are homeless?

What current knowledge do various stakeholders such as individuals who are homeless, health care professionals and policy makers have regarding TBI and homelessness, and what knowledge can we disseminate to these stakeholders?

When and how can interventions be implemented and how can the symptoms of TBI be managed within the homeless population?

How can homeless shelter workers be trained to help clients with a TBI navigate through the system and how can specialists aid these workers in supporting their clients?
Homelessness and TBI: Pilot Study Rationale

A better understanding of TBI, its presentation and characteristics in the homeless is vital to enable appropriate interventions, treatments, and case management to improve outcomes.
Study Objectives

1. To obtain preliminary descriptive data regarding the incidence of TBI in a homeless population.

2. Evaluate the feasibility of implementing a research protocol in the homeless shelter setting.
METHODS

• Participants recruited from an urban adult men’s shelter in Toronto, Canada

• Exclusion criteria:
  • Non-communicative;
  • Poor English language skills;
  • Mental illness;
  • Incapable of providing consent

• Provided with $20 for their participation in the study

• Study tools:
  • Self-report head injury questionnaire
  • Qualitative history and demographic survey
PRELIMINARY RESULTS - FEASIBILITY

- One month in 2011 – 48 shelter clients in a harm-risk reduction program were approached to participate in the study
- 45 recruited and consented to participate: 1 declined, 2 excluded due to mental health reasons
- 44 (97.8%) individuals completed the entire protocol
- 38 (84.4%) completed 3-month follow-up

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Interview</td>
<td>54 (19) minutes</td>
<td>22-98 minutes</td>
</tr>
<tr>
<td>Number of clients who took a break</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Number of breaks</td>
<td>1</td>
<td>0-2 breaks</td>
</tr>
<tr>
<td>Length of time for breaks</td>
<td>5.5 (7) minutes</td>
<td>0-20 minutes</td>
</tr>
<tr>
<td>Number of assessments per day</td>
<td>4.5</td>
<td>3-8 assessments</td>
</tr>
</tbody>
</table>
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For 80% of those with a positive screen for TBI, injury occurred before the onset of homelessness.
Of those who may have experienced a traumatic brain injury, what percentage would you say did so within the following time frames?

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>%</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within the past 3 months</td>
<td>11.8</td>
<td>0-50</td>
</tr>
<tr>
<td>3-12 months ago</td>
<td>20.4</td>
<td>0-65</td>
</tr>
<tr>
<td>Greater than 12 months ago</td>
<td>54.8</td>
<td>0-100</td>
</tr>
</tbody>
</table>
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Of those who may have experienced a traumatic brain injury, what percentage would you describe as having the following severities of injury?

<table>
<thead>
<tr>
<th>Severity</th>
<th>%</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>36.1</td>
<td>3-100</td>
</tr>
<tr>
<td>Moderate</td>
<td>45.4</td>
<td>3-80</td>
</tr>
<tr>
<td>Severe</td>
<td>17.8</td>
<td>0-50</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Injury Severity</th>
<th>N = 49*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>3 (6.1%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>31 (63.3%)</td>
</tr>
<tr>
<td>Severe</td>
<td>15 (30.6%)</td>
</tr>
</tbody>
</table>

*Injury severity could not be determined for one participant as he could not remember how long he had lost consciousness for.
Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

**RESULTS - TBI**

<table>
<thead>
<tr>
<th></th>
<th>Negative Screen for TBI (n = 61)</th>
<th>Positive Screen for TBI (n = 50)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of arrests</td>
<td>63.5%</td>
<td>82.5%</td>
<td>0.023*</td>
</tr>
<tr>
<td>History of substance abuse</td>
<td>60.0%</td>
<td>68.0%</td>
<td>0.39</td>
</tr>
<tr>
<td>History of mental illness</td>
<td>40.4%</td>
<td>60.9%</td>
<td>0.038*</td>
</tr>
<tr>
<td>History of seizures</td>
<td>31.1%</td>
<td>46.3%</td>
<td>0.15</td>
</tr>
<tr>
<td>Parental history of substance abuse</td>
<td>34.5%</td>
<td>55.0%</td>
<td>0.047*</td>
</tr>
</tbody>
</table>
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Mechanisms of all reported TBI's by study participants. Percentage indicates the proportion of patients (n=50) who had sustained injury by the mechanism indicated. Note that some patients had reported sustaining injuries by more than one mechanism.

Mechanisms of Injury

- Assault: 66%
- Sports and Recreation: 44%
- MVA: 42%
- Falls: 42%
- Fainting: 36%
- Drug/Alcohol Blackout: 32%
- Pedestrian: 24%
- Struck by or against: 22%
- Biking: 20%
- Other: 16%

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SUMMARY OF THE PILOT STUDY

✓ Feasible
✓ TBI rate = 45% but varied by program in the shelter
✓ Most often moderate TBI; 30% had experienced severe TBI
✓ TBI history of arrests, mental illness, parental substance abuse
✓ Assaults were the most common mechanism, but sports and rec, MVC, and falls were second most common
✓ TBI preceded homelessness in 80% of cases
Rates, symptoms, and causes of traumatic brain injury amongst individuals who are homeless: research findings

**NEEDS ASSESSMENT SURVEY RESULTS**

In each of the following categories, please rate the top three issues for those clients who may have experienced a traumatic brain injury in the past:

<table>
<thead>
<tr>
<th>Physical</th>
<th>Cognitive</th>
<th>Emotional/Behavioural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain²</td>
<td>Memory³</td>
<td>Substance Abuse¹*</td>
</tr>
<tr>
<td>Balance Impairment</td>
<td>Impulsivity¹</td>
<td>Depression²</td>
</tr>
<tr>
<td>Fatigue and Headache¹</td>
<td>Concentration and Attention²</td>
<td>Anger</td>
</tr>
<tr>
<td>Sleep Disturbance³</td>
<td></td>
<td>Lack of Insight</td>
</tr>
<tr>
<td>Motor Weakness</td>
<td></td>
<td>Anxiety</td>
</tr>
<tr>
<td>Seizures</td>
<td></td>
<td>Aggression³</td>
</tr>
<tr>
<td>Vision Disturbance</td>
<td></td>
<td>Irritability</td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel/Bladder Concerns</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SURVEY RESULTS: ADDITIONAL ISSUES

• Lack of timely case management and appropriate housing options.
• Resources, programs and tools for homeless clients with TBI.
• More practical diagnosis and treatment strategies; less research data.
• How to differentiate between symptoms of mental health, brain injury and behavioral issues?
• Interactions with the Justice system, including incarceration.
• Need to enable Service Providers to provide flexible and integrated models of care and supports.
• Substance use linking to homelessness.
• Understanding the underlying issues involving homelessness and other chronic diseases including mental health and addictions.
Conclusions

• Rates of TBI are high amongst homeless populations.

• TBI in this population has been linked to seizures, arrests, substance use, poorer mental and physical health.

• There are numerous factors which need to be addressed in working with complex clients including lack of resources, substance use, mental illness, experience with the justice system, and physical health issues.

• There is a need for practical ways to diagnose and manage TBI and its associated symptoms.
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STUDY TEAM

**Lead Investigator:**
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**Co-Investigators and Collaborators:**

**St. Michael’s Hospital**
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Cheryl Masanic, MD Physiatrist, Head Injury Clinic  
Alicja Michalak, RN MScN, Case Manager, Nurse  
Patricia Johnson, PhD, Researcher  
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Vicky Stergiopoulos, MD Chief, Dept. Psychiatry

**Toronto Rehab**
Angela Colantonio, PhD, OT Reg. Ont., Senior Scientist  
Pia Kontos, PhD Scientist

**Support Staff:**
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Amy Wong

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Jackie Andersen  
Connor Cooper  
Brianna Epringham  
Mackenzie Howatt  
Nadine Kot  
Justin Shamis  
Michael Taylor  
Farhaad Virjee

**Funding Sources:**
St. Michael’s Hospital Head Injury Clinic  
Canadian Institutes of Health Research

*Thank you to the wonderful staff and clients at Seaton House Men’s Shelter, Toronto!*
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