National Coalition on Mental Health and Aging and National Council on Aging Present

Traumatic Brain Injury and Mental Illness Among Older Adults: The Problem and New Management Approaches

March 26, 2020
Mission:
To provide opportunities for professional, consumer and government organizations to work together towards improving the availability and quality of mental health preventive and treatment strategies to older Americans and their families through education, research and increased public awareness.

Visit: www.ncmha.org
History, Membership and Activities:

• Formed in 1991 by a group of organizations from the aging and mental health fields
• Comprised of 100 national and state associations, state coalitions, and governmental agencies, e.g., SAMHSA and ACL.
• Co-sponsor events to highlight challenges of mental health and aging
• Identify new approaches to addressing problems.
Webinar Series on “Addressing Disparities in Behavioral Health Care for Older Adults”

• Following the May 20th National Older Adult Mental Health Awareness Day (OAMHD) events, NCMHA developed a plan to collaborate with interested government agencies, private sector groups, and experts to maintain the momentum and recommendations generated from OAMHD.

• A series of webinars during 2019/2020 that target specific topics with a practical focus and accompanying tools/resources to address the needs of older adults with mental health conditions, as well as state/local efforts/best practices.

• A special feature of the webinars will be that the sessions will coincide with monthly, weekly and daily national mental health or aging observances.
Key Objectives of the Webinar Series

- Identify specific approaches that address disparities in behavioral health care for older adults
- Ensure that older adults with mental health and addiction-related conditions are integrated within all MH awareness raising, policy, programmatic and research efforts going forward.
- Raise awareness among primary care, mental health, other health service providers and the aging network about the impact of suicide, opioid use, and interrelated problems, and impact provider practice patterns for older adults.
- Identify specific tools such as geriatric assessment, questions – suicide ideation, firearm presence, opioid use and other screening tools – and detailed guidance.
Webinar Series Roll Out – 2019-2020

August 21 (12:00 PM EDT) – Senior Citizen’s Day
“Prevention and Health Promotion for Late-Life Mental Health Disorders”

September 18 (12 PM EDT) – Suicide and Healthy Aging Month
“Strategies for Reducing Suicide in Older Adults”

October 10 (2:00 PM EDT) – World Mental Health Day
“Home & Community-Based Mental Health Services: Meeting the Needs of Older Adults”

November 13 – Family Caregivers and Alzheimer’s Awareness Month
“The Invisible Health Care Provider: Family Caregivers of Individuals with Dementia”
Webinar Series Roll Out – 2019-2020

January 23, 2020 (12:00 PM EST) – Mental Health Wellness Month
“Solutions to Behavioral Health Workforce Shortages & Lack of Funding”

February 27 (2:00 PM EST) – Eating Disorders and Mental Health Month
“Bridging the Science-Practice Gap: Potential Opportunities for Geriatric Mental Health”

March 26 (3:00 PM EDT) – National Brain Injury Awareness Month
“Traumatic Brain Injury and Mental Illness Among Older Adults: The Problem and New Management Approaches”

April 7, 2020 (12:00 PM EDT) – National Public Health Week and World Health Day
“Social Determinants of Mental Health for Older Adults: A New Perspective”
Today’s Webinar

In recognition of National Brain Injury Awareness Month:

“Traumatic Brain Injury and Mental Illness Among Older Adults: The Problem and New Management Approaches”

Presenter: Matthew Peters, M.D.

Matthew Peters, M.D., is Assistant Professor at Johns Hopkins University School of Medicine. Dr. Peters is an active clinician, teacher, and researcher, and sees patients in the Acquired Brain Injury Clinic and Memory and Alzheimer’s Treatment Center at Johns Hopkins Bayview. He has been internationally recognized for his research work and has received research funding from the National Institutes of Health, Department of Defense, and National Alzheimer’s Coordinating Center.
Traumatic Brain Injury in Older Adults

The Problem and New Management Approaches
Relevant Disclosures

- Funding from NIA, DoD, NACC
Outline

• What is a Neuropsychiatric Symptom?
• New TBI in the Aged
• Aging with a TBI
• A Focused Clinical Approach
• Geriatric Approach to TBI Research
**Sources**

**GUEST EDITORIAL**

**Traumatic brain injury (TBI) in older adults: aging with a TBI versus incident TBI in the aged**

Editorial

For reprint orders, please contact: reprints@futuremedicine.com

**Concussion**

**Traumatic brain injury in older adults: do we need a different approach?**

Matthew E Peters*1 & Raquel C Gardner2,3

**The Growing Epidemic of TBI in Older Patients**

May 1, 2019

By Bharat R. Narapareddy, MD, Lisa N. Richey and Matthew E. Peters, MD

Despite advances in neurology, a silent epidemic of older adults who sustain a TBI is growing. The authors provide tools and tips for a geriatric approach to treatment.
Neuropsychiatric Symptoms
Neuropsychiatric Symptoms

Definition

- “Non-cognitive” symptoms occurring with brain pathology (aging / dementia)
  - Delusions
  - Hallucinations
  - Agitation / Aggression
  - Depression / Dysphoria
  - Anxiety
  - Elation / Euphoria
  - Apathy / Indifference
  - Disinhibition
  - Irritability / Lability
  - Aberrant Motor Behavior
  - Sleep Disturbances
  - Appetite and Eating Disturbances
Neuropsychiatric Symptoms

Difference from Idiopathic Syndromes

- Neuropsychiatric symptoms are viewed differently than psychiatric symptoms starting earlier in life.
- Idiopathic psychiatric syndromes can be lifelong.
- If the presentation of an idiopathic syndrome changes with time, brain pathology may be involved.
Neuropsychiatric Symptoms
Focus on Dementia

- Essentially universal in dementia
- Associated with:
  - Faster cognitive decline
  - Accelerated progression to severe dementia and death
  - Greater caregiver stress
  - Lower quality of life
  - Higher neuropathological markers of dementia
Neuropsychiatric Symptoms
Theoretical Causes in Dementia

- **Symptom Hypothesis**
  - NPS are a result of neurodegenerative changes
  - NPS a symptom of dementia

- **Risk Factor Hypothesis**
  - Concurrent non-dementia pathology that lowers the brain’s reserve for neurodegenerative pathology
  - NPS are part of a separate process

- **Unmet Needs Model**
  - Individual is unable to meet his/her own needs
  - Caregivers have insufficient knowledge/ability to do so
  - Most relevant for severe dementia
Traumatic Brain Injury (TBI)
A Focus on TBI
Finite Capacity

- The brain has a finite capacity for recovery and adaptation
  - Both TBI recovery and aging utilize the same plasticity mechanisms
  - Alters the handling of normal aging
New TBI in the Aged

Overview Statistics

• ~20 million emergency room visits
  – 61% increase from prior years
• Rising levels of hospitalizations and death
  – 75 years and older, highest number of TBIs
New TBI in the Aged
Geriatric Specific Factors

- Mechanism of injury – falls
  - Risk of repetitive TBI
- Female > Male
- Pre-existing medical conditions
  - e.g., anti-coagulant use
New TBI in the Aged

Geriatric Specific Factors

• Increased risk of intracranial bleeding
  – Dura adherence, bridging vein fragility, cerebrovascular atherosclerosis

• Normal neurological examination despite intracranial bleed
Table 1. Baseline demographic comparison of older vs. younger individuals with blunt head trauma.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Younger: age &lt;65</th>
<th>Older: age ≥65</th>
<th>Statistic</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median in years (IQR)</td>
<td>37 (26–51)</td>
<td>75 (70–81)</td>
<td>255.204</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>252 (64.5)</td>
<td>44 (40.4)</td>
<td>20.4681</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female</td>
<td>139 (35.5)</td>
<td>65 (59.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>187 (47.8)</td>
<td>17 (15.6)</td>
<td>49.0981</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>White</td>
<td>171 (43.7)</td>
<td>89 (81.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>33 (8.5)</td>
<td>3 (2.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1.
Baseline demographic comparison of older vs. younger individuals with blunt head trauma.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Younger: age &lt;65 (n = 391)</th>
<th>Older: age ≥65 (n = 109)</th>
<th>Statistic</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest level of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>70 (17.9)</td>
<td>24 (22.0)</td>
<td>2.5191</td>
<td>0.276</td>
</tr>
<tr>
<td>High school graduate</td>
<td>234 (59.8)</td>
<td>56 (51.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>87 (22.3)</td>
<td>29 (26.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>107 (27.4)</td>
<td>45 (41.3)</td>
<td>7.8045</td>
<td>0.007</td>
</tr>
<tr>
<td>Employed</td>
<td>234 (59.8)</td>
<td>16 (14.7)</td>
<td>69.5582</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Prior concussion</td>
<td>125 (32.0)</td>
<td>24 (22.0)</td>
<td>4.0347</td>
<td>0.045</td>
</tr>
<tr>
<td>Mood disorder</td>
<td>112 (28.6)</td>
<td>40 (36.7)</td>
<td>2.8437</td>
<td>0.296</td>
</tr>
<tr>
<td>Non-mood psychiatric disorder</td>
<td>81 (20.7)</td>
<td>18 (16.5)</td>
<td>1.2508</td>
<td>0.488</td>
</tr>
</tbody>
</table>
# New TBI in the Aged

**HeadSMART**

## Table 2.

Injury descriptor comparison of older vs. younger individuals with blunt head trauma.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Younger: age &lt;65 (n = 391)</th>
<th>Older: age ≥65 (n = 109)</th>
<th>Statistic[^b]</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian struck</td>
<td>46 (11.8)</td>
<td>4 (3.7)</td>
<td>79.4018</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Motor vehicle-traffic</td>
<td>105 (26.9)</td>
<td>21 (19.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>100 (25.6)</td>
<td>76 (69.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assault</td>
<td>83 (21.3)</td>
<td>3 (2.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Struck by/against</td>
<td>21 (5.2)</td>
<td>3 (2.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedal cycle</td>
<td>36 (9.2)</td>
<td>2 (1.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intoxicated on drugs/alcohol</td>
<td>94 (24.0)</td>
<td>12 (11.0)</td>
<td>8.6652</td>
<td>0.002</td>
</tr>
<tr>
<td>Abnormal CT findings</td>
<td>65 (16.6)</td>
<td>27 (24.8)</td>
<td>3.7677</td>
<td>0.068</td>
</tr>
</tbody>
</table>
Table 2.

Injury descriptor comparison of older vs. younger individuals with blunt head trauma.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Younger: age ≤65 (n = 391)</th>
<th>Older: age ≥65 (n = 109)</th>
<th>Statistic^b</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms at time of presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCS &lt; 15 at presentation</td>
<td>61 (15.6)</td>
<td>12 (11.0)</td>
<td>1.4414</td>
<td>0.283</td>
</tr>
<tr>
<td>Post-traumatic amnesia</td>
<td>221 (56.5)</td>
<td>52 (47.7)</td>
<td>3.0436</td>
<td>0.226</td>
</tr>
<tr>
<td>Deficits in short-term memory</td>
<td>54 (13.8)</td>
<td>14 (12.8)</td>
<td>0.9925</td>
<td>0.511</td>
</tr>
<tr>
<td>Focal neurological deficits</td>
<td>33 (8.4)</td>
<td>5 (4.6)</td>
<td>2.0996</td>
<td>0.392</td>
</tr>
<tr>
<td>Headache</td>
<td>329 (84.1)</td>
<td>76 (69.7)</td>
<td>12.1865</td>
<td>0.002</td>
</tr>
<tr>
<td>Vomiting since injury</td>
<td>43 (11.0)</td>
<td>9 (8.3)</td>
<td>0.6870</td>
<td>0.481</td>
</tr>
<tr>
<td>GOAT total score, median (IQR)</td>
<td>99 (94–100)</td>
<td>99 (92–100)</td>
<td>0.109</td>
<td>0.7408</td>
</tr>
<tr>
<td>Met VA/DoD criteria</td>
<td>302 (77.2)</td>
<td>63 (57.8)</td>
<td>16.3428</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
New TBI in the Aged

Outcomes

- On average,
  - Higher morbidity and mortality
  - Slower recovery trajectories
  - Greater functional dependence
  - Increased risk of dementia

- Risk of new onset depression, anxiety, and/or PTSD
New TBI in the Aged

Outcomes

• However, there may be a subset of older individuals who achieve outcomes similar to, or better, than younger individuals
  – Chronological age and TBI severity are not the sole determinants of outcome
**Table 3.** One, Three, and Six Month Outcomes in Older vs. Younger Participants with Mild Traumatic Brain Injury.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>One Month</th>
<th>Three Months</th>
<th>Six Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Younger: Age &lt;65</td>
<td>Older: Age ≥65</td>
<td>Younger: Age &lt;65</td>
</tr>
<tr>
<td>Incomplete Functional Recovery, No. (%)¹</td>
<td>160/258 (62.0%)</td>
<td>26/76 (34.2%)</td>
<td>146/240 (60.8%)</td>
</tr>
<tr>
<td>Post-Concussive Symptoms²</td>
<td>132/259 (51.0%)</td>
<td>11/74 (14.9%)</td>
<td>120/239 (50.2%)</td>
</tr>
<tr>
<td>Depressive Symptoms³</td>
<td>113/258 (43.8%)</td>
<td>14/74 (18.9%)</td>
<td>90/239 (37.7%)</td>
</tr>
</tbody>
</table>

¹ Incomplete functional recovery defined as Glasgow Outcome Scale Extended Score of <8; ² Post-concussive symptoms defined as endorsing at least two symptom categories on the Rivermead Post-Concussion Questionnaire; ³ Depressive symptoms defined a score of ≥5 on the Patient Health Questionnaire-9.
New TBI in the Aged

HeadSMART

Figure 1. Bar Chart of Age Effects on Functional Recovery, Depressive Symptoms, and Post-Concussive Symptoms

- Proportion of incomplete Functional recovery Respondents
- Proportion of Depressive symptoms Respondents
- Proportion of Post-concussive symptoms Respondents

1 month, 3 month, 6 month
Aging with a TBI

Overview Statistics

• Across all age groups, 5.3 million Americans are living with a TBI-related disability
  – Many of these individuals will live to be older adults
Aging with a TBI

Dementia Risk

- Even mild TBI without loss of consciousness has been associated with a 2-fold increase in risk of dementia diagnosis
- TBI may be a risk factor for early-onset (<65 years) Alzheimer’s disease
  - Disinhibition a more likely symptom
- TBI associated with Parkinsonian signs and may be a risk for Parkinson’s Disease

March 25, 2020
Aging with a TBI
Chronic Traumatic Encephalopathy

- A separate neurodegenerative process directly related to repetitive TBI
- Inconsistencies in the literature
- Age at first exposure seems important
New or Existing TBI in the Aged

Mild Behavioral Impairment

- The emergence after the age of 50 years of sustained and impactful neuropsychiatric symptoms
  - A precursor to cognitive decline and dementia
  - NPS can be of any severity, persist for at least six months, and occur in advance of or in concert with mild cognitive impairment (MCI)
Mild Behavioral Impairment

Hypotheses

Figure 1.
The Neuroanatomic Correlates of Syndromal Presentations after Traumatic Brain Injury.
### Cox Proportional-Hazards Models (All MBI Domains):

<table>
<thead>
<tr>
<th>MBI Domain</th>
<th>Hazard Ratio</th>
<th>95% CI</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal Perception or Thought Content</td>
<td>Unadjusted</td>
<td>0.997</td>
<td>(0.530 - 1.874)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.050</td>
<td>(0.557 - 1.979)</td>
</tr>
<tr>
<td>Affective Dysregulation</td>
<td>Unadjusted</td>
<td>1.002</td>
<td>(0.755 - 1.330)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.029</td>
<td>(0.775 - 1.367)</td>
</tr>
<tr>
<td><strong>Decreased Motivation</strong></td>
<td>Unadjusted</td>
<td>1.734</td>
<td>(1.240 - 2.425)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.708</td>
<td>(1.220 - 2.392)</td>
</tr>
<tr>
<td>Impulse Dyscontrol</td>
<td>Unadjusted</td>
<td>1.372</td>
<td>(1.040 - 1.811)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.345</td>
<td>(1.019 - 1.776)</td>
</tr>
<tr>
<td>Social Inappropriateness</td>
<td>Unadjusted</td>
<td>0.946</td>
<td>(0.550 - 1.627)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.002</td>
<td>(0.581 - 1.727)</td>
</tr>
<tr>
<td>All MBI Domains (Any NPS)</td>
<td>Unadjusted</td>
<td>1.216</td>
<td>(0.968 - 1.528)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.218</td>
<td>(0.969 - 1.531)</td>
</tr>
<tr>
<td>All MBI Domains (Threshold of 2)</td>
<td>Unadjusted</td>
<td>1.192</td>
<td>(0.897 - 1.584)</td>
</tr>
<tr>
<td></td>
<td>Adjusted</td>
<td>1.202</td>
<td>(0.904 - 1.598)</td>
</tr>
</tbody>
</table>
Mild Behavioral Impairment
National Alzheimer’s Coordinating Center

Decreased Motivation Survival Curve:

Strata:
- No History of TBI
- History of TBI

Survival Probability vs. Time

$p = 0.0013$
Mild Behavioral Impairment
National Alzheimer’s Coordinating Center

Impulse Dyscontrol Survival Curve:

Survival Probability

Time

p = 0.025
Mild Behavioral Impairment
National Alzheimer’s Coordinating Center

Affective Dysregulation Survival Curve:

Strata
- No History of TBI
- History of TBI

Survival Probability

Time

p = 1

March 25, 2020
A Focused Clinical Approach
A Focused Clinical Approach

Era of Individualized Medicine

- Utilize patient characteristics and clinically relevant biomarkers to guide care
- There have been a few recent advances in the field of TBI
A Focused Clinical Approach

Recent Advances

- Trauma-field triage criteria to optimally identify older adults with TBI who require emergent transfer to a trauma center
- Neurorehabilitation practices specific to older adults with a focus on removing “excess disability”
A Focused Clinical Approach

Recent Advances

- Neurocritical care teams involving geriatricians
- Developing accreditation standards for geriatric trauma care
- Multidisciplinary, comprehensive fall clinics
A Focused Clinical Approach

Future Directions

- Measures used to diagnose TBI and evaluate outcomes were developed in younger cohorts (e.g., GCS)
- Prognostic models (e.g., CRASH CT, IMPACT) show poor performance in older adults
Geriatric Approach to TBI Research

Current Issues

- Excluded from studies
  - upper age limit
  - Pre-existing conditions
  - Frail and unable to complete outcome assessments
  - Unable to travel for research appointments
Geriatric Approach to TBI Research

Possible Solutions

- A battery of neuroimaging- and blood-based biomarkers used to supplement clinician evaluations and inform on diagnosis in ambiguous cases
  - Optimal diagnostic biomarkers in TBI are not clear
- Systematically measure and study, rather than exclude for, pre-existing conditions and disability
- Reliance on proxy informants and study partners
- Home and telemedicine visits
Conclusions

• Working with older adults with TBI is extremely rewarding and a critical area of study that will become more important as the population ages
Conclusions

- It is important to distinguish an individual aging with a TBI versus an individual with new onset TBI later in life
Conclusions

- Clinical endeavors, such as comprehensive, multidisciplinary fall and TBI clinics, focused guidelines, etc. are an increasing focus
Conclusions

- With individualized, precision medicine a "one-size-fits-all" approach is antiquated and unacceptable
Conclusions

- Geriatric research, particularly on Alzheimer’s disease and related dementias, has an extensive track record and application of similar techniques to research on older adults with TBI will help move the field forward
Conclusions

- Older adults with TBI deserve the same advocacy and focused study as sports- and military-related TBI
Questions?

Please type your questions into the “Q&A” chat box at the bottom of your screen.
Next Webinar

In recognition of National Public Health Week and World Health Day, please join us for our next webinar:

Social Determinants of Mental Health for Older Adults: A New Perspective

April 7, 2020 @ 12:00pm EDT
Registration Coming Soon