CONCUSSIONS in the Elderly & those with Neurodegenerative Diseases

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CANADIAN CONCUSSION CENTRE
Research | Diagnosis | Solutions

LiUNA!
Laborers' International Union of North America

Tanz Centre for Research in Neurodegenerative Diseases
UNIVERSITY OF TORONTO

UHN Canada's Hospital

Learning Objectives

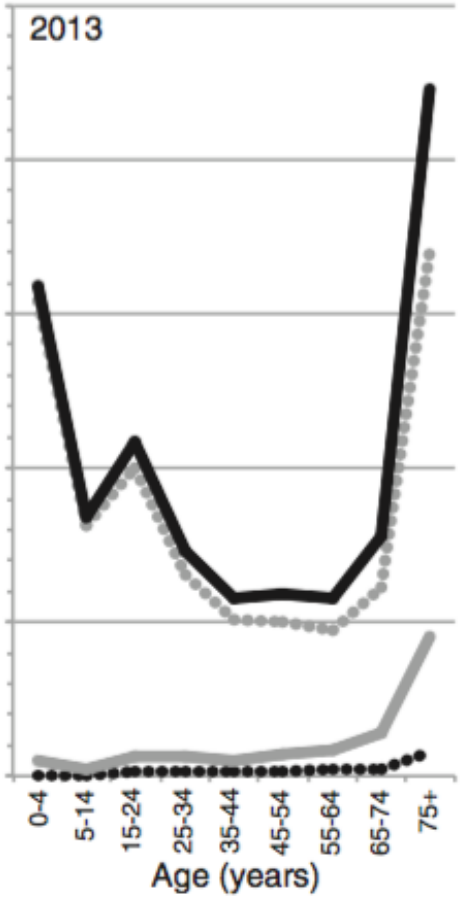
a. Identify characteristics that are unique to the Elderly

b. Describe how the different characteristics influence diagnostic considerations

c. Identify the unique clinical/social resources that may be needed

Traumatic Brain Injury in Older Adults

- Very common in older adults
- Increasing



- >1/200 Americans ages 65–74yr
- >1/50 Americans ages >=75yrs experienced a TBI-related ED visit, hospitalization, or death in 2013
- In 2013, adults ages >= 75yrs accounted for 26.5% of all TBI- related deaths and 31.4% of all TBI-related hospitalizations in US
- Incidence of TBI-related ED visits, hospitalizations & deaths is increasing among older adults

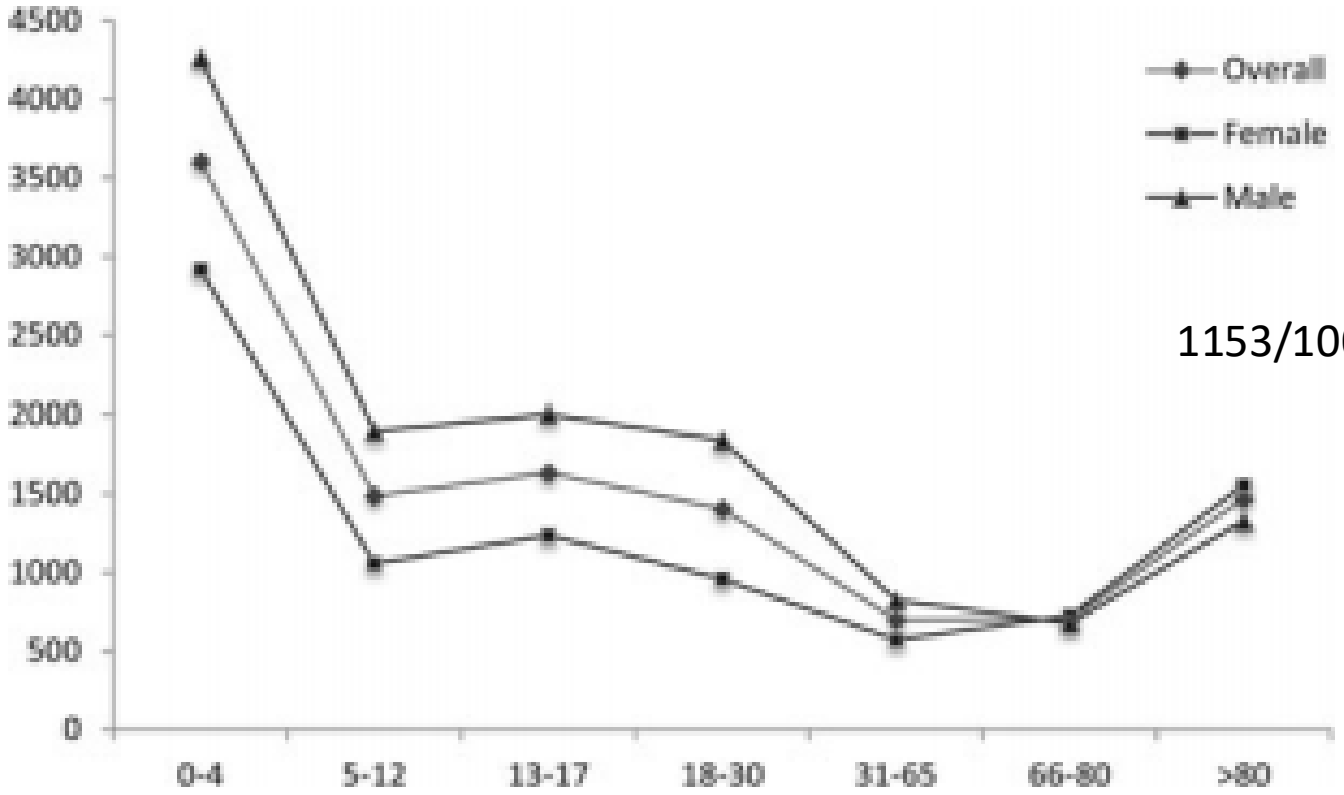
J Neurotrauma 2018 35:889–906

CONCUSSION/mTBI IN THE ELDERLY

- 2002-2006: 390/100000 → 2009-2010: 631/100,000 (61% increase)
- >=75yo - 69% increase
- 2009-2010 - increased frequency of ED visits for TBI (all severities) among older adults
  - Increased rates of ED visits for mTBI may be due to enhanced public health awareness

J Head Trauma Rehabil. 2016 ; 31(5): E1–E7.

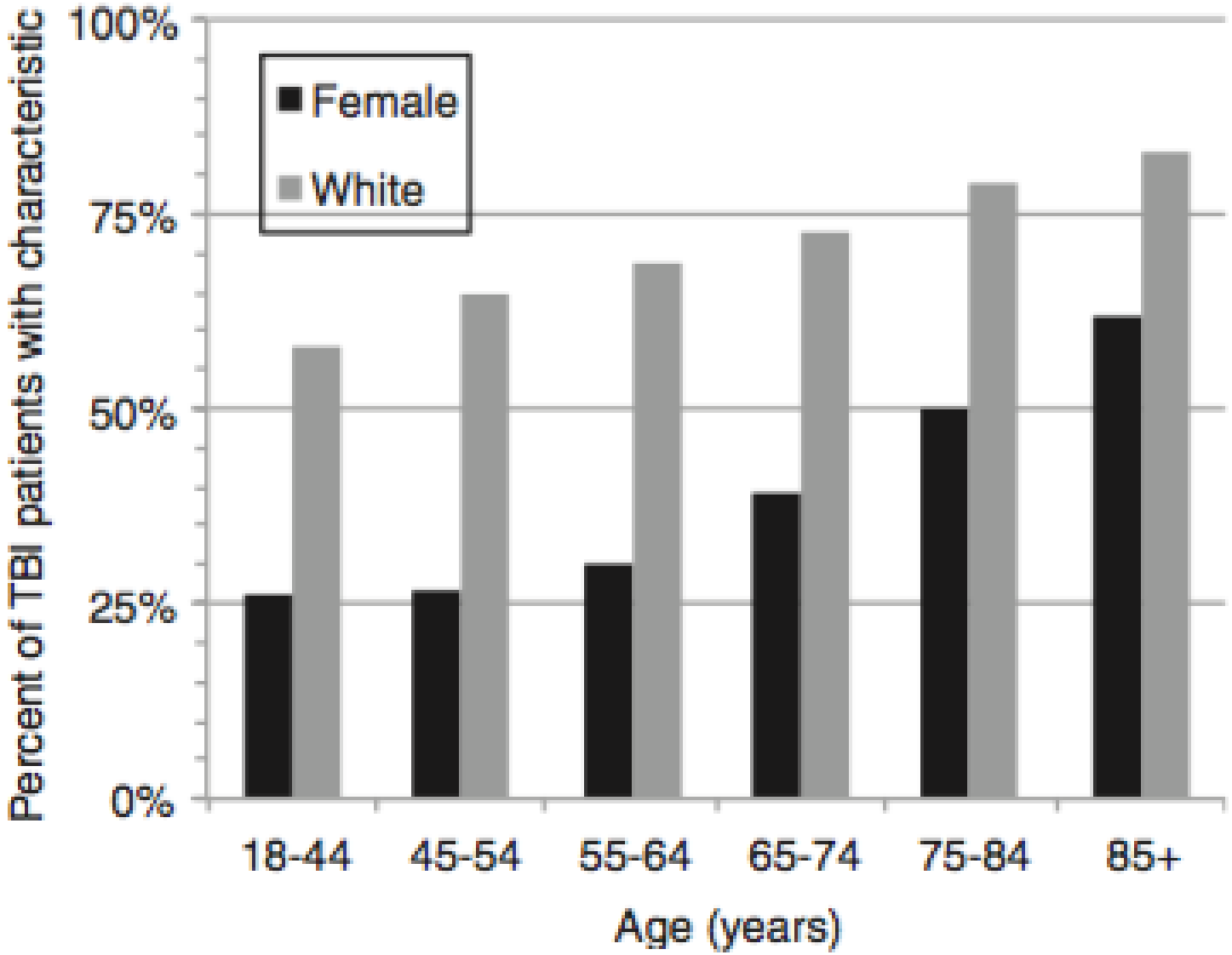
CONCUSSION INCIDENCE in ONTARIO



1153/100000

J Head Trauma Rehabil Vol. 35, No. 1, pp. E60–E66

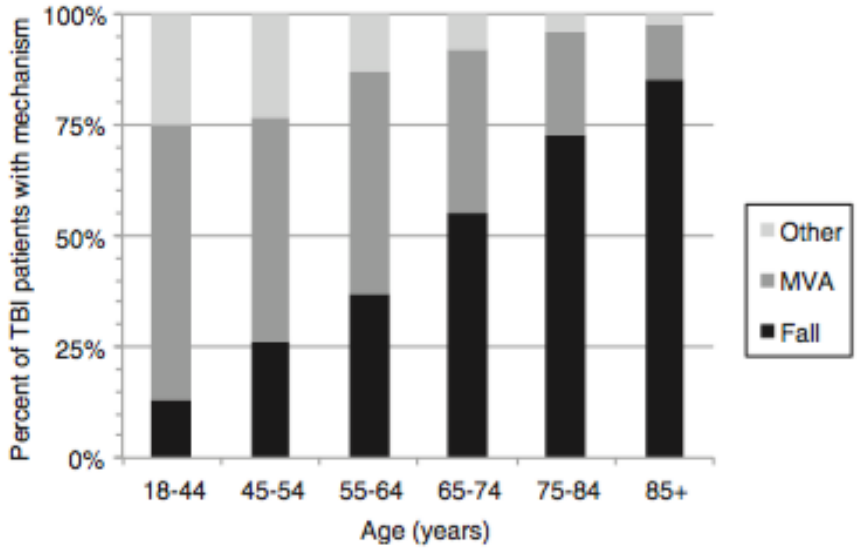
Majority of oldest old with TBI are F & white



J Neurotrauma 2018 35:889–906

CAUSES OF TBI IN ELDERLY

- Falls: 8% of 65+ visit ER b/c of falls; ¼ get hospitalized; falls in hospital
  - 10% of fall = TBI
  - History of a single fall is a major risk factor for a subsequent fall = increasing the risk of repetitive TBI
- MVC: 70+ have higher accident rate/km driven than any other age group, except young male drivers
  - Age-related changes in cognitive functioning (reduced visual, cognitive and psychomotor skills)
- Suicide: highest >=65;
  - 3rd leading cause of injury in >=65
  - Gunshot or jumping
  - RF: white, male, PAST depression.
    - Chronic pain, illness, social isolation
- Elder abuse



J Neurotrauma 2018 35:889–906; Can J Neurol Sci. 2018; 45: 636-642; Accid Anal Prev. 2003;35(2):227-35. ; Nat Rev Neurosci. 2006;7(1):30-40.; Accid Anal Prev. 1998;30 (3):337-46.

MECHANISMS & DEMOGRAPHICS

- Mechanisms of TBI are important considerations:
  - Fall-related TBIs more commonly = mass lesions, i.e. Subdural hemorrhage (BLEEDS)
  - MVC–related TBIs more commonly result in diffuse axonal injury
- Distribution of mild, moderate, severe unknown but study suggests similar across ages

J Neurotrauma 2018 35:889–906

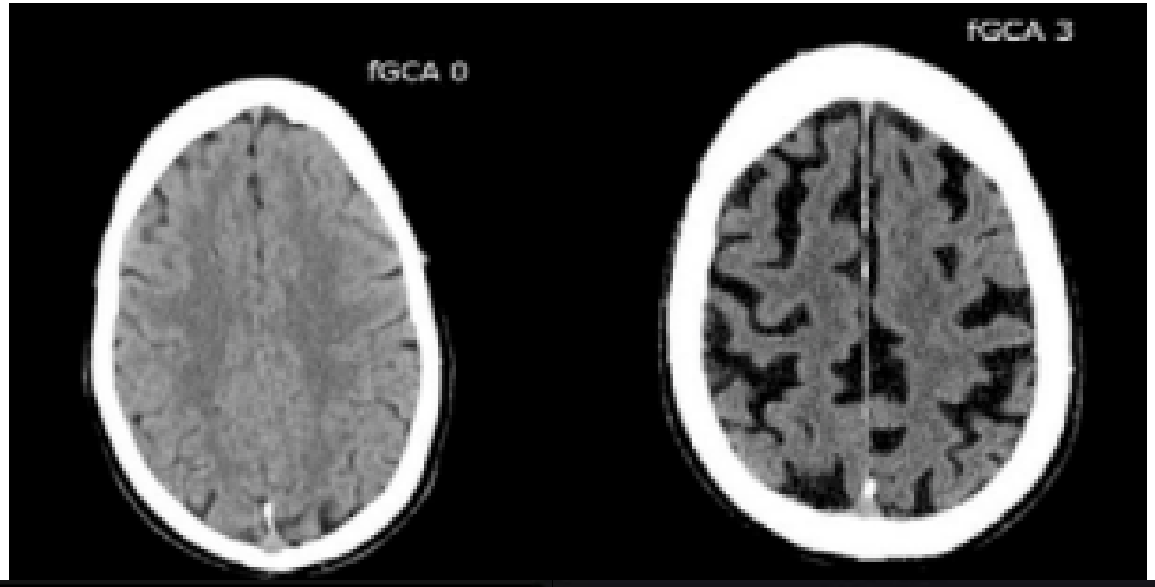
ELDERLY & mTBI

- Assessment in acute phase difficult:
  - age-related issues such as variable baseline cognitive function and impaired memory
  - comorbid diseases and medications that can affect their mental status
- Interaction of complex comorbid medical conditions, medications, premorbid cognitive difficulties, and aging brain makes diagnosis more difficult and prognostication challenging
- With repetitive falls, older individuals are also at risk for repetitive head injury
- Risk of delayed intracranial bleeding from anticoagulant use (blood thinner)
- Risk of delayed effect of bleed because of atrophy (brain shrinkage)

J Am Geriatr Soc. 2006 October ; 54(10): 1590–1595

WHY ARE ELDERLY AT HIGHER RISK OF MORE SEVERE TBI?

Younger



Older

MISSING THE TBI DIAGNOSIS IN OLDER ADULTS

300 REFERRALS <1% IN >65

>1000 <1% IN >65

aids/institutionalization

- Assess
- Can they recall falls, etc
- Unexplained bruises
- Gaps in memory
- Meds: impairing memory, causing hypotension (low blood pressure), parkinsonism (slowness/stiffnes)etc

Quality Improvement Study

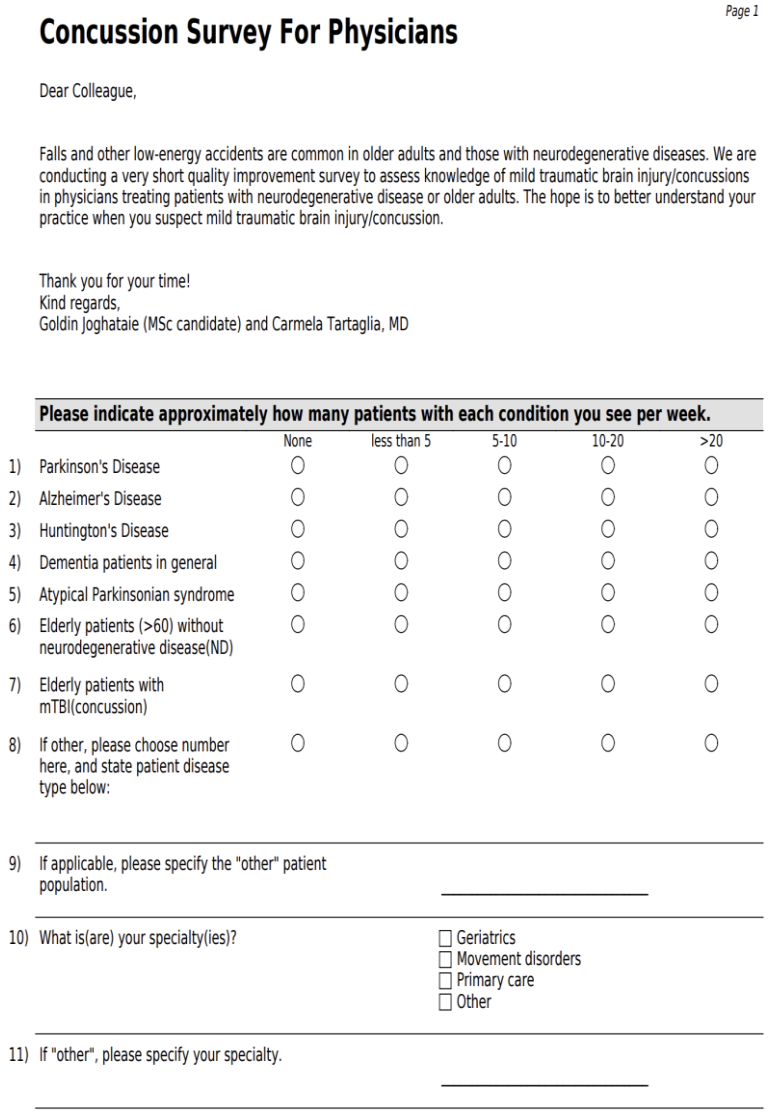
- **Methods**

- We sent 1400 surveys to physicians that see older adults or those with ND, most of whom practice in North America, through email using the REDCap platform.

- A total of 141 physicians replied.

- Neurologists made up the largest group of respondents at 44% with 13% being movement disorder specialists. Geriatrics comprised 37.1% of respondents followed by primary care (8.3%).

- The rest of the group was made up of psychiatry, palliative medicine, neurosurgery, emergency medicine/neurocritical care, and pain doctors.



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Concussion Survey For Physicians

Dear Colleague,

Falls and other low-energy accidents are common in older adults and those with neurodegenerative diseases. We are conducting a very short quality improvement survey to assess knowledge of mild traumatic brain injury/concussions in physicians treating patients with neurodegenerative disease or older adults. The hope is to better understand your practice when you suspect mild traumatic brain injury/concussion.

Thank you for your time!
Kind regards,
Goldin Joghataie (MSc candidate) and Carmela Tartaglia, MD

Please indicate approximately how many patients with each condition you see per week.

		None	less than 5	5-10	10-20	>20
1)	Parkinson's Disease	○	○	○	○	○
2)	Alzheimer's Disease	○	○	○	○	○
3)	Huntington's Disease	○	○	○	○	○
4)	Dementia patients in general	○	○	○	○	○
5)	Atypical Parkinsonian syndrome	○	○	○	○	○
6)	Elderly patients (>60) without neurodegenerative disease(ND)	○	○	○	○	○
7)	Elderly patients with mTBI(concussion)	○	○	○	○	○
8)	If other, please choose number here, and state patient disease type below:	○	○	○	○	○

9) If applicable, please specify the "other" patient population. _____

10) What is(are) your specialty(ies)?
☐ Geriatrics
☐ Movement disorders
☐ Primary care
☐ Other

11) If "other", please specify your specialty. _____

Joghataie et al GeroScience (2025) 47:1269–1276

Summary of Main Results

>**70%** of physicians **never ask** about history of falls!

>**96%** of physicians don't inquire about concussion symptoms – **even after patients or caregivers mention a fall**!

- 51.8% either never ask or do not consider it necessary to ask about concussion symptoms post-fall.
- 92% of physicians recognized that concussions can have lasting effects on patients, particularly on mood and demonstrated good knowledge of post-concussion symptoms.
- > 70% of responding physicians believed that patients with neurodegenerative disease or older adults can fully recover from a concussion.

Joghataie et al GeroScience (2025) 47:1269–1276

TBI IN OLDER ADULTS

- Pre-existing medical conditions = worse outcomes after TBI - common in older adults
  - Past history of TBI = Risk factor for TBI
  - Cerebrovascular disease, depression, impaired activities of daily living – a late-life TBI risk
- Older adults with TBI experience higher morbidity & mortality, slower recovery trajectories, worse functional, cognitive & psychosocial outcomes
- If hospitalized following TBI, older adults usually require extended hospitalizations and more severely disabled & functionally dependent after discharge
  - Trauma registry data in 3244 elderly patients (age > 64 years) with mTBI
    - higher % of nonsurvivors in >=65- risk ratio of 7.8 for elderly vs. nonelderly patients
    - sharp increase in mortality from age 65 -75 years (mortality leveled off at 75 and not significantly different from 75 to 84 years or over 84 years
    - >64 years who survived worse functional outcome at discharge than those who were younger

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J Am Geriatr Soc. 2006 October ; 54(10): 1590–1595; J Neurotrauma 2018 35:889–906;;
Susman, J Trauma Aug. 2002; 53(2):219–223

LIVING CONCUSSION GUIDELINES FOR OLDER ADULTS

1. Concussion should be suspected for all older persons presenting with a fall or other mechanism of injury that could plausibly cause a concussion.
2. For older persons presenting with new onset cognitive impairment, concussion should be considered within the differential diagnosis.
3. For older persons presenting to the Emergency Department after a concussion, the need for immediate neuroimaging should be determined according to the Canadian CT Head Rule.
4. Older persons taking vitamin K antagonist anticoagulants (e.g., warfarin) should undergo neuroimaging immediately after a concussion.
5. For persons sixty-five years of age and older, routine in-hospital observation periods or repeat CT scans (after an initial negative CT scan) are not recommended for persons presenting with concussion who are currently on antithrombotic medication (e.g., antiplatelet medication, direct oral anticoagulants, vitamin k antagonists).
6. Older persons diagnosed with concussion should have concussion symptoms managed similarly to other age groups.
7. For older persons diagnosed with concussion and concurrent geriatric health issues, referral to a geriatric assessment program (e.g., has geriatric expertise) is recommended.

https://concussionsontario.org/index.php/concussion/guideline-section/older-adults

COGNITIVE CONSEQUENCES OF TBI IN OLDER ADULTS

- Cognitive symptoms and impairment common after TBI in older adults
- Increasing impairment with increasing severity
- Slower cognitive recovery c/w younger
- Worse cognitive outcomes c/w younger (inconsistent)
- Premorbid conditions affect outcome
- Need to know baseline

J Neurotrauma 2018 35:889–906; Curr Transl Geriatr Exp Gerontol Rep. 2012 Sept 1; 1(3): 135–142.

RATES OF NEUROPSYCHIATRIC SYMPTOMS POST CONCUSSION

- Prevalence of psychiatric disorder in PCS extremely high: depression 14-61% & anxiety 18-60%
- More concussions = higher risk
- Can have >1 psychiatric disorder
- Post-traumatic stress disorder symptoms overlap
- Comorbid conditions ie substance abuse
- Worsening of pre-morbid psychiatric condition

Vargas 2015; Busch 1998; Fisher 2019; Guskiewicz 2007

NEUROPSYCHIATRIC SYMPTOMS OF PCS IN OLDER ADULTS

- **Common symptom**
- Most common include: depression, anxiety, irritability
- Post-TBI depression
  - Prevalence of depression:
    - In older community-dwelling is 1.8–8.9%
    - In skilled nursing facilities is 25%
    - Older adults with TBI 21-37%
- TBI in older adults - associated with 11% increased risk of new-onset depression and 50% increased risk of new-onset PTSD
- SCREEN FOR DEPRESSION after TBI

J Neurotrauma 2018 35:889–906; Curr Transl Geriatr Exp Gerontol Rep. 2012 Sept 1; 1(3): 135–142.

TREATMENT OF PCS IN OLDER ADULTS

- Just like with younger people
- Target all the symptoms
- Headache/vertigo/sleep issues/pain COMMON IN OLDER ADULTS
  - OSA common in PCS, in older adults
  - Neuropsychiatric symptoms affected by physical symptoms - address both
- Prevention – assess causes ie falls, MVC
  - Fall prevention/driving

Santos 2020

PAST HISTORY CONCUSSION & NEURODEGENERATION

- Increasing evidence that remote head trauma is a risk factor for delayed neurodegeneration i.e. chronic traumatic encephalopathy, Alzheimer's disease, Parkinson's disease, ALS, and other neurodegenerative diseases
  - Study of > 350 000 veterans +/- TBI, mTBI w/o LOC associated with > 2-fold increase in risk of dementia
- Concern in aging population because of media attention ie people reporting concussion in childhood

Dementia prevention, intervention, and care: 2020 report of the *Lancet* Commission

Gill Livingston, Jonathan Huntley, Andrew Sommerlad, David Ames, Clive Ballard, Sube Banerjee, Carol Brayne, Alistair Burns, Jiska Cohen-Mansfield, Claudia Cooper, Sergi G Costafreda, Amit Dias, Nick Fox, Laura N Gitlin, Robert Howard, Helen C Kales, Mika Kivimäki, Eric B Larson, Adesola Ogunniyi, Vasiliki Orgeta, Karen Ritchie, Kenneth Rockwood, Elizabeth L Sampson, Quincy Samus, Lon S Schneider, Geir Selbæk, Linda Teri, Naaheed Mukadam

Barnes et al, JAMA Neurology, 2018;
Tartaglia et al, Front in Neuroscience, 2013;
Livingston et al, Lancet, 2020

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Tolppanen, 2017 Alz Dem; Barnes JAMA 2019 Neurology; Yaffe 2019 Neurology; Redelmeier 2019 JAMA Neurology; Livingston 2024 Lancet

CONCUSSION IN PATIENTS WITH COGNITIVE IMPAIRMENT

- Concussion often **UNDIAGNOSED – patient can't recall/afraid to report as may lead to walking aid/institutionalization**
- Could be associated with sudden deterioration
- Untreated concussion symptoms (i.e. headache, dizziness, etc) could be associated with behavioral issues, i.e. agitation, aggression
- Risk for multiple concussions

SUMMARY

- Personalized medicine: consider the person, their circumstances and mechanism of injury
- Special populations: elderly/pre-existing cognitive impairment
  - FEAR/EMBARRASSED OF REPORTING; FORGET TO REPORT
- Global vulnerability factors for PERSISTENT SYMPTOMS
  - Previous concussions
    - Elderly – baseline functions (neurodegeneration), comorbid conditions/meds, “forgetting” falls

RESOURCES

https://parachute.ca/en/professional-resource/adult-falls-collection/

https://www.uhn.ca/Krembil/Canadian-Concussion-Centre/Education/Pages/Webinar-Series-Archive.aspx

Youtube Concussion in Older Adults

THANK YOU FOR LISTENING