Traumatic Brain Injuries Chairperson: Alice Hathaway Monday, March 25th, 2019 Parallel Session A 1:35 – 2:15 pm

Concussion Management

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Disclosures

• I, Douglas Comeau, nor any family members, have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation

Learning Objectives

- Discuss concussion updates from recent international conference
- Know appropriate return to work progression
- Identify newer strategies to assist in recovery
- Attempts at prevention
- Future research

Boston College 2015



Boston College 2015



Evolution of Concussion

- Pre-2001:
 - 16 different grading scales
 - Too many opinions and return to play guideline
- 2001: 1st International Concussion Conference (Vienna)
 - Redefined sports concussion
 - Abandoned grading scales
 - Still graded a concussion once patient returned to baseline
 - Number of head injuries did not correlate with severity

Evolution of Concussion

- 2005: 2nd International Concussion Conference (Prague)
 - Definition unchanged
 - Concussions either "simple" vs. "complex"
 - Managed according to this classification
 - First mentioned post-concussion syndrome
- 2008: 3rd International Concussion Conference (Zurich)
 - Simple vs. Complex doesn't work
 - Treat all concussions individually
 - Recommend neuropsychological testing for all concussions
 - SCAT₂ formed
 - First mentioned exercise testing for post-concussion syndrome

Evolution of Concussion

- 2013: 4th International Conference on Concussion (Zurich)
 - Developed SCAT₃, including a child SCAT₃
 - Neuropsychologist recommended but not mandated
 - Vestibular rehab for chronic symptoms
 - Added exercise from chronic symptoms
- 2016: 5th International Conference on Concussion (Berlin)
 - Redefined sports concussion and also answered more relevant clinical questions
 - Developed SCAT5

Berlin Guidelines

- Changed term and definition to "Sports Related Concussion" (SRC)
- SRC is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:
 - MOI direct blow to head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
 - Results in rapid onset of short-lived impairment of neurological function that resolves spontaneously.
 - Signs and symptoms can evolve over a number of minutes to hours.
 - May result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a function disturbance rather than a structural injury so no abnormality is visible on standard structural neuroimaging studies.
 - Results in a range of clinical signs and symptoms that can also be consistent with other comorbidities such as substance abuse, cervical injury, vestibular dysfunction, psychological conditions.

Berlin: Signs and Symptoms of SRC

- Suspected diagnosis of SRC can include one or more of the following clinical domains:
 - Symptoms: somatic (e.g. headache), cognitive (e.g. feeling like in a fog) and/or emotional symptoms (e.g. liability).
 - Physical signs (e.g. loss of consciousness, amnesia, neurological deficit).
 - Balance impairment (e.g. gait unsteadiness).
 - Behavioral changes (e.g. irritability).
 - Cognitive impairment (e.g. slowed reaction times).
 - Sleep/wake disturbance (e.g. somnolence, drowsiness).
- These symptoms and signs are non-specific to concussion, so they
 prompt concussion in the differential but do not confirm the diagnosis
 on its own.

SCAT 5 Changes (from SCAT3)

- Symptom Checklist to be completed by the patient, not via clinician interview.
- Symptom Checklist to be completed when patient is in a "resting state" approximated by their heart rate. Similar to previous version's recommendation of 10 minutes post-exercise, but is no longer tied to specific time window.
- A 10-word (versus 5-word) option for the SAC Immediate and Delayed Recall to minimize ceiling effects is recommended.

More changes in SCAT 5

- Utilizes both tandem-gait and BESS testing as opposed to one or the other.
- Declaration that the complete SCAT5 cannot be accurately completed in less than 10-minutes.
- Diagnostic utility of the full SCAT5 decreases significantly after 3-5 days.
- Symptom checklist validated as a measure of progress/healing in all stages of healing.
- Baseline testing may be useful, but is not necessary.



STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS²

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

Mark Y for correct answer / N for incorrect

What venue are we at today?	Y	N	
Which half is it now?	Y	N	
Nho scored last in this match?	Y	N	
Nhat team did you play last week / game?	Y	N	
Did your team win the last game?	Y	N	
Note: Appropriate sport-specific questions may be substitute	ed.		
	© Concu	ssion in Sp	oort Gro

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rand

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STEP 4: EXAMINATION GLASGOW COMA SCALE (GCS)³

Time of assessment			
Date of assessment			
Best eye response (E)			
No eye opening	1	1	1
Eye opening in response to pain	2	2	2
Eye opening to speech	3	3	3
Eyes opening spontaneously	4	4	4
Best verbal response (V)			
No verbal response	1	1	1
Incomprehensible sounds	2	2	2
Inappropriate words	3	3	3
Confused	- 4	4	4
Oriented	5	5	5
Best motor response (M)		-	
No motor response	* 1 .	1	1
Extension to pain	2	2	2
Abnormal flexion to pain	3	3	3
Flexion / Withdrawal to pain	4	4	4
Localizes to pain	5	5	5
Obeys commands	6	6	6
Glasgow Coma score (E + V + M)		in in the second	

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?

If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?

Is the limb strength and sensation normal?

In a patient who is not lucid or fully conscious, a cervical spine injury should be assumed until proven otherwise.

Y

Y

Y

N

N

N

Sport / team / school:		
Date / time of injury:		
Years of education completed:		
Age:		
Gender: M / F / Other		*
Dominant hand: left / neither / right		
How many diagnosed concussions has the athlete had in the past?:		
When was the most recent concussion?:		
How long was the recovery (time to being cleared to p from the most recent concussion?:	olay)	(days)
Has the athlete ever been:		
Has the athlete ever been: Hospitalized for a head injury?	Yes	No
Has the athlete ever been: Hospitalized for a head injury? Diagnosed / treated for headache disorder or migraines?	Yes Yes	No
Has the athlete ever been: Hospitalized for a head injury? Diagnosed / treated for headache disorder or migraines? Diagnosed with a learning disability / dyslexia?	Yes Yes Yes	No No No
Has the athlete ever been: Hospitalized for a head injury? Diagnosed / treated for headache disorder or migraines? Diagnosed with a learning disability / dyslexia? Diagnosed with ADD / ADHD?	Yes Yes Yes Yes	No No No
Has the athlete ever been: Hospitalized for a head injury? Diagnosed / treated for headache disorder or migraines? Diagnosed with a learning disability / dyslexia? Diagnosed with ADD / ADHD? Diagnosed with depression, anxiety or other psychiatric disorder?	Yes Yes Yes Yes Yes	No No No No

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: 🗆 Baseline 🗆 Post-Injury

Please hand the form to the athlete

	none	m	ild	moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1.	2	3	• 4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	.4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:						c	f 22
Symptom severity score:						of	132
Do your symptoms get worse	e with physic	al acti	vity?		1	Y N	
Do your symptoms get worse	e with menta	l activ	ity?		1	YN	
If 100% is feeling perfectly n percent of normal do you fee	ormal, what						





Orientation score

of

IMMEDIATE MEMORY

The Immediate Memory component can be completed using the traditional 5-word per trial list or optionally using 10-words per trial to minimise any ceiling effect. All 3 trials must be administered irrespective of the number correct on the first trial. Administer at the rate of one word per second.

Please choose EITHER the 5 or 10 word list groups and circle the specific word list chosen for this test.

I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order. For Trials 2 & 3: I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before.

						Trial 1	Trial 2 Tria
А	Finger	Penny	Blanket	Lemon	Insect		
В	Candle	Paper	Sugar	Sandwich	Wagon		
С	Baby	Monkey	Perfume	Sunset	Iron		
D	Elbow	Apple	Carpet	Saddle	Bubble	and a second second	
E	Jacket	Arrow	Pepper	Cotton	Movie		
F	Dollar	Honey	Mirror	Saddle	Anchor		
		•	Im	mediate Mem	ory Score		of 1
			Time that I	ast trial was c	ompleted		

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I+FI

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	Ν	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	· Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1
List D	List E	List F			
7-8-2	3-8-2	2-7-1	Y	N	0
9-2-6	5-1-8	4-7-9	Y	N	1
4-1-8-3	2-7-9-3	1-6-8-3	Y	N	0
9-7-2-3	2-1-6-9	3-9-2-4	Υ.	N	1
1-7-9-2-6	4-1-8-6-9	2-4-7-5-8	Y	N	0
4-1-7-5-2	9-4-1-7-5	8-3-9-6-4	Y	[.] N	1
2-6-4-8-1-7	6-9-7-3-8-2	5-8-6-2-4-9	Y	N	0
8-4-1-9-3-5	4-2-7-9-3-8	3-1-7-8-2-6	Y	N	1

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan 0 1

Concentration Total Score (Digits + Months)

Months Score

of 1

of 5

oort Group 2017 doi:10.1136/bisports-2017-097506SCAT5

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

U

C

Can the patient read aloud (e.g. symptom check- list) and follow instructions without difficulty?	Y	Ν	
Does the patient have a full range of pain- free PASSIVE cervical spine movement?	Y	* N	
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N	
Can the patient perform the finger nose coordination test normally?	Y	N	
Can the patient perform tandem gait normally?	Y	N	

19

5

(-)

0

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing⁵

Which foot was tested (i.e. which is the non-dominant foot)	□ Left □ Right	
Testing surface (hard floor, field, etc.)		
Footwear (shoes, barefoot, braces, tape, etc.)		
Condition	Errors	
Double leg stance		of 10
Single leg stance (non-dominant foot)		of 10
Tandem stance (non-dominant foot at the back)		of 10
Total Errors		of 30

6

5

く



"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."





(b) Single leg stance:

"If you were to kick a ball, which foot would you use? [This will be the dominant foot] Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."



(c) Tandem stance:

"Now stand heel-to-toe with your **non-dominant foot** in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."

Biodex Balance Machine



Biodex Report Comparison





Sport concussion.				
Q	5 /	9		
6				
STEP 6: DECIS	ION			
	Date	& time of assessn	nent:	Date and time of inju
Domain				If the athlete is know
Symptom number (of 22)	(INTERNAL)			(If different, describ
Symptom severity score (of 132)	And			Concussion Diagnos
Orientation (of 5)			and the second s	If re-testing, has the Yes No Un
Immediate memory	of 15 of 30	of 15 of 30	of 15 of 30	I am a physician administered or
Concentration (of 5)				Signature:
Neuro exam	Normal Abnormal	Normal Abnormal	Normal Abnormal	Name:
Balance errors (of 30)				Title:
Delayed Recall	of 5 of 10	of 5 of 10	of 5 of 10	Registration nun Date:

Sport concursion

R 4 2 00% ury: ____ wn to you prior to their injury, are they different from their usual self? nsure 🗆 Not Applicable be why in the clinical notes section) sed? nsure 🗆 Not Applicable athlete improved? nsure 🗆 Not Applicable or licensed healthcare professional and I have personally supervised the administration of this SCAT5. mber (if applicable):

Sideline Card (Boston College)

Name:	Date:
Sport:	Practice / Game
Time of Injury:	_ AM / PM
Time of Initial Eval:	AM / PM
LOC: No / Yes; Duration	n:
Headache Nausea	No / Yes No / Yes
Balance Difficulty	No / Yes
Difficulty Concentrating	No / Yes
Sensitive to Light	No / Yes
Sensitive to Sound	No / Yes
Visual Change	No / Yes
Pupils: Equal Yes / No	Reactive: Yes / No
Ba Evaluation (Begular inte	errole until stehle)
TC-LVardation (Regular mic	ervais until stable)
Time/Status/Comments	

Berlin: Re-Evaluate

- Key features of the follow-up exam should encompass:
 - Medical assessment including a comprehensive history and detailed neurological examination including a thorough assessment of mental status, cognitive function, sleep/wake disturbance, ocular function, vestibular function, gait and balance.
 - Determination of the clinical status of the patient and if there has been improvement/deterioration since the time of injury.
 - Determination of the need for emergent neuroimaging to exclude a more severe brain injury.
- Neuropsychological assessments can aid in assessing cognitive recovery independent of symptom resolution.
- Advanced neuroimaging, fluid biomarkers and genetic testing are important research tools, but require further validation to determine their ultimate clinical utility in evaluation of SRC.

Neuropsychological testing

- Pre-injury/Post-injury comparison
- Old school pencil to paper modality
- New school computerized testing
 - Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT)
 - Concussion Resolution Index
 - CogSport
- Well established, mixed support
- Data does not support one test over the other; however, research is ongoing
- ImPACT frequently used at high school, colleges, professional levels

ImPACT Example

ImPACT[®]Clinical Report

Exam Type	Baseline	Post-Injury 1		123	
Date Tested	09/10/2016	01/23/2017			
Last Concussion					
Exam Language	English	English		ASN'S	
Test Version	2.1	2.1			

Composite Scores	Percentile scores if available are liste					isted
Memory composite (verbal)	87	59%	99	96%		hite
Memory composite (visual)	77	53%	85	80%		
Visual motor speed composite	40.88	58%	37.73	43%		
Reaction time composite	0.62	31%	0.58	49%		
Impulse control composite	2		3			
Total Symptom Score	0		3			
Cognitive Efficiency Index *	0.32		0.41			

The Cognitive Efficiency Index measures the interaction between accuracy (percentage or (reaction time) in seconds on the Symbol Match test. This score was not developed to m decisions but can be helpful in determining the extent to which the athlete tried to work

Berlin: Rest

- After 24-48 hours of rest post-injury, patients should be encouraged to gradually progress their activity level while staying below their symptom threshold.
- The exact amount and duration of rest is not yet well defined in the literature.
- There is insufficient evidence to support complete rest beyond 48 hours to enhance recovery.

Berlin: Rehabilitation

- The literature has not evaluated early interventions, as most individuals recover in 10-14 days.
- A collaborative and varied treatment approach may be needed due to the diverse symptoms and problems associated with the injury (psychological, cervical and vestibular rehabilitation and controlled cognitive stress, pharmacological treatment and school accommodations).
- Active rehabilitation programs (sub-max and sub-symptom threshold exercise) have been shown to be safe and may benefit in facilitating recovery.

Vestibular/Ocular-Motor Screen

- Screening Tests:
 - Smooth Pursuits
 - Horizontal Saccades
 - Vertical Saccades
 - Convergence
 - Vestibular-Ocular Reflex
 - Visual Motor Sensitivity

- Treatment:
 - Beeds
 - Pencil Push-Up
 - Laser
 - Laser Reposition

Berlin: Refer

- Persistent symptoms following SRC persist beyond expected time frames of recovery (>10-14 days in adults and >4 weeks in children).
- Detailed multimodal clinical assessment is required with these patients to identify specific primary and secondary pathologies that may be contributing to symptom manifestation in a similar manner to the re-evaluation model.
- Individualized treatment programs should be developed on a patient-to-patient basis informed by the results of the specific assessment tools.

Berlin: Refer

- Preliminary evidence supports the use of:
 - Symptom-limited aerobic exercise programs in patients with autonomic instability or physical deconditioning.
 - Targeted physical therapy program in patients with cervical spine or vestibular dysfunction
 - Collaborative approach including cognitive behavioral therapy in patients with persistent mood/behavioral issues.
 - Limited evidence to support pharmacotherapy.

Symptomatic Treatment

- Early (24 to 48 hours) symptoms are generally best manage by cognitive and physical rest
- OTC analgesics are commonly used for headache symptoms
- Other commonly used medications/supplements have an unclear role in symptom management
 - ADHD medications
 - Migraine Medication
 - Fish Oil
 - Others
- Care should be taken not to cloud the return to play decision by masking post-concussive symptoms

Insomnia and Depression in PCS

- Effective
 - Amitriptyline
 - Nortriptyline
 - Trazodone
 - Melatonin 3-5 mg PO qhs
- Mixed
 - Gabapentin
 - SSRIs

- Ineffective
 - Ambien

Cognitive Function

- Fish Oil/Omega 3 Fatty Acid
 - 1000 mg tablets (600 mg EPA/DHA)
 - 5 tabs PO TID for 10 days
 - 5 tabs PO BID for 10 days
 - 5 tabs PO daily for 10 days

Headache

- Coenzyme Q10
 - 160 mg PO daily
- Riboflavin/Vitamin B2
 - 400 mg PO daily
- Magnesium Oxide
 - 400 mg PO daily
- D-Ribose
 - 4 grams PO daily

Berlin: Recovery

- Neurobiological recovery may extend beyond clinical recovery in some patients.
- Predictors or slower recovery from SRC are:
 - Initial symptoms in the first-second day post-injury (most consistent predictor).
 - Development of subacute problems with migraine headache or depression.
 - Pre-injury history of mental health problems or migraine headaches (in children, adolescents and young adults).
 - ADD/ADHD or other learning disabilities might require more careful planning with return to academics, but do not appear to be at substantially greater risk of persistent symptoms.
 - Being a female, particularly teenage female.

Berlin: Establishing Time for Recovery

- Based on research limitations there is no current single definitive physiological time window for SRC recovery.
- Modalities to measure physiological change after SRCs are not ready for clinical measurement just yet.

Berlin: Return to Work

- Symptom-limited activity can begin below a cognitive and physical exacerbation threshold following brief period of initial rest (24-48 hours).
- Once concussion symptoms have resolved the patient should be taken through a gradual step-wise progression back to activity with each phase spanning at least 24 hours.
- If symptoms return during the progression the patient should be dropped to the previous step until symptoms resolve and then begin progressing again.

Return to Work Progression

- Rest 24-48 hours prior to sub-therapeutic exercise
- Light aerobic exercise (stationary cycle)
- Sport-specific training (drills, no head impact)
- Non-contact training drills (start light resistance training or more complex drills)
- Full contact training after medical clearance
- Return to competition (game play)
- No less than 24 hours before each stage

Berlin: Residual Effects and Sequelae

- There is much more to be learned in the literature regarding the potential cause-and-effect relationship of repetitive head-impact exposure and concussions.
- A cause-and-effect relationship has not yet been demonstrated between CTE and SRCs or exposure to contact sports.



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Post-Concussive Syndrome

- No universal definition of post-concussive syndrome
- Persistent symptoms and signs of concussion for weeks to months after the incident
- Symptoms of post-concussion syndrome can be subjective or objective and are often vague and nonspecific making the diagnosis difficult.
- Risk factors not clear
- No correlation between severity of injury on presentation and development of PCS
- Rehabilitation (Cervical, Vestibular, Ocular, Cognitive)



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Future

- Research ongoing, with difficulty in obtaining doubleblinded prospective studies
- Validate current assessment tools
- Delineate role of neuropsychological testing
- Improve identification of those at-risk of PCS, prolonged symptoms
- Enhanced imaging, biomarkers
- Further NCAA-DOD data
- Minimum time out for concussion?

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Team Physicians for:

BU, BC, Emerson, Boston Public Schools, USA Gymnastics First Primary Care Sports Medicine Center in Boston Multi-Disciplinary Sports Medicine Center

What does the Ryan Center Offer?

Concussion Clinic

- Trained sports medicine physicians
- Biodex Balance Machine
- ImPACT neuropsychological testing
- Vestibular-ocular rehab
- Cervical Rehabilitation
- OMT
- MSK Ultrasound

Physical Therapy

■X-Ray

- Treadmill Testing
- Fracture Care
- **PRP**

Thank You! Questions during Q&A



Traumatic Brain Injuries Danielle Hannigan, RN,CCM Clinical Director Private Home Care Services , LLC.

THE FACTS TO KNOW WHEN IT COMES TO TREATING TBI'S

TBI are a major cause of death and disability in United States

TBI's contribute to 30% of all injuries, 153 people die everyday from a traumatic brain injury

Traumatic Brain Injuries are typically caused by a bump , blow or jolt to the head. This disrupts the normal function of the brain.

★Over the last six years the rate for TBI related Emergency has increased by 47%! Hospitalization has decreased by 2.5% Death has decreased by 5%

Leading Cause Of Traumatic Brain Injuries

1. Falls 47% 2. Stuck by Object 15% 3. Motor Vehicle Accidents 19%

- What to expect Long Term depends on the severity of the injury.
- Minor Injuries do not have long lasting effects
- Traumatic Brain Injury Patients may face permanent changes to their personality, physical abilities, and they ability to think in general. Cognitive deficits.
- The 3 C's when tragedy occurs that the patients healthcare team should be doing from the start of care.
- <u>Communicating</u> with the patient and the patient's family. Current up to date informatation
- <u>Content</u> Important information that you would want to know if your family member was injured.
- <u>Compassion</u> The delivery of the information can be just as important as what is being delivered in the message.

Major Types of TBI's

Hematoma collection or clotting of blood outside the blood vessels (If the blood enters the Brain the condition becomes more serious. The head has the most blood vessels.

Hemorrhage uncontrolled bleeding around the brain, subarachnoid hemorrhage s/sx vomiting and nausea, and Intracerebral hemorrhage bleeding within the brain tissue *Pressure can build up over time. The skull can stretch to accommodate some swelling but in serious events this may lead to the brain pressing up against the skull

Diffuse anoxal Injury with edema Anoxal Injuries are the most serious as they lead to permanent brain damage

Edema that increases pressure in the brain

Concussion when the impact on the head is severe enough to cause injury to the brain

Effects on Consciousness

A TBI can cause problems with arousal, consciousness, awareness, alertness, and responsiveness. Generally, there are four abnormal states that can result from a severe TBI:

Brain death

The lack of measurable brain function and activity after an extended period of time is called brain death and may be confirmed by studies that show no blood flow to the brain.

Coma

A person in a coma is totally unconscious, unaware, and unable to respond to external stimuli such as pain or light. Coma generally lasts a few days or weeks after which an individual may regain consciousness, die, or move into a vegetative state.

Vegetative state

A result of widespread damage to the brain, people in a vegetative state are unconscious and unaware of their surroundings. However, they can have periods of unresponsive alertness and may groan, move, or show reflex responses. If this state lasts longer than a few weeks it is referred to as a persistent vegetative state.

Minimally conscious state

People with severely altered consciousness who still display some evidence of selfawareness or awareness of one's environment (such as following simple commands, yes/no responses).2

Types of Head and Traumatic Brain Injuries

Types of Head Injuries Skull, Scalp, Closed or Open

- <u>Closed-Linear</u> -Straight line comminuted , broken in 3 sections or more, compound fracture, simple fracture, The skin that covers the fractures is closed.
- <u>Open Compound Fracture</u>- Skin is broken and bone emerges.
- <u>Depressed</u> Intent skull into the brain cavity
- <u>Basal</u> Floor of skull around the eyes, ears, nose, and top of neck near the spine.
- Skull is there to protect the brain. However injuries severe enough can effect the spine

How do these injuries occur at work?

- Falling and hitting the ground
- Objects not being secure and falling from significant height
- Trauma
- Safety ensuring that rock salt is placed at work place, items are not in places where people can trip and fall. Secure all items on the job site.
- Call 911 Do not move the IW

What To Look For?

Physical

- Sleep disorders
- Loss of stamina
- Appetite changes
- Diffculty swallowing
- Physical paralysis
- Chronic pain
- Loss of control of bowel and bladder
- Seizures
- Diffculty regulating body temperature
- Headaches
- Room moving

Cognitive Effects

- Difficulty with attention
- Distractibility
- Memory problems
- Slow speed in processing
- Confusion/ Inappropriate acts or gestures
- Repetition of words, gestures, acts
- Impulsiveness
- Difficulty with languages
- Difficulty executing functions such as planning
- Difficulty with cognitive flexibility
- Abstract thinking

What can we do better when transitioning a patient from acute phase to rehabilitation phase

Hospital to Rehab

- Routine
- Meetings weekly on progress, prognosis, and plan
- Discharge planning meeting typically start when the patient arrives. Let the patient know they are not leaving it is to prepare.
- Be compassionate when the patient becomes frustrated or tired. The patient is overwhelmed by the emotional and physical toll this injury has caused
- ALWAYS COLLABORATE!

Rehab to Home

- Ensure the Home Care Team has been invited to the discharge meetings. This will help the NCM from having to explain or miss any information that may of occurred during this weekly meeting
- Clearly lay out who will be doing what, when, why and where for the patient
- Home Assessment has been completed and all supplies are ordered and have arrived
- The team that is going to be working daily with the patient is going to be able to train with the rehabilitation center
- Set yourself up for success. Be overly cautious. Get to know the patient because brain injuries are so different.
- Make sure there is a rehab plan for home that will be followed.
- ALWAYS COLLABORATE!

Once the Injured Worker Arrives Home All injuries will be monitored to ensure the injury does change. Routine

- Anti-Seizure medication Some brain injuries are at risk for weeks while others remain on the rest of their life
- Diuretics if the injury has caused a pressure build up Diuretics cause to excrete more fluids to relieve the pressure
- Secondary Injury
- Secondary brain injury results from metabolic and physiologic changes that at the time of the initial injury and may last for hours and days, such as:
- Hypoxia and Hypotensions ۲
- Ischemia
- Cerebral Edema resulting in increased intracranial pressure
- Hydrocephalus
- Second Impact Syndrome an extremely rare outcome where death or severe neuroloic injury occurs when a person sustains a second concussion before symptoms from an earlier one have subsided.

- Difficult to transition home from a place that is an institution and the IW was able to follow the calendar
- Mimic the live of the rehab for at least a month post discharge
- Ensure that if the clients is going home with Personal Care Attendants, Certified Nursing Assistants or Family that they are educated by someone who has managed traumatic brain injuries at home. Provide In Home Service Trainings to the caregivers and the patients.
- Teach them the exercises and activities that you have learned from caring from other TBI's
- Collaborate with the patient, families, NCM, rehabilitation facility, and the medical team
- Never be scared to report anything to the MD's you are their eyes and ear's

Treatment

• While most people agree that rehabilitation should begin as early as possible following a brain injury, it is not uncommon to begin rehabilitation months or years following the injury event. With the help of specialized rehabilitation, anyone with a brain injury can continue to make improvements in his or her life, no matter how many years have transpired since the injury.

"Inspire your TBI to want to get better and believe it will together". -Anoyomous

• "Brain injury doesn't mean never," says Peggi. "It means just not now, maybe. And maybe not ever, but at least I can get a rung on the ladder, I can hold on to something and try to get better."

Different types of services specific to brain injury rehabilitation

- Cognitive therapy
- Speech/language therapy
- Physical therapy
- Occupational therapy
- Neurobehavioral therapy
- Vocational rehabilitation
- Neuropsychological testing
- Alternative
- Craniosacral therapy
- Hyperbaric oxygen treatment
- Biofield therapies
- Meditation/mindfulness
- Medical professionals typically involved in brain injury rehabilitation

Neuropsychologists

- Behavioral analysts
- Cognitive therapists
- Physiatrists
- Physical therapists
- Recreational therapists
- Occupational therapists
- Neurologists
- Neuropsychiatrists
- The Rehabilitation Process
- During and after the physical recovery from a brain injury, a person may receive various tests that help determine what parts of the brain have been affected. Sometimes this testing is conducted by a neuropsychologist or a clinical evaluator who is experienced in brain injury screening. If the need for rehabilitation is evident, then specific rehabilitation services will be recommended. In most cases, a hospital social worker or case manager will help direct a person to programs that offer the type of treatment the person needs.

TBI's will need rehabilitation in the <u>home setting</u> to regain full use of their brain function. It is great when the Home Care Team escorts them to and from the therapy because then therapy never stops and it continues $\mathbf{H} \cdot \mathbf{The Team from The Clinical}$

- Most Common therapies
- Phyical therapy-Mobility
- Occupational therapy-Learn to live again examples using the stove, how to remember you were using the stove, how to put you shoes on or lace them again
- **Speech**-Cognitive,Processing, Time, Space and Speech

 H • The Team from The Clinical Director to the nurses and the aids should be following the care plan that was developed back when the NCM invited the Home Care Team to the discharge meeting.

- The Clinical Director or the nurse and NCM will collaborate sometimes on a daily level when a IW is just arriving home
- The NCM and Home Care team will help patient to return to their new baseline by fostering independence but not creating dependence, if possible

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Will My IW That Suffered A TBI Return To Work???

- In a study of Vietnam veterans with TBI, Dr. Jordan Grafman showed that problems navigating social behaviors were the most definitive factors for not being able to return to work. Why Consider the Customized Employment Approach for Employees with TBI and/or PTSD?
- Employees with TBI and/or PTSD can experience a range of physical, cognitive and emotional symptoms that interfere with everyday activities, including work. Customized Employment can provide an advantage for these job seekers who may struggle in the competitive job market.

You Have Only Seen One Brain Injury

• "You've seen one brain injury, you've seen one brain injury..." As someone who treats patients with traumatic brain injury, you know that every brain injury is unique and diagnosis and treatment are rarely simple.

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