Interdisciplinary Strategies to Maximize Function & Return to Work

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Objectives

1. Obtain a General Understanding of Spinal Cord Injury (SCI) and Traumatic Brain Injury (TBI) Demographics, Mechanism of injuries, and Interdisciplinary Treatment

2. Learn about Rehab Technology Available to Treat SCI and TBI patients

3. Determine when to use Work Conditioning vs. Work Hardening

4. Utilize a Complex Case Study to Learn How to Implement Strategizes to Maximize Function and Return to Work

Spinal Cord Injuries

Spinal Cord Injury

How often?

- Estimated 17,700 new injuries per year*
- Estimated 291,000 people living with spinal cord injury in the United States*

*United Spinal Association “Spinal Cord Resource Center”

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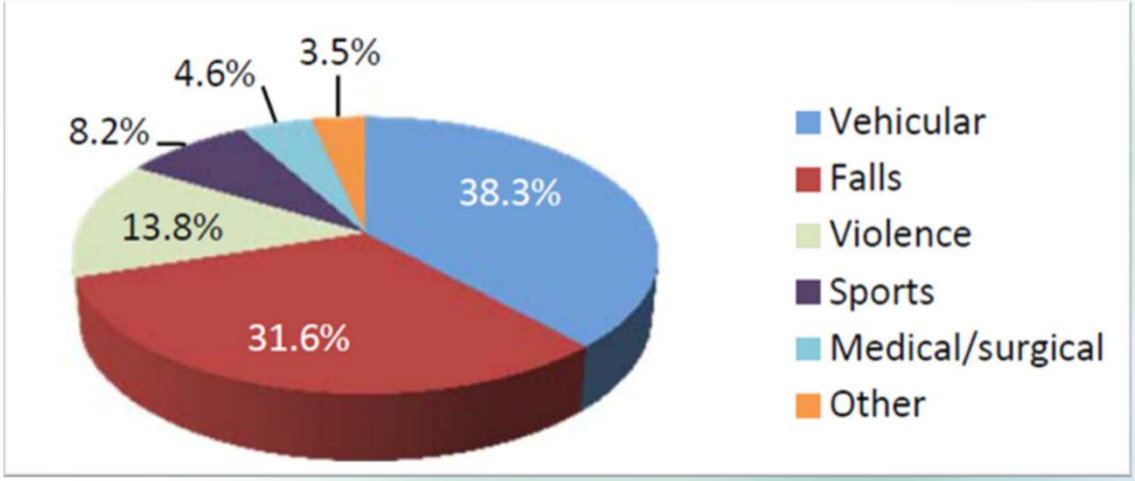
Demographics and Mechanism of Injury

1/1/2015 – 12/31/2022

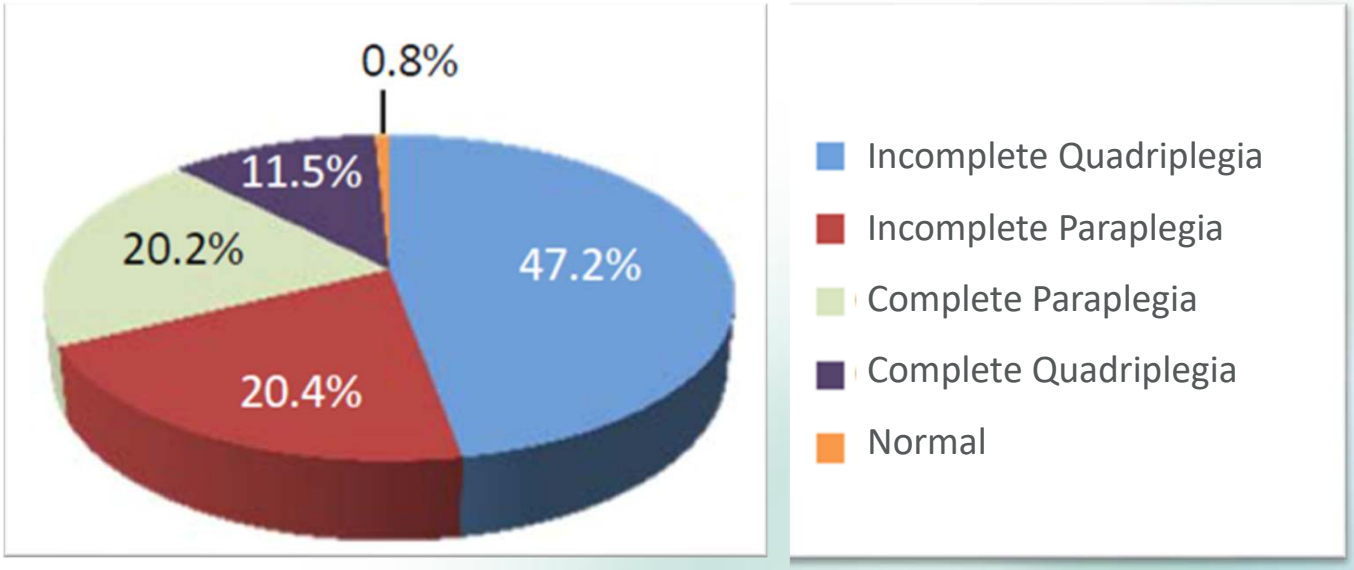
- Average Age: 43
- 78% Men



*United Spinal Association "Spinal Cord Resource Center"

What Level?

1/1/2015 – 12/31/2022



*United Spinal Association
"Spinal Cord Resource Center"

Early Treatment of Traumatic SCI

- ABCs, transport in collar
- High dose methylprednisolone
- Radiograph entire spine
  (high frequency of multiple fx's)
- Neurological examination
- Positioning, splinting, ROM, bowel, bladder, skin care, nutrition, pain control, respiratory treatment, early immobilization

Early Treatment

- Surgical stabilization or spine orthosis allows mobilization
- MRI better for cord and ligaments
- CT better for bone
- GSW: surgery rarely needed

Continuum of Care: Post-Acute Care Rehabilitation

LTACH: Long Term Acute Care Hospital:

- Focus on medical complexity and rehabilitation needs of patient
- Patients may or may not tolerate 3 hours per day of rehab
- Can admit patients straight from ICU

Inpatient Rehab Facility:

- Patients must be able to participate in 3+ hours per day of rehab
- Patients must be medically stable

SNF:

- Must be medically stable
- Only 1-3 hours of therapy/day
- Limited physician oversight

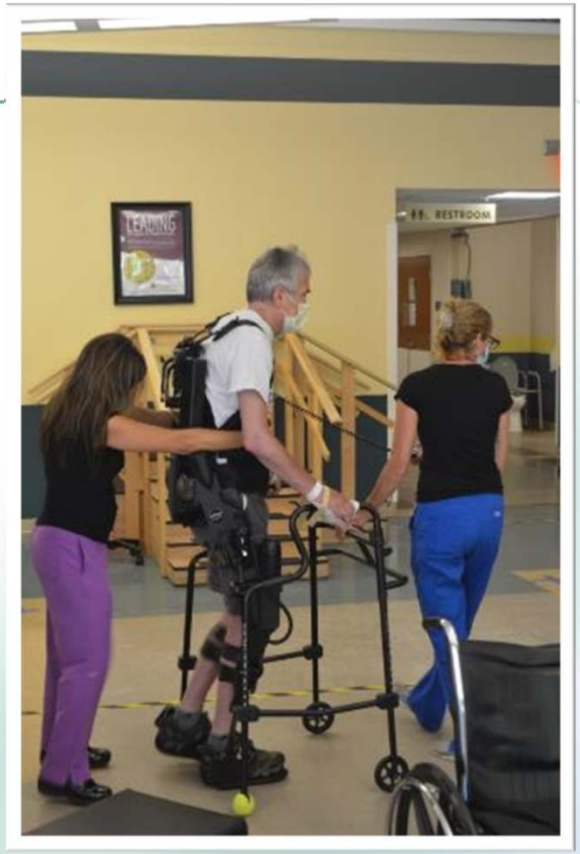
Homecare/Outpatient:

- PT, OT, ST a few times a week

Rehabilitation

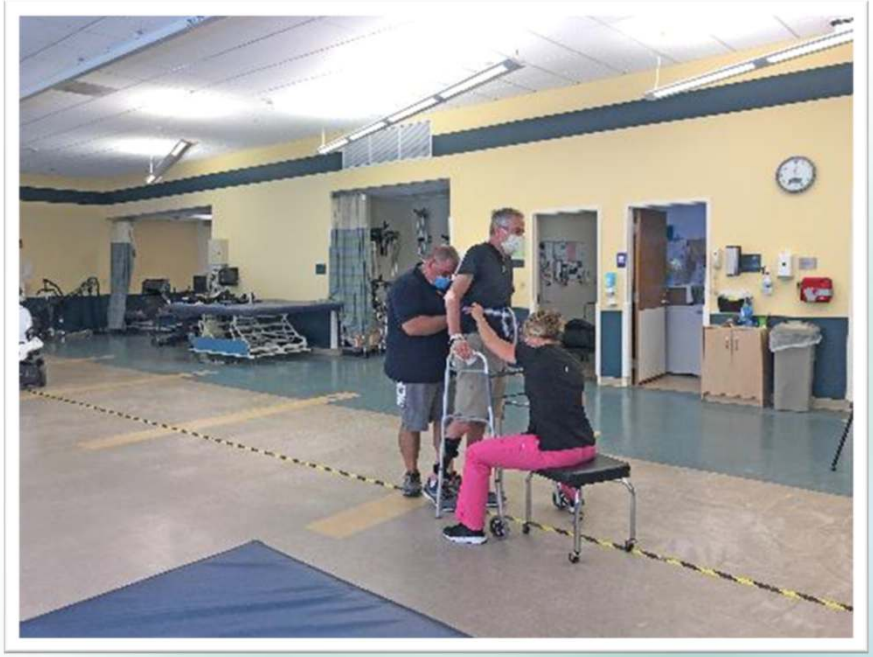
- Systematic, coordinated interdisciplinary team approach
- Physiatric Assessment
- PT, OT, ST, psychology, nutrition, respiratory,

- **Goal:** to maximize function and facilitate return to work



Prevent or Treat **Complications**

- Respiratory
- Skin
- Spasticity
- Pain
- Bowel and Bladder
- Sexuality/Intimacy
- DVTs
- Heterotopic Ossification



Consistent Messaging for SCI Patients

- New SCI patients generally have a **BETTER** prognosis for recovery than most healthcare providers think
- Giving the wrong message may lead patients to give up and/or deeply mistrust healthcare providers
- We need to give a consistent, optimistic, yet realistic prognosis to patients and their loved ones
- Stress the importance of empowering the individual with education regarding their diagnosis

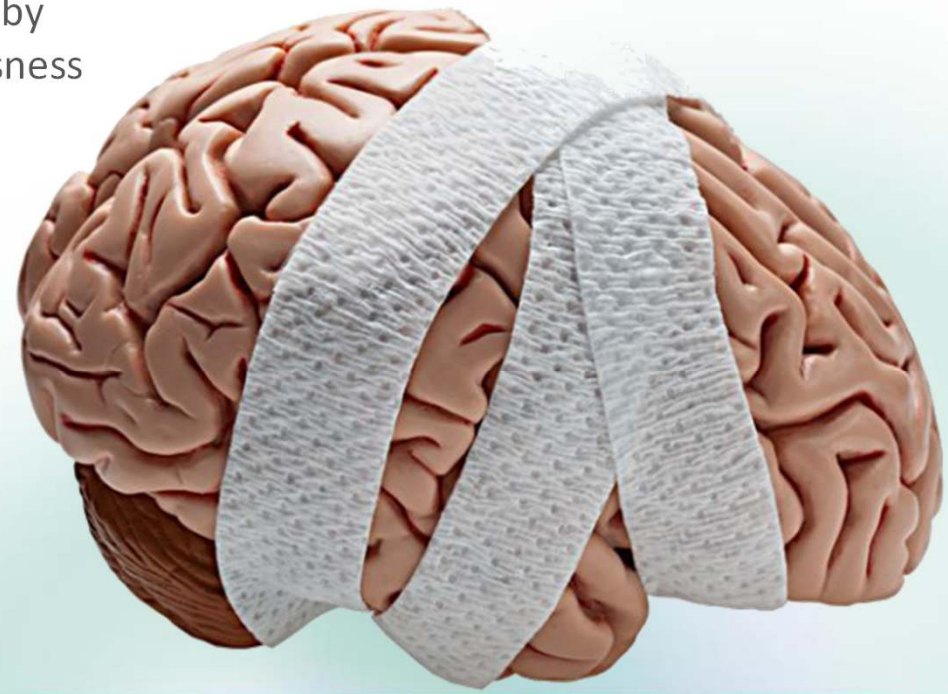
Brain Injuries

TBI: Brain Injury

An insult to the brain, not degenerative but caused by **external physical force** producing altered consciousness

With resultant impairment of:
- Cognition and/or
- Physical function
- Behavioral /emotional function

The impairments may:
- be temporary or permanent
- lead to partial or total disability



TBI: Leading Causes

- **Falls—40.5%**
  - 55% children 0-14yo
  - 81% adults >65yo
- **Motor Vehicle—14.3%**
  - Highest % of deaths
- **Struck by/Against—15.5%**
  - 25% children <15yo
- **Assaults—10.7%**
  - Between ages 15-44yo
- **Unknown/Other—19%**

TBI: Severity of Injury

Glasgow Coma Scale

- 3-15 point scale
- Assesses:
  - Eye opening
  - Verbalizations
  - Movement/command follow

Eye opening	
Spontaneous	4
Response to verbal command	3
Response to pain	2
No eye opening	1
Best verbal response	
Oriented	5
Confused	4
Inappropriate words	3
Incomprehensible sounds	2
No verbal response	1
Best motor response	
Obeys commands	6
Localizing response to pain	5
Withdrawal response to pain	4
Flexion to pain	3
Extension to pain	2
No motor response	1

TBI: Severity of Injury

- **MILD:**
  GCS 13-15
- **MODERATE:**
  GCS 9-12
- **SEVERE:**
  GCS 3-8
  Duration of coma >24 hrs.

TBI: Primary: Contusion

Pathophysiology:

Results from vascular damage sustained at the moment of impact; appears as focal injury that may be seen on scan

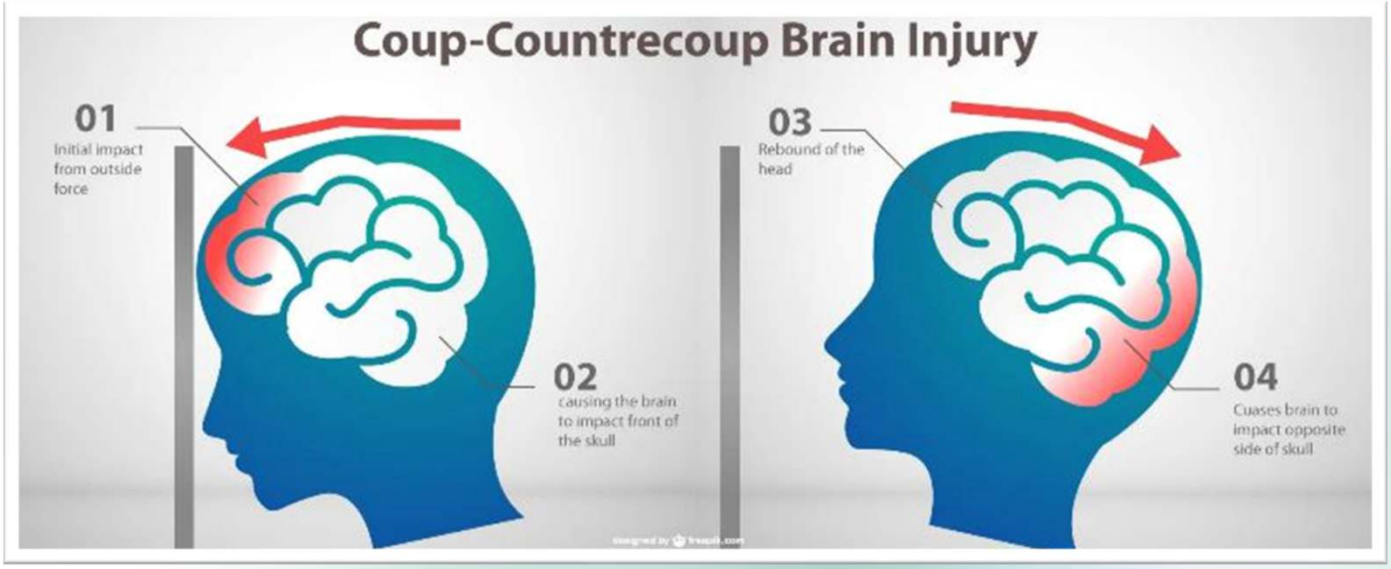
Initial hemorrhage evolves into an area with ischemic change and leads to infarction

Process goes from hours to days: hemorrhage-> edema-> ischemic necrosis

TBI: Primary: Contusion

Common Areas Involved:

May also occur contralateral to the site of impact = therefore, ContreCoup



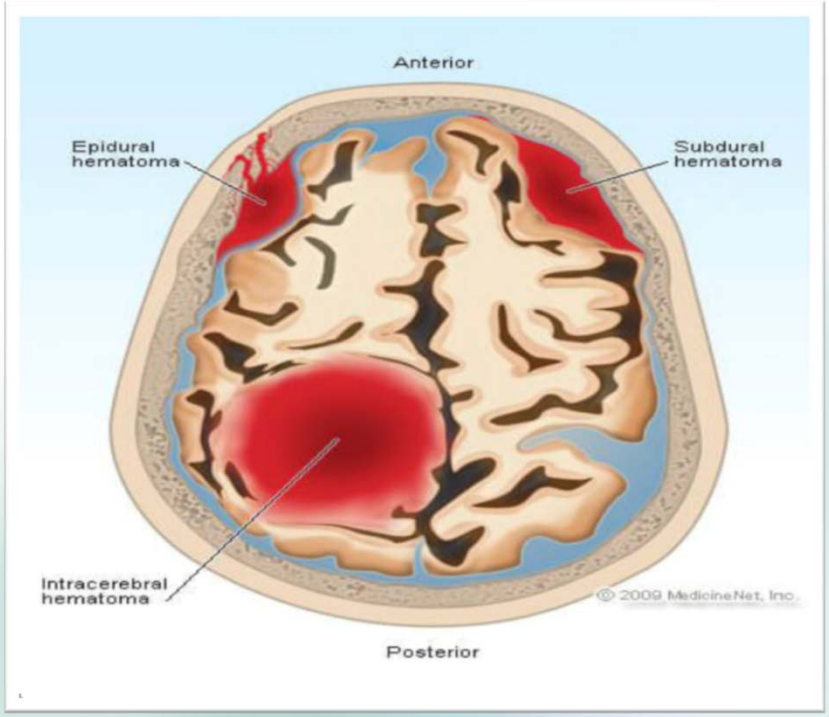
TBI: Primary: Extracerebral Hemorrhage

Epidural Hematomas

- discrete and localized lesion
- commonly associated with fracture through the temporal bone which lacerates the meningeal artery
- occur in up to 15% severe injuries
- more common in older patients with bone injuries
- clinically lucid period followed by onset of unconsciousness

Subdural Hematomas

- caused by tearing of bridging vessels in the subdural space
- about 50% arterial in origin
- blood can spread freely and quickly
- early intervention critical for larger hematomas
- worse outcomes when ischemia is underlying the hematoma



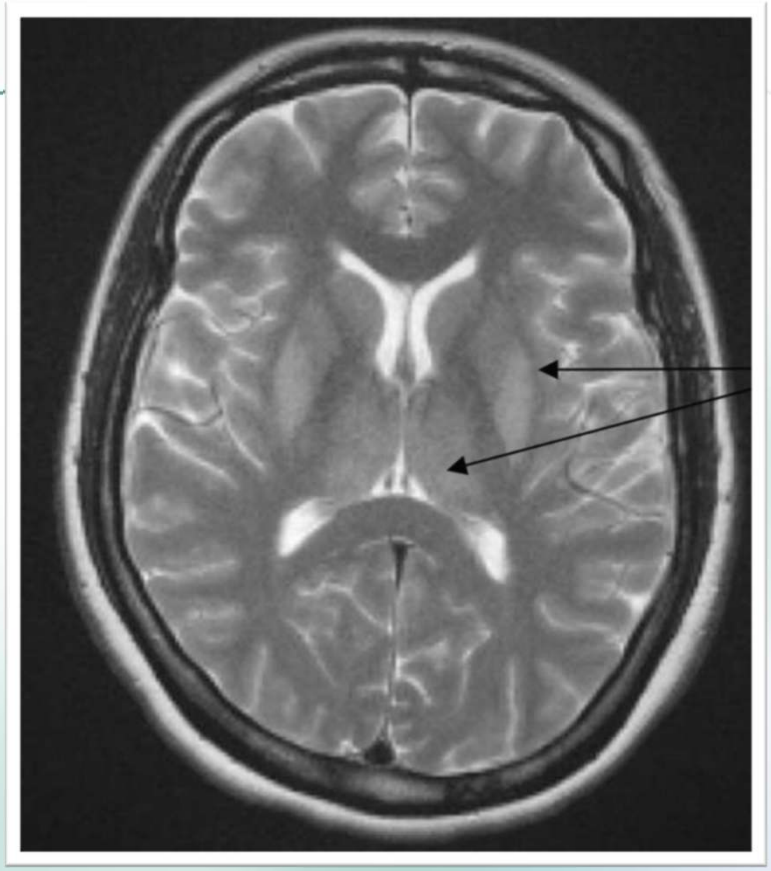
TBI: Secondary: Hypoxia

Diffuse injury primarily throughout the cortex with some predominance in the hippocampal regions

- Caused by hypotension/hypoxemia

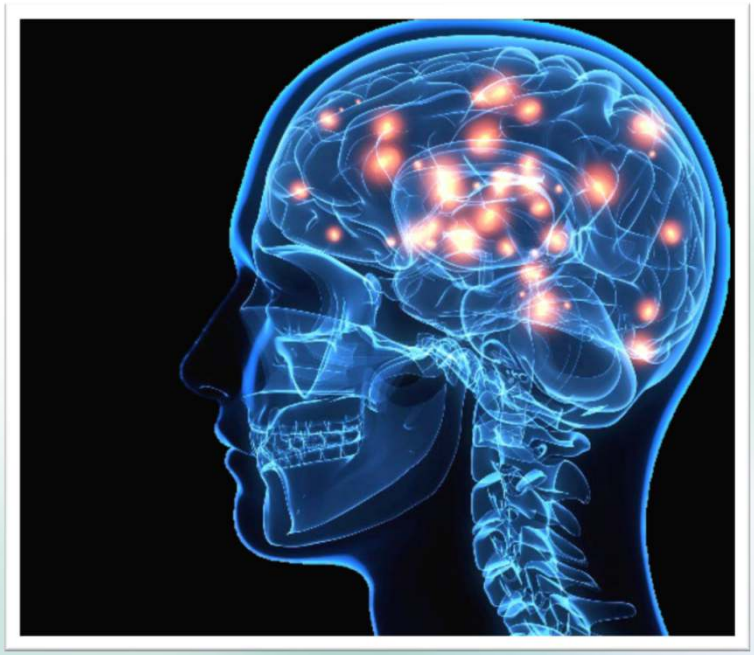
- pulmonary obstruction and/or hypoventilation can also contribute

- Can occur anytime from acute to ICU
- Outcomes maybe significantly worse



Associated Complications

- Dysphagia/Malnutrition
- Skin Breakdown
- Incontinence
- Endocrine dysfunction
- Seizures
- Accompanying injuries/processes:
    - Heterotopic Ossification
    - Contractures
    - Facial/Skull Fractures
    - Fractures—axial and extremities

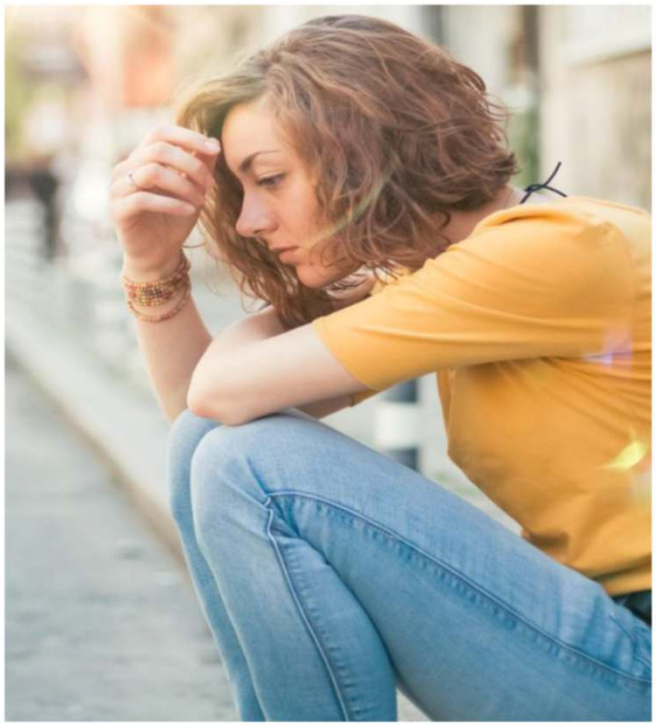


TBI: Impairments of Cognition

- Changes with arousal and attention
- Delirium
- Delusions/confabulations
- Memory impairments
- Delayed processing speed
- Lack of mental flexibility
- Aphasia
- Neglect
- Impaired problem solving, reasoning & judgment
- Anosagnosia = decreased self-awareness

Impairment of Behaviors/Emotions

- Post-Traumatic Agitation
- Disinhibition
- Perseveration
- Decreased initiation
- Dysphoria/Euphoria
- Anxiety
- Impaired pragmatics
- Poor social skills



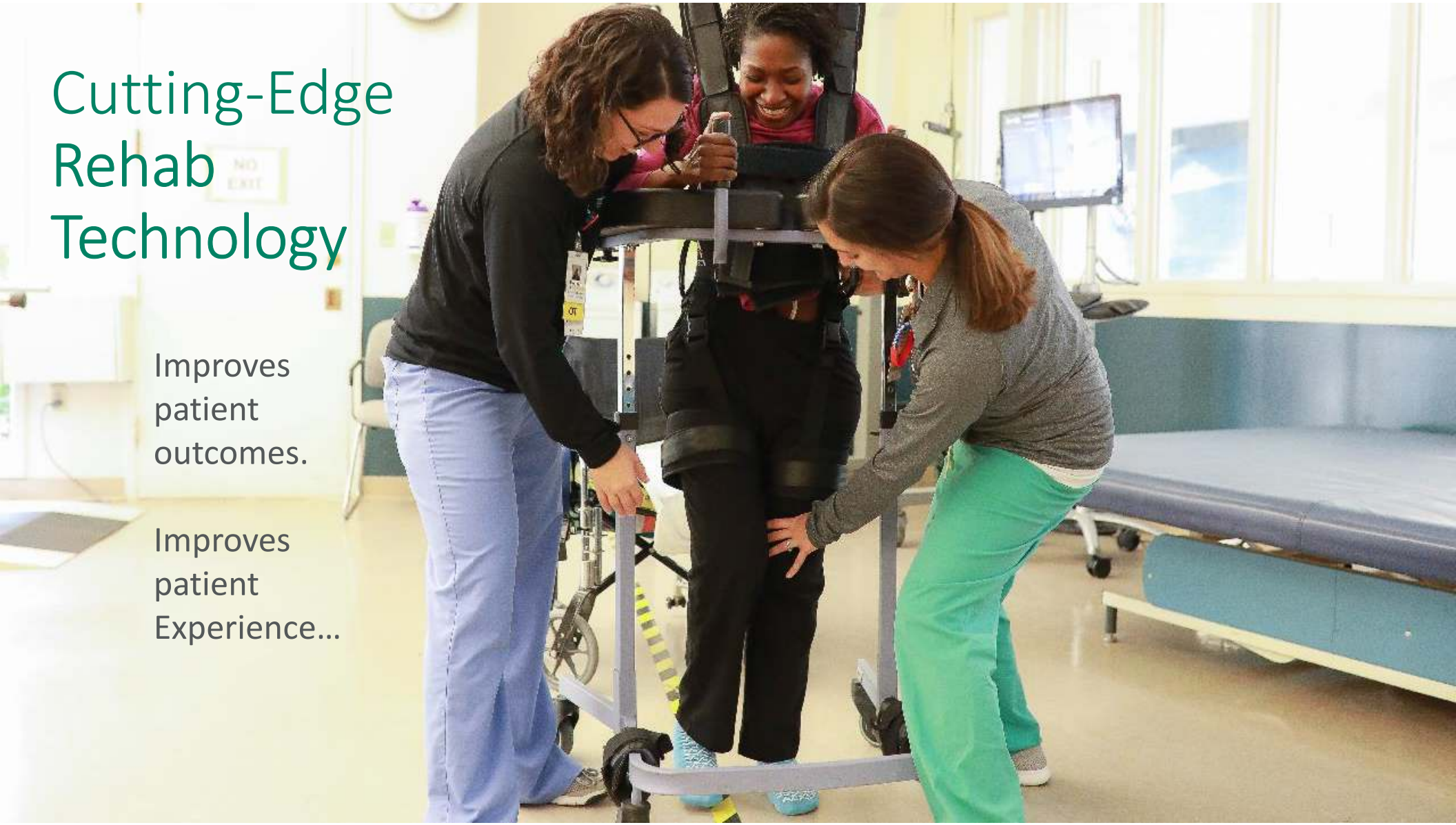
Residential Living Center

Acquired Brain Injury Residential Center

- Average length of stay - 35 days
- Licensed as Residential Care Home - 8 beds
- 24/7 staff, certified in Medication Administration, CPR and First Aid
- Five days a week Cognitive and Aphasia Day Treatment Services within Gaylord Outpatient

Residential Living Center- a safe place to practice physical, cognitive and communication skills

Cutting-Edge Rehab Technology



Improves patient outcomes.

Improves patient Experience…

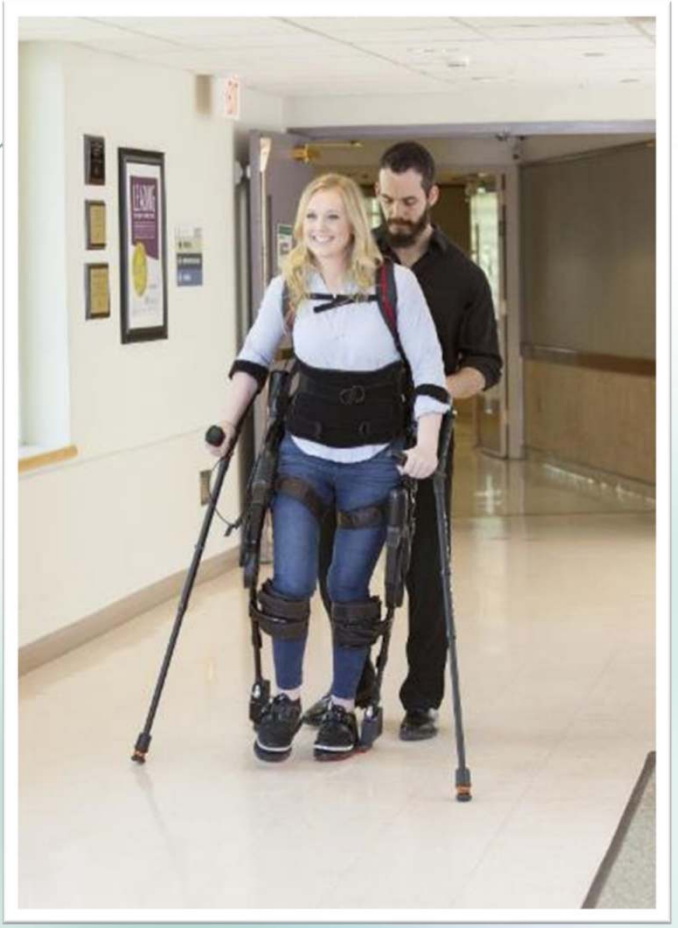
Cutting Edge **Rehab Technology**

Bionic Exoskeleton Technology

Ekso™ is a wearable robot or exoskeleton that enables people with lower-extremity paralysis or weakness to stand and walk

For patients with:

- Traumatic Brain Injury
- Spinal Cord Injury
- Neurological conditions with lower extremity weakness



Cutting Edge **Rehab Technology**

ZeroG® Gait & Balance System

- Mounted to an overhead track
- Protects patients from falls while providing dynamic body-weight support as patients practice walking, balance tasks, sit-to-stand maneuvers and even stairs
- Patients can begin rehab as early as possible in a safe, controlled environment

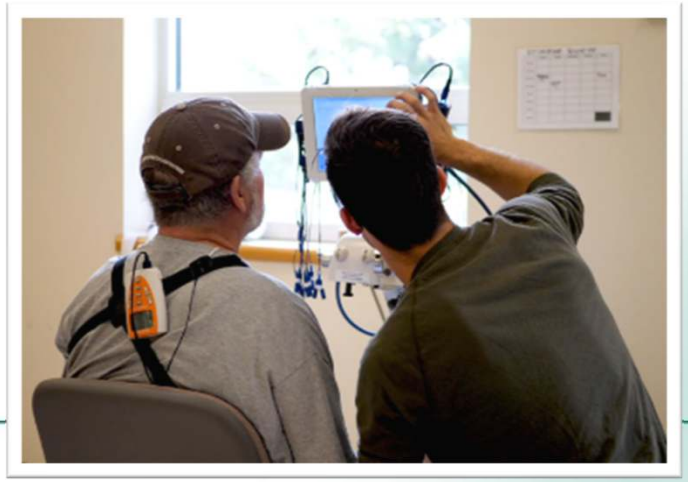
Cutting Edge Rehab Technology

AlterG® Anti-Gravity Treadmill

- Anti Gravity Treadmill with NASA Differential Air Pressure technology
- Unweights the individual from 100% to as low as 20% of body weight to support normal gait mechanics and avoid compensatory strategies for increased balance, strength and ROM
- Provides real time gait data and video monitoring with visual feedback to increase awareness

Functional Electrical Stimulation (FES)

- FES Bike
- Direct muscle stimulation
- Implantable Electrodes and Gait
- Phrenic and Diaphragmatic pacing



Cutting Edge Rehab Technology

KINESIQ™

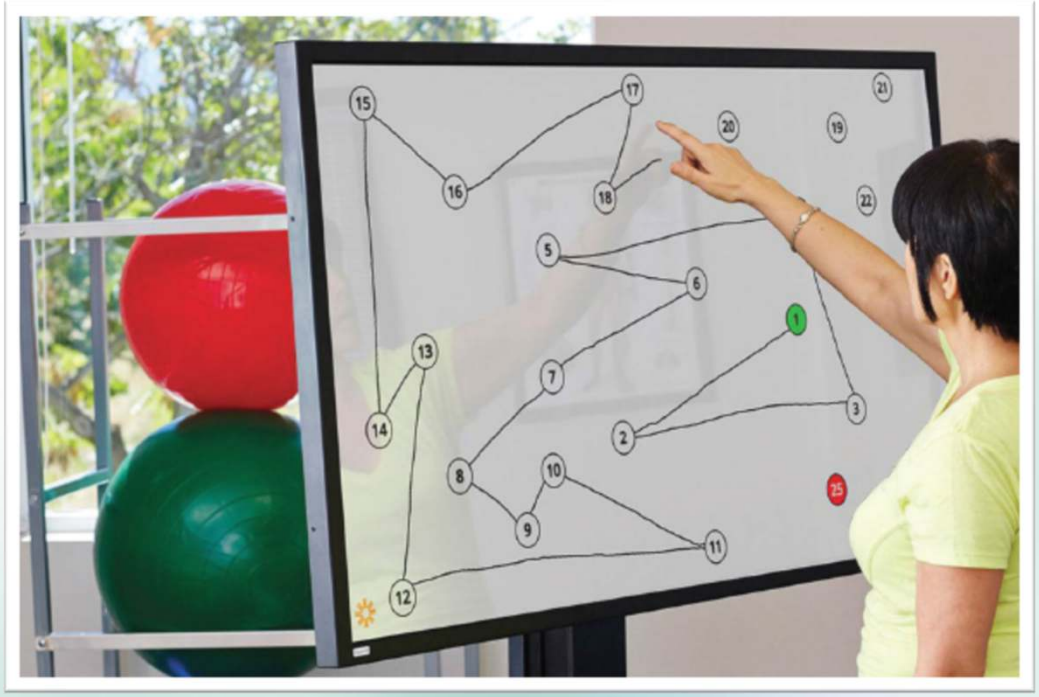
The best single tool to objectively document, quantify and treat balance, gait, orthopedic and cognitive impairment

- Multisensory virtual reality tool
- Dual motorized plates that sync with multimedia content to simulate real life scenarios
- Multi dimension dynamic balance system

Cutting Edge Rehab Technology

Bioness Integrated Therapy System **(BITS)**

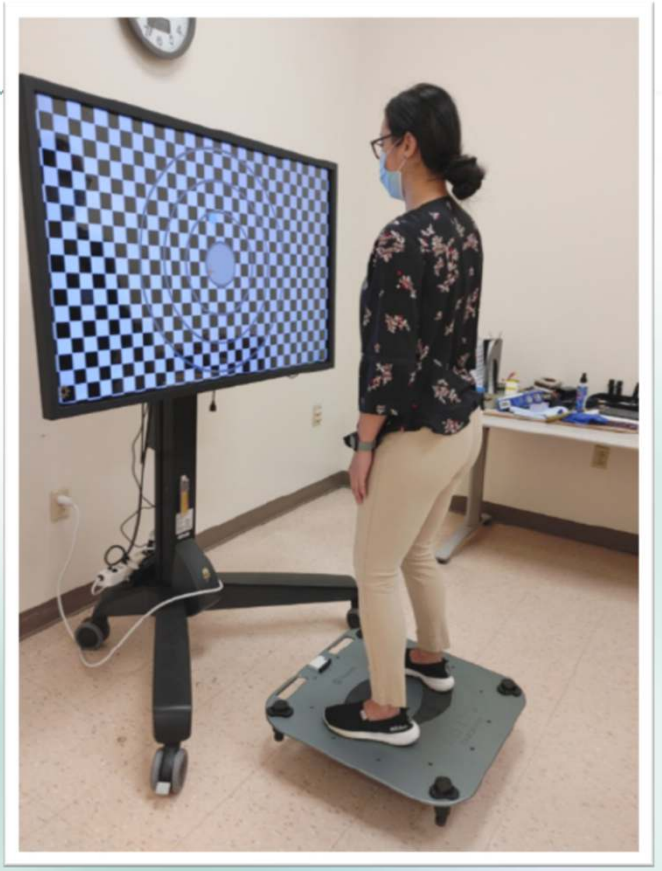
- Multidisciplinary tool for vision, motor, cognition & balance training
- Multiple assessment and therapy programs
- Tracks patient progress allow document objective outcomes



Cutting Edge Rehab Technology

BITS Balance

- Versatile balance tracking using a balance platform to detect posterior, anterior and lateral movements



Aquatic Therapy

- Specially trained physical therapists
- Pools may be accessible through lift technology

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Therapeutic Recreation & Adaptive Sports

Set the Patient up for Success…

Restoration: Strengthening, Sports

Set the Patient up for Success…

Adaptive Equipment:

- Alternate keyboard or mouse
- Mouth stick
- Stylus with adaptive equipment

Power Wheelchair

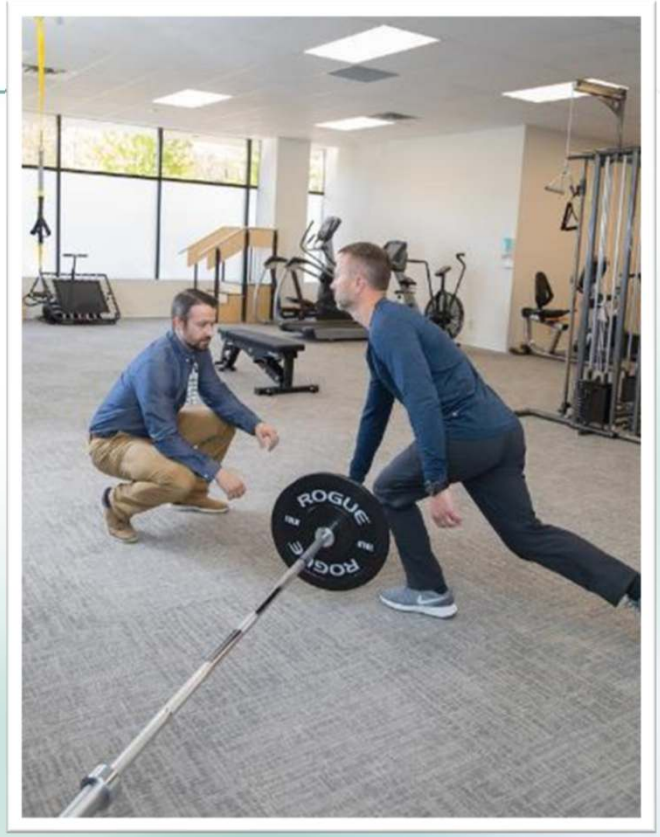
ParaGolfer Cart

- Originally designed for disabled golfers, but can also be customized for use in other sports and leisure activities such as fishing or archery
- Can cope with gradients of up to 30 degrees and sideways inclinations of about 17 degrees
- Turns automatically into a safe position should these limits be exceeded
- Design allows for an absolutely secure footing in any position

Work Conditioning Program

- Short and long-term goals that are specific to job tasks
- Single discipline
- Therapy-directed, 3-5 days per week over 6-8 weeks
- Weekly reassessment with report – to assess goals through objective measurement testing
- Weekly Workers' Comp care manager updates to the Workers' Comp carrier and referring provider
- Treatment oversight that includes a physiatrist, care manager, and physical therapy team

- **Goal:** Return to work – full duty without restrictions



Work Hardening

- Interdisciplinary team:
  - OT/PT/ST/Psych/Respiratory/Nutrition/Physiatry
- Physical, cognitive, psychosocial components
- Work related and job simulated tasks

- **Goal:** Return to work – full duty without restrictions

Case Study

Case Study

Eric: Multiple Jobs

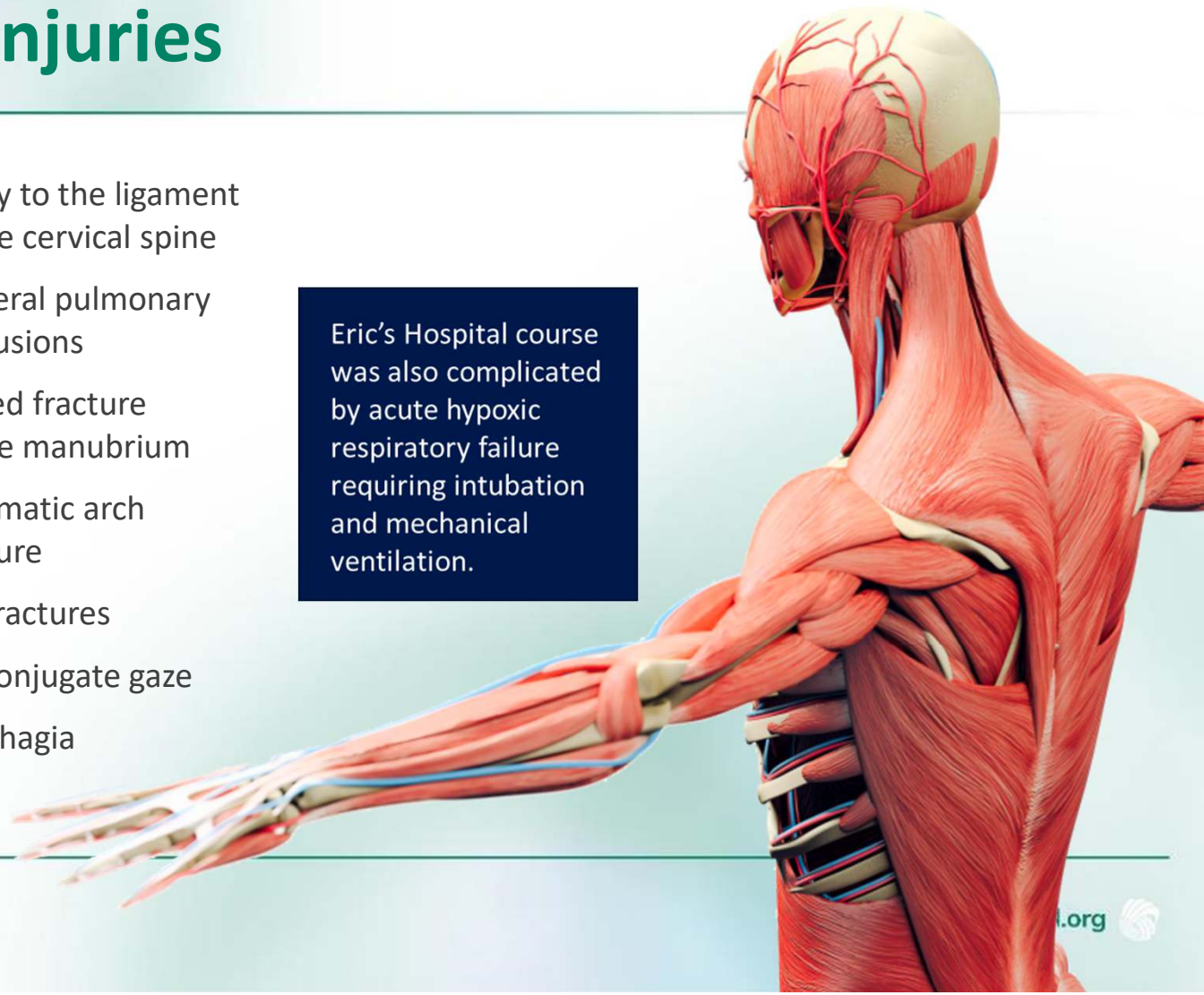
Background:

- 24 years old
- Employed Full-time - Works as a Draftsman
- Volunteer at the Local Fire Department
- Member of the National Guard
- Severe MVA while working as firefighter

Case Study – **Eric's Injuries**

- Basilar skull fracture – requiring intubation in the field
- TBI and diffuse axonal injury
- Temporal bone fracture
- Multiple thoracic spine fractures
- Traumatic hemoperitoneum
- Grade 4 splenic laceration
- Grade 4 kidney injury
- Injury to the ligament of the cervical spine
- Bilateral pulmonary contusions
- Closed fracture of the manubrium
- Zygomatic arch fracture
- Rib fractures
- Dysconjugate gaze
- Dysphagia

Eric's Hospital course was also complicated by acute hypoxic respiratory failure requiring intubation and mechanical ventilation.



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Case Study – **Outpatient Challenges**

After Completing Comprehensive Inpatient Program:

- Ongoing mild cognitive impairment
- Balance impairment
- Driving impairment
- Decrease in strength & range of motion
- Back pain
- Visual impairments
- Headaches and difficulty using computer for drafting work
- Unable to meet physical Demands of Volunteer Fire Dept. & National Guard

Case Study – **Eric's Outpatient Program**

Physical Therapy:
- Strength
- Flexibility
- Endurance
- Balance

Occupational Therapy:
- Work Simulation
- Vision Therapy Including BITS

Speech Therapy:
- Cognitive Retraining
- Work Simulation

Case Study – **Return To Work/Life Outcomes**

- **Spring:**
  Back to work full-time as Draftsman

- **Late Summer:**
  Cleared, with no restrictions, for the Volunteer Fire Dept.

- **Early Fall:**
  Deemed “Fit for Duty” for the National Guard

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LIEUTENANT

QUESTIONS?
THANK YOU!