NEURO INSTITUTE

Continuing Education for Rehabilitation Professionals

Functional Gains Do Not End At Discharge: Family Training for Creating an Environment of Maximum Practice -- AFTER Discharge!

Victoria Harding, PhD, CCC/SLP, MBA

NeuroRestorative's COVID-19 Response

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- We are committed to protecting the health and safety of the individuals we serve, our staff, and the community. Our services are considered essential, and we are taking precautions to minimize disruption to services and keep those in our care and our team members safe. In some programs, that has meant innovating our service delivery model through Interactive Telehealth Services. We provide Interactive Telehealth Services throughout the country as an alternative to in-person services. Through Interactive Telehealth Services, we deliver the same high-quality supports as we would in-person, but in an interactive, virtual format that is HIPAA compliant and recognized by most healthcare plans and carriers.

- You can learn more about our COVID-19 prevention and response plan at our Update Center by visiting **neurorestorative.com**.

Agenda

- The Long Tail of Rehabilitation in The Community
- Abilities, Adjustment to Disability and Community Participation
- Maximizing Opportunities for Functional Improvement Using Principles of Neural Plasticity
- Outcomes
- Family Participation
- The Most Reliable Predictor of Durability of Long Term Outcomes
- Practical Activities

Preparing for The Long Term: Durable Outcomes at Home and in Community

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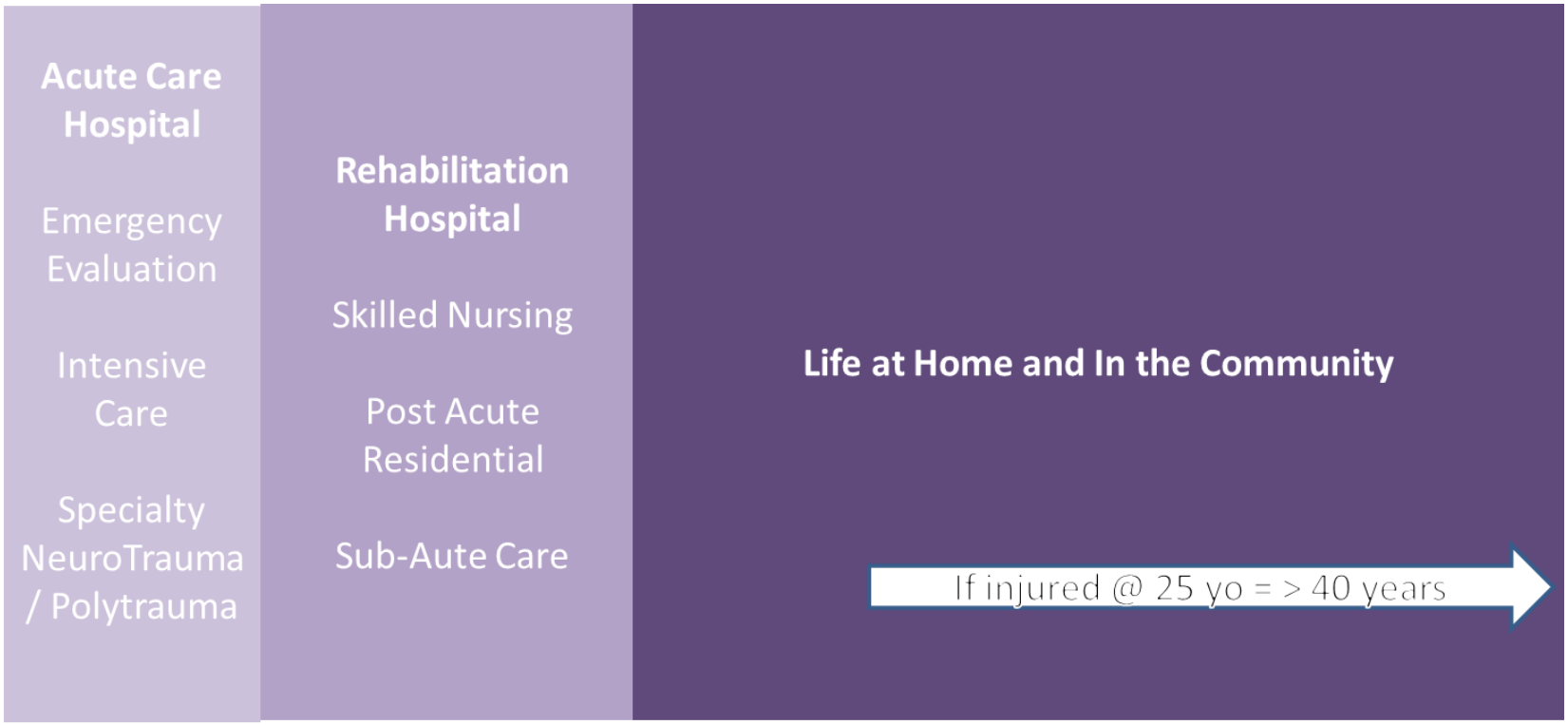

Mean LOS = 7.8 Days [1]

Mean LOS = 58 Days [2]

TBI reduces life expectancy in the US by an average of 9 years [3]

1. Yue et al 2022 *Predictors of Extreme Hospital Length of Stay After Traumatic Brain Injury*
2. *Avesani et al 2022 Exploring Variables Associates with Length of Stay in Brain Injury*
3. *www.cdc.gov/traumaticbraininjury*

Start with Function

Physical alibies are important for mobility, strength, balance and coordination – for motor output sure … but what else do people need to make their life work after neurologic injury or illness?

✓ opportunities to practice (correctly) those skills that help people live safely and with independence in the community

We can Impact:

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Abilities:
- Mobility
- Use of Hands
- Vision
- Dizziness
- Motor Speech
- Attention
- Concentration
- Memory
- Fund of information
- Novel Problem Solving
- Visuospatial Abilities

Adjustment:
- Anxiety
- Depression
- Irritability, anger, aggression
- Pain and Headache
- Fatigue
- Inappropriate Social interaction
- Impaired Self Awareness

Participation:
- **Initiation**
- Social Contact (friends, work associates, others)
- Leisure and Recreational Activities
- Self-Care
- Residence
- Transportation
- Employment
- Managing Money and Finances

Items are from the Mayo Portland Adaptability inventory (MPAI-4) – Lezak & Malec 2003

The Most Enduring and Disabling Items Affecting Outcomes - Lewis & Horn 2016

Create An Environment of Maximum (Correct) Practice
Expect Maximum Trials of Output

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Maximizing Neural Plasticity to Improve Function Following Brain Injury

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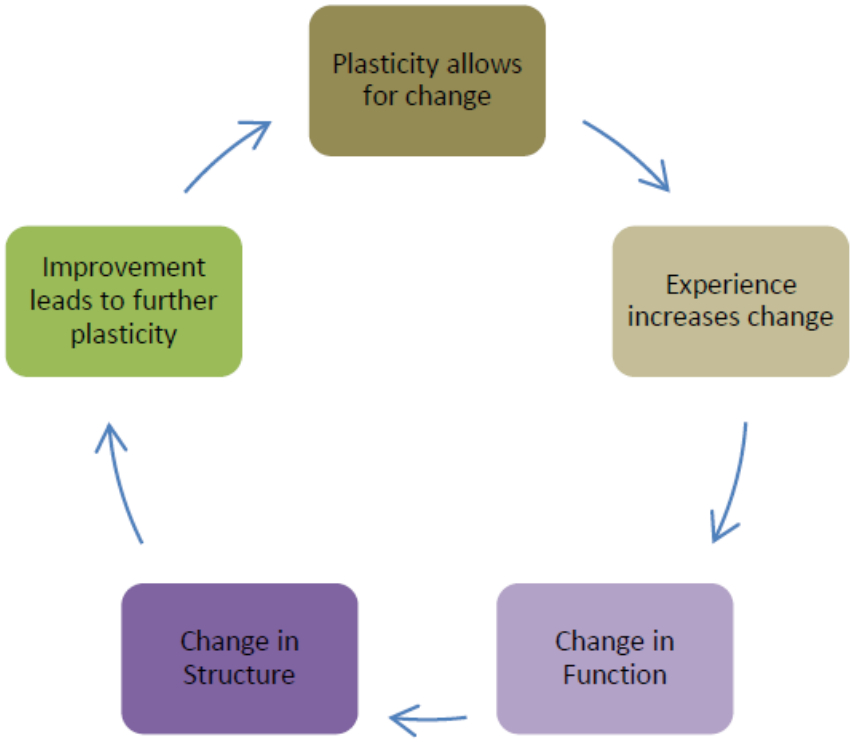
Brains continue to change throughout our lives due to **plasticity – the ability of the brain to change in structure and function as a result of experience**. This change in neural structure and function facilitates new learning, and ultimately leads to continued neural change and improved performance.

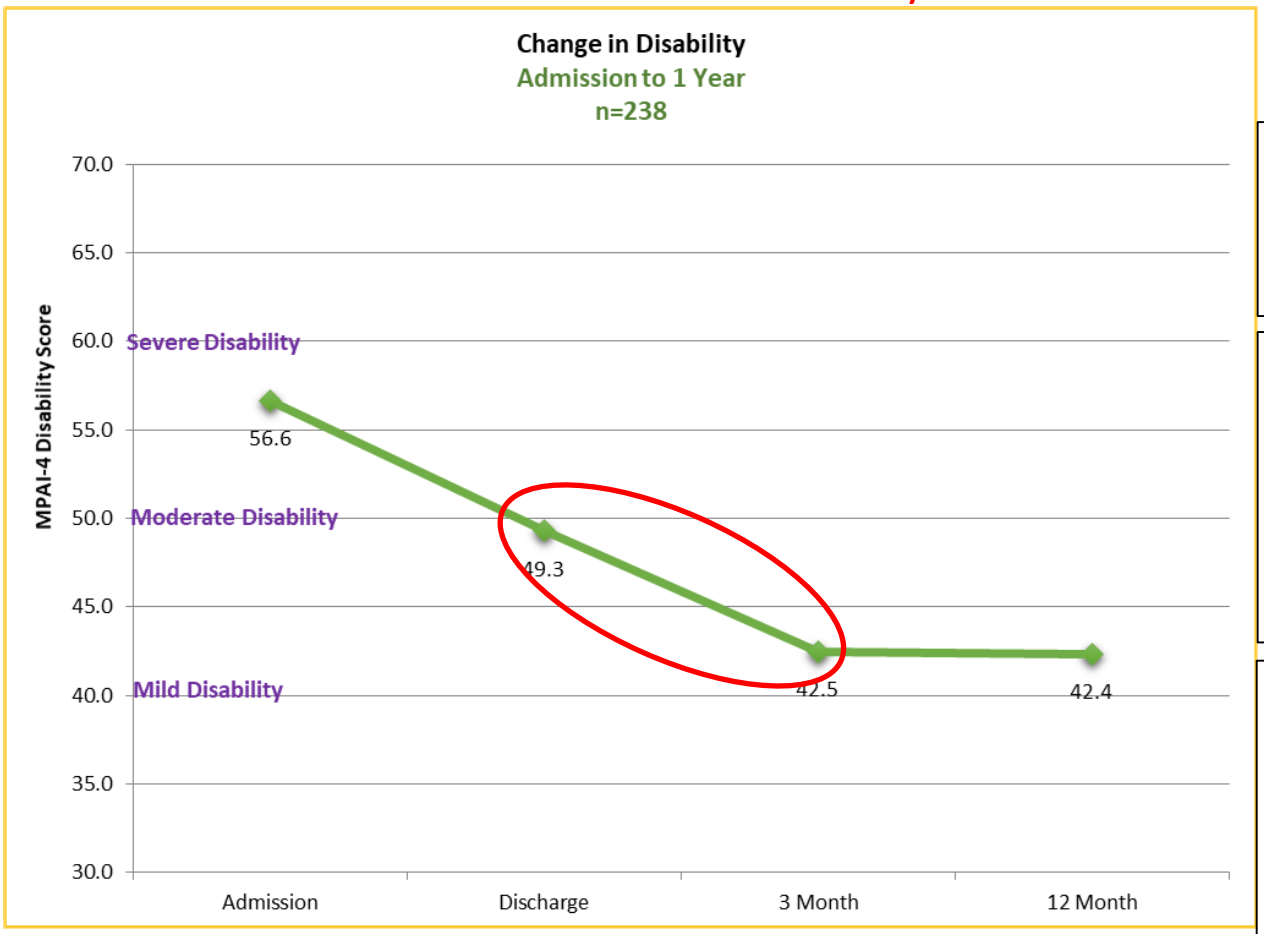


7 Tenets of Neural Plasticity

1. ***Neural plasticity occurs when the brain is alert.***
2. ***Neurons that wire together fire together.***
3. ***Do it over and over again.***
4. ***Bad habits change the brain, too.***
5. ***Focused attention is critical to plasticity and new learning.***
6. ***Sleep and rest strengthens learning.***
7. ***Motivation is key.***

Benefits and Durability of Rehabilitation after Neurological Impairment

Decrease Functional Disability!



On this scale - higher scores represent greater disability.

Neurorehabilitation efforts are effective at reducing disability. Outcomes are durable.

N = 238 people with severe neurological injury or disease one year after completing comprehensive inpatient rehabilitation

Person Demographics:

- Diagnosis: TBI = 156, CVA =60, Anoxic = 6, SCI =5, Other neurological conditions = 11.
- Average Length of Stay in Program: 183 days.
- Average onset from injury to admission: 232 days.

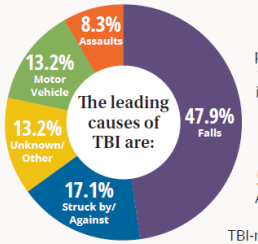
Educate Families: FACTS

What is brain injury?

Brain injury, also called acquired brain injury, is any damage to the brain affecting a person physically, emotionally or behaviorally. Brain injuries can happen at birth, or later, from an illness or a trauma, and are called either traumatic or non-traumatic, depending on the specific cause.

How common is brain injury?

- They are most common in men between the ages of 15 to 24.
- After a brain injury, survivors are at higher risk (3 to 8 times higher) of having another brain injury.

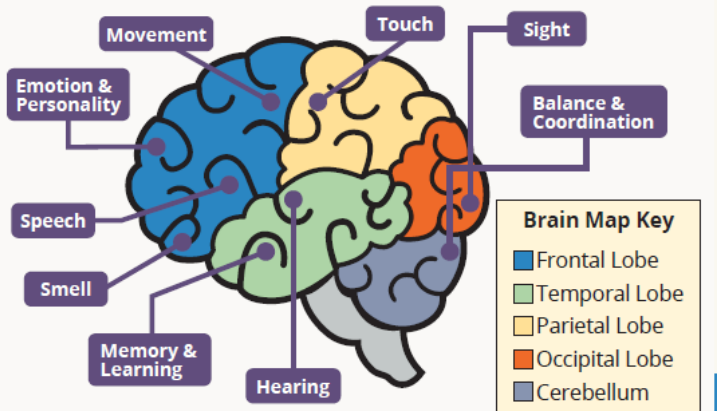


An estimated **1.7 million** people sustain a traumatic brain injury (TBI) each year.

About **5.3 million** Americans are living with a TBI-related disability.

»cdc.gov/traumaticbraininjury/severe.html
»biausa.org/brain-injury/about-brain-injury

What part of the brain is responsible for what?



»biausa.org/brain-injury/about-brain-injury/basics/function-of-the-brain

The Impact of Brain Injury

A brain injury may lead to a wide range of short- or long-term issues affecting:

- **Cognitive Function**
  - Memory
  - Attention
  - Processing Speed
  - Problem-Solving
  - Language
- **Sensation**
  - Hearing
  - Vision
  - Sensation
  - Body Awareness
  - Smell
- **Physical Function**
  - Strength
  - Coordination
  - Balance
  - Swallowing
  - Bowel and Bladder Control
- **Emotion & Behavior**
  - Depression
  - Anxiety
  - Irritability/anger
  - Impulse control
  - Personality changes

From The Shepherd Center

Educate Families: TIPS

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Injury Prevention

- Remove trip hazards, such as throw rugs.
- Stay healthy and active to reduce your risk of falls.
- Drive sober and distraction free.
- Always wear a seat belt.
- Wear a helmet while riding a bike, skateboard, motorcycle, horse or ATV.
- Wear a helmet while playing contact sports, skiing, skating or snowboarding.

Avoid Alcohol

- Alcohol slows down or stops brain injury recovery.
- Alcohol magnifies some of the cognitive and mood problems caused by brain injury.
- Alcohol lowers the seizure threshold and may trigger seizures.
- Alcohol use increases risk of another brain injury.

»msktc.org/tbi/factsheets/Alcohol-Use-After-Traumatic-Brain-Injury

Exercise Regularly

People with TBI who exercise show fewer symptoms of depression, fatigue and cognitive problems. Talk to your providers about an exercise plan that meets your physical needs.

The Brain Benefits of Exercise

- Increases production of neurochemicals that promote brain cell repair
- Boosts decision making skills
- Improves memory and attention span
- Prompts growth of new nerve cells and blood vessels
- Improves multi-tasking and planning

»brainline.org/content/2008/07/aerobic-exercise-following-tbi_pageall.html

Use Organization Tools

Calendars, daily planners, checklists, phone reminders and pill organizers to help stay organized and assist your memory.

Manage Stress

Stress Management

- Therapy
- Exercise
- Yoga
- Music
- Hobby
- Nature

Improving Sleep After Brain Injury

Do:

- Follow a bedtime routine.
- Establish a regular bed and wake time.
- Have a regular daytime routine
- Create a restful atmosphere.
- Minimize screen time before bed.

Don't:

- Nap more than 20 minutes during the day.
- Eat, read, watch TV or do work while in bed.
- Bring screen time into the bedroom
- Use caffeine, nicotine, alcohol and sugar for five hours before bedtime.
- Watch the clock.

Talk to your doctor about options to improve your sleep.

For more tips go to:
»msktc.org/tbi/factsheets/Sleep-And-Traumatic-Brain-Injury

Monitor Mood

- Depression is about eight times more common in the first year after TBI than in the general population (about 50% of people with TBI).
- Seek help! There are many options to help with depression following TBI.

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DO NOT DO FOR YOUR LOVED ONE!

Encourage Independence

The Concurrent Four Legged Approach

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1. Awareness: Education about injury/ accident/ support needs

2. Compensation: Compensatory Tools & Training

3. Internalization: Impairment Level Process Treatment & Training

4. Generalization: Carryover in real world function

The Concurrent Four Legged Approach

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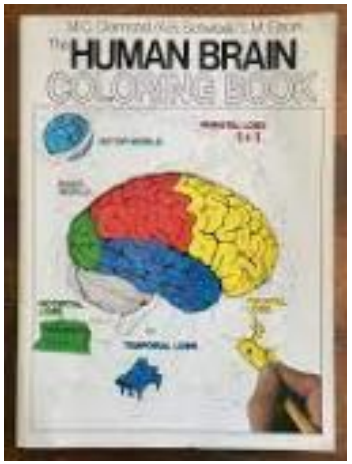
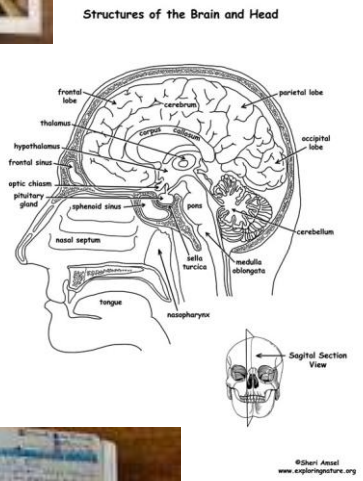
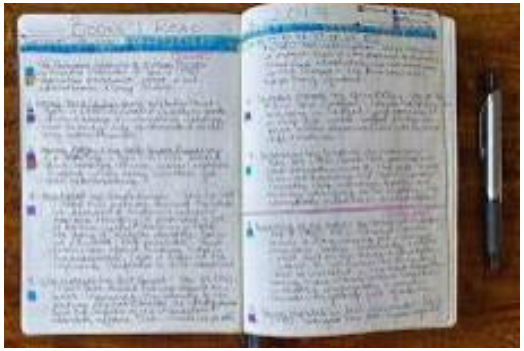




Awareness/ Education

- Basic brain and spinal cord neuroanatomy
- Self evaluation (pre-activity and post activity)
- Awareness Intervention – video and
- Behavior change inventories
- Self identified goals with collaboration
- Written Feedback Journaling



Example of Pre/ Post Self Rating

Date:

Self Rating Scale

5 = **Most Excellent** I will get up, and have getting ready by 9:00 am
4 = **Good** I will have a bit of difficulty. I might need someone to remind me once to shower, shave or to brush my teeth by 9:00 am
3 = **Average** I will complete the activity, but someone will remind me more than three times to shower, shave brush my teeth by 9:00 am
2 = **Not Well** I will eventually be showered, shaved and brush my teeth by 9:00 am, even if I am reminded more than three times.
1 = **Bad** I won't get all 3 things done, even after I am reminded.

Shaving: using my electric razor to remove all unwanted facial hair cleaning my face and the skin area	* I think I will achieve * My actual achievement was	1 2 3 4 5 1 2 3 4 5
Showering: cleaning hair and all body parts with soap and shampoo and water, rinsing off, toweling off and hanging up towel	* I think I will achieve * My actual achievement was	1 2 3 4 5 1 2 3 4 5
Toothbrushing: using toothpaste and toothbrush to clean teeth, rinse mouth	* I think I will achieve * My actual achievement was	1 2 3 4 5 1 2 3 4 5

What I will do differently is:

Compensation - Training on Tools

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Develop Train on Use Maximize Practice

Errorless Learning – eliminate false step with examples prior to activity

Backward Chaining with Fade Assistance

Memory: Rehearse, Picture and Practice Output examples
- photo practice example

Internalization: Impairment Level Process Treatment & Training

The (re) development of skills through direct training or practicing the underlying skills. Provided in an environment for *maximum practice of output.*

Internalization

The clinical process of gradually increasing the automaticity of practiced strategies which facilitates independence through the use of compensatory strategies and tools.

Cue Types

- Direct cue: specific prompt given by someone other than the person with injury
- Indirect cue: general prompt given by someone else
- Self-cue: consciously cueing oneself; think about where info would be found
- Independent routine: person with injury completing independently or automatically referring compensatory tool

Internalization: Impairment Level Process Treatment & Training

PAUSE to provide an opportunity for patient to self correct errors, if not apparent

PROMPT

Non-specific prompts: “Stop and tell me what you are doing right now”

Specific prompts: “check the recipe and find the first ingredient to put in the mixing bowl”

PRAISE

*Metacognitive contextual intervention to enhance error awareness Ownsworth et al., 2006

Internalization: Impairment Level Process Treatment & Training

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Evaluation is essential

Treatment designed to strengthen underlying/associated skills

Interdisciplinary Team:

- The Patient
- The Family
- Physical Therapy
- Occupational Therapy
- Speech-Language Pathology
- Neuropsychology
- Behavior Analyst
- Recreational Therapist
- Counseling/ Social Work

E.g.: Take The TRAIL MAKING TEST

Teach Initiation

1. BE PREPARED TO TEACH INITIATION — REVIEW
   a. What is expected or what is the goal?
      Initiation increases when a person sees the reason for the goal.
   b. What are the steps to complete the goal?
      List them in order from first to last.
   c. Identify any barriers to starting the activity.
2. MODEL IT – show how to do something; watch to see if the person tries to initiate during your instruction.
3. LET THE INDIVIDUAL DO IT WITHOUT ASSISTANCE – allow enough time and allow for mistakes. Most people do not learn something perfectly when first trying.
4. PRAISE THE EFFORT, NOT THE RESULT ("You did great – this is a hard task") – the goal is that the person will eventually be able to self-initiate the task with enough practice and time.
5. PRACTICE the task or skill daily so that it can be mastered, but more importantly so the task is initiated without cues.

Generalization: Carry Over to The Real World

Practice in the environment of Life to maximize Generalization

Real World Application – The use of skills in everyday life including home, work, school and in the community.

Generalization - Application of appropriate strategies for managing deficits in personally relevant areas of everyday functioning

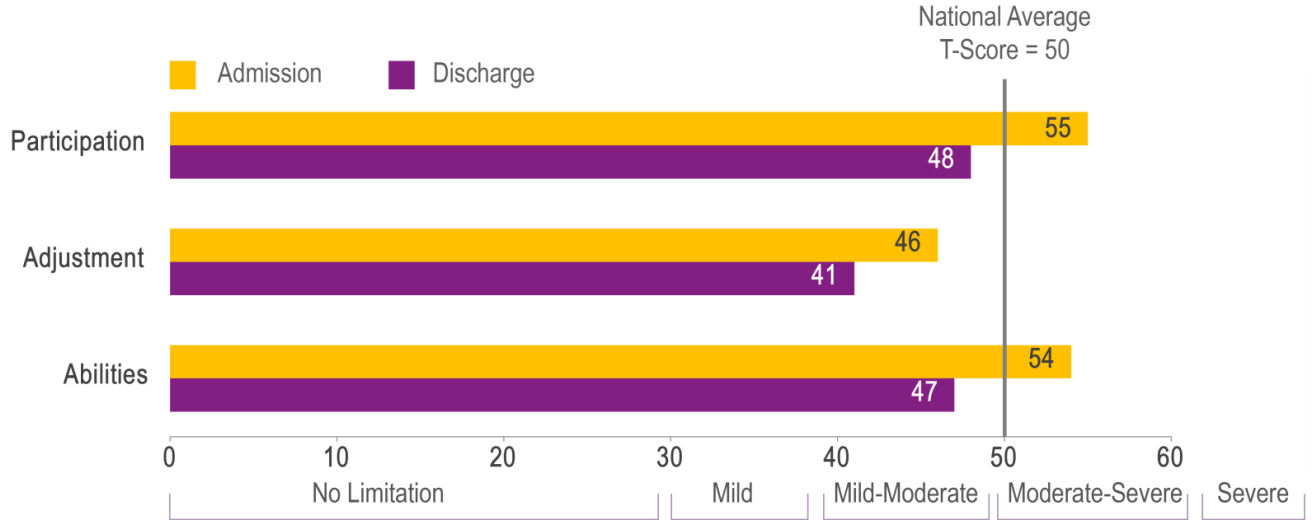
Research Question

- **Who are the individuals** who make the greatest gains in function while participating in a Post-Acute Brain Injury Rehabilitation-Residential program, as measured by the Mayo-Portland Adaptability Inventory-4?

- **What** are the components that those individuals, their families and funders attribute to their successes?

Outcomes

The Mayo-Portland Adaptability Inventory (MPAI– 4) is the industry standard in measuring functional outcomes in Post-Acute Brain Injury Programs. The tool measures outcomes based upon 29 functional measures in three areas: Ability, Adjustment, and Participation

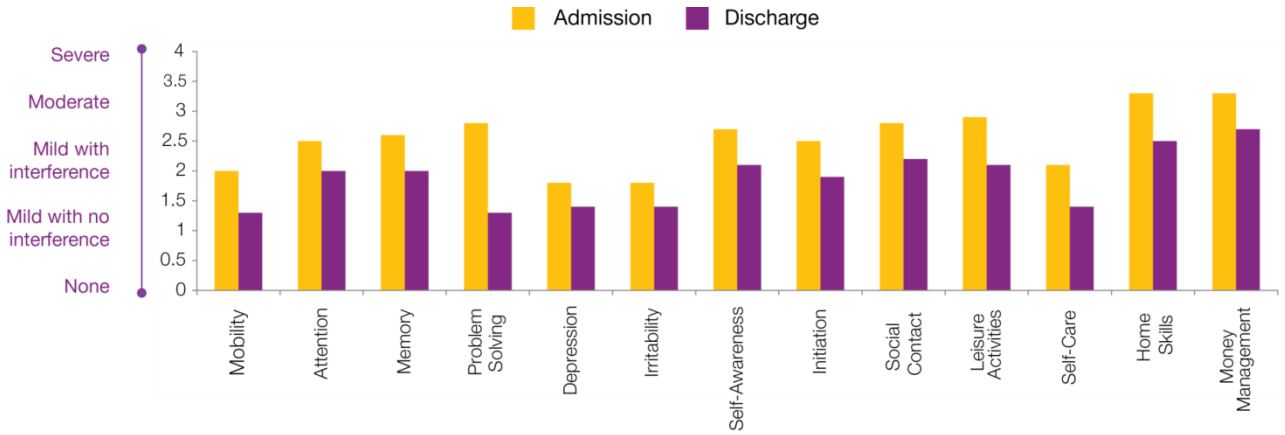


Why are the scores going down?

The decreased scores show a reduction of disability. In other words, our participants increased their levels of independence as their scores decreased.

Key Findings

- Our outcomes show that, on average, our participants demonstrated an increase in functional independence across all 29 items of the MPAI-4
- We exceeded the national reference sample's average T-score of 50 in every subscale



Methodology

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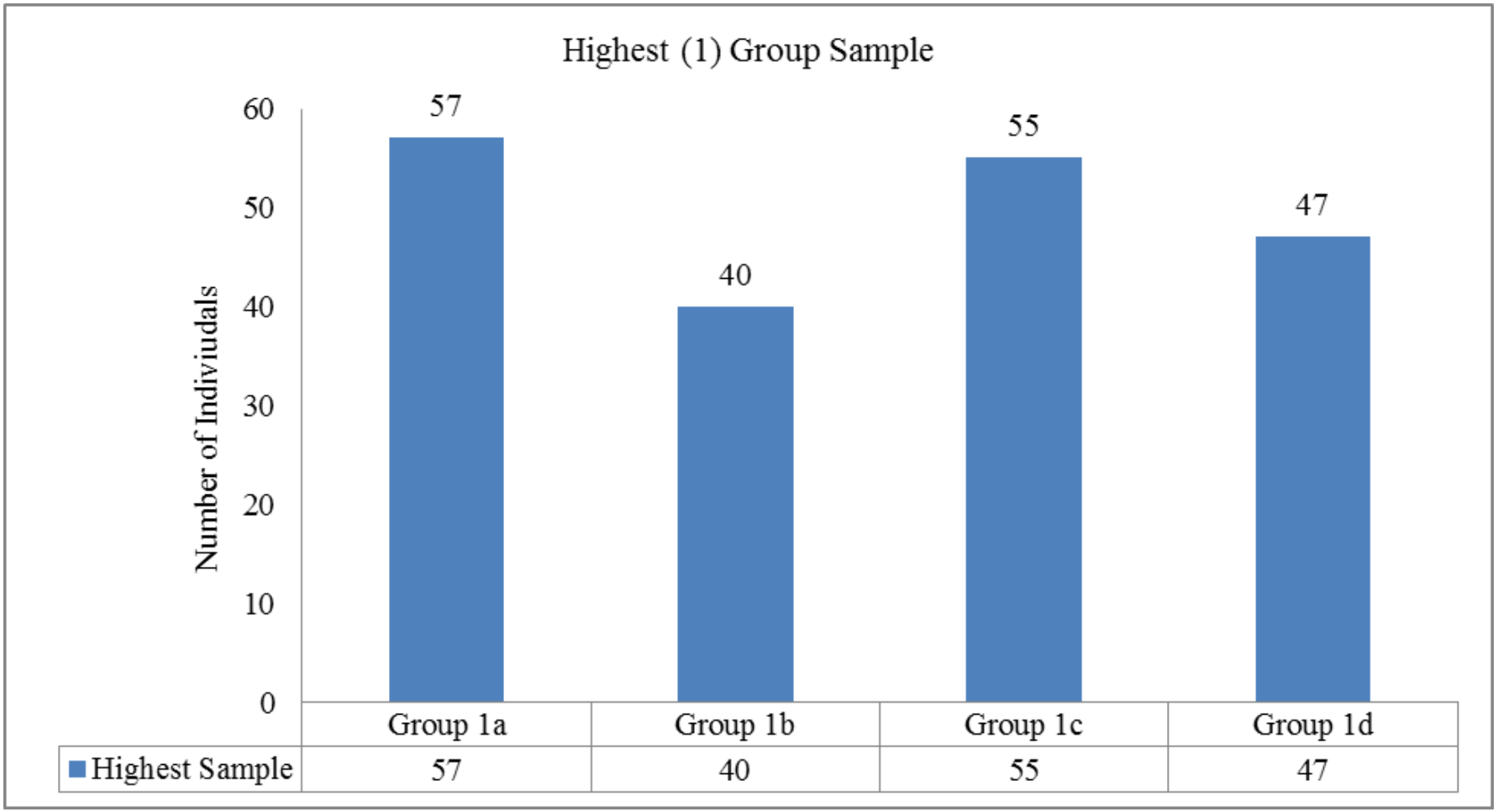
Phase One – WHO MADE THE GREATEST GAINS?

- **712 Individuals** - A change Score was determined by subtracting the post-test MPAI – 4 total standardized score, (as gathered at discharge from the program) from the pre-test total standardized score (as gathered at admission to the program) for all participants during the identified twelve-month period.

- Change Scores assigned to one of four groups representing their change category of highest (199 people); high-mid; mid-low; lowest.

Methodology



Categories, Themes, and Idea Clusters

Category (1, 2, 3, 4) Theme (a, b, c, d)	Idea Cluster 1	Idea Cluster 2	Idea Cluster 3
(1) **Support**			
(a) Paid Staff	Supportive Stance	Attitude	Skill
(b) Program Peers	Collectiveness Feeling	Competition	X
(c) Family Support	Frequency of Visits	Involvement in Treatment	X
(d) Higher Power	Saved from Death	Source of Strength	Control of Outcomes
(2) **Therapies**			
(a) Staff Skills	Specialties	Availability; Individual Treatment	X
(b) Self-Assessment	Describe Adaptation	Attitude of Self-Efficacy	X
(c) Equipment or Techniques	Level of Supervision	X	X
(3) **Continuum of Care**			
(a) Time of Treatment	After Hospital Experience	Community Integration	X
(b) Accessing	Real World	X	X
(c) Levels of Care	Progress in One Setting	X	X
(4)**Environment of Care**			
(a) Daily Schedule	Structured Day	Work Ordered Day	X
(b) Physical Set Up	Home-Like	Barrier-Free	X
(c) Location and Setting	Community Imbedded	Transportation	Proximity to Home

Data Analysis

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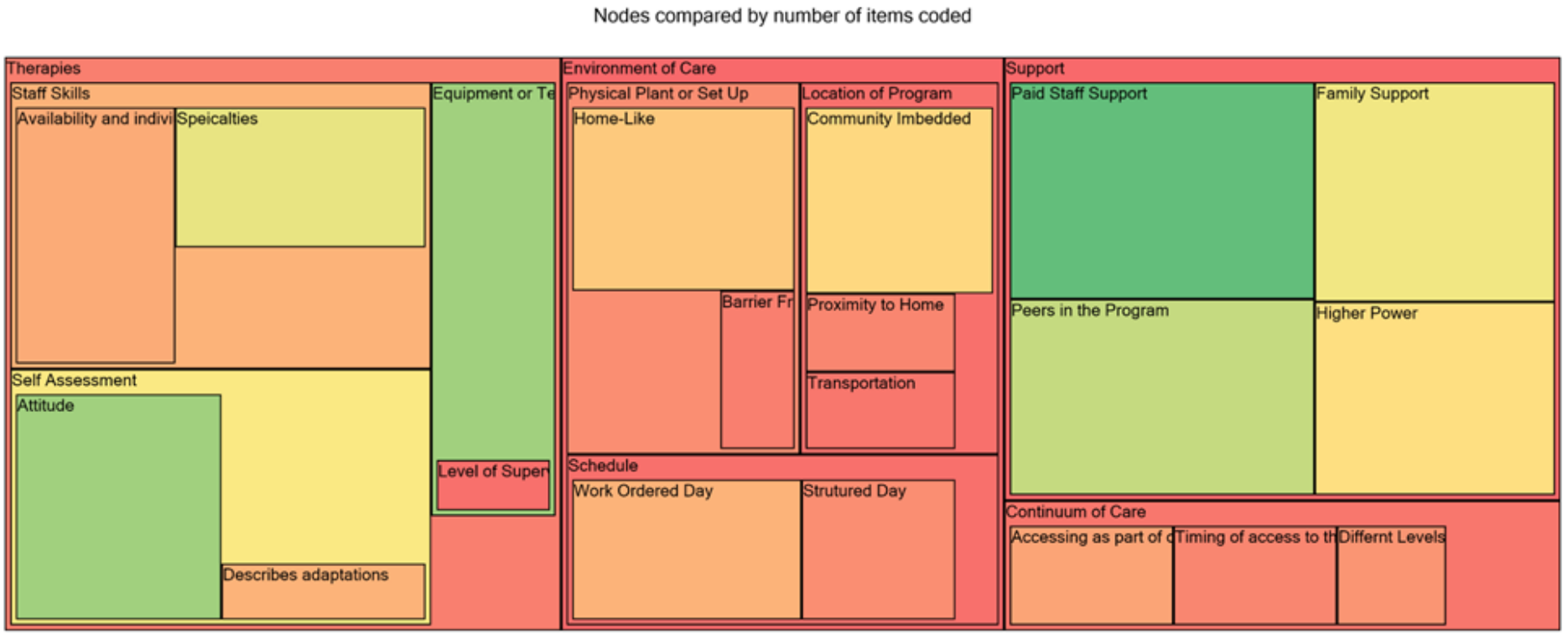

Emergent Themes – Peer and Group Treatment

- **Peers in the program provide motivation or support**.

  "When I met R, I got much more excited. He was hurt real, real bad. Much worse than me. But he was so positive, it was just incredible. I thought - If he could do it. He made the whole place better for us" (Angel 9).

- **Paid program staffs' and peers support.**

  "staff support and the support of the people in my groups is what helped me more than anything, because I'm like - they care. They talk with me and get me to do a lot of stuff and seem to care that I get it right. These people who have gone through these things like me – I like to see that they can do so that I can do it. They were encouraging. They're not leaving me sitting in this room all day like in the hospital. I was out there participating even in neighborhood like stuff" (Sawyer, 4)

Emergent Themes

- **Therapies: Staff Skills and Groups**

  "They just have more time one on one and leading groups than at the hospital. They had a lot more patients at [name of hospital] and the doctor recommended that I do these spring exercises twice a day, so I would do it on days when they could help. But at [name of program], I was able to do like twenty times a day every single day… they had these LSTs who could do it in groups ith other people who were going through what I was too. So that was very really good at getting success." (Angel, 3)

- **Therapies: Self-assessment and Groups**

  "After thinking about it for a bit, I took a pair of needle-nosed pliers put them in my left hand and then got the pliers onto the swivel. So, I was able to use the pliers as my left hand and then my right hand is just as dexterous as it ever was. I was able to change that hook from a hook to a lure. That was big for me that I was taught how to figure stuff like that on my own. So my hand might not work perfect, but I can still get a job done, you know? It was this LST who was sitting with me in this group where we were all just trying this stuff out." (Sawyer, 5)

Emergent Themes

- **Family support helped to achieve gains**

  “It was beneficial being close to family because I had that connection and they could learn all of my exercises and my strategies and help me with them when I went home on the weekends and even after I got discharged.” (Marion, 4)

- **A higher power provided success**.

  “He said something about being blessed and I was like, ‘Oh, mother***ker. He's going to be all into God and s**t.’ And that was when I was devoutly atheist and now I'm talking about God all the time. It’s because I can’t really explain why I’ve done so good. At some point I started saying prayers, so it feels like they were answered.” (Angel 9).

Emergent Themes

- **Therapies: Equipment or techniques**.

  “They took an hour or so in the community to do all the things that I used to do but seemed different now. All the staff were trying to be on the same page…which is very hard to do because you're dealing with so many different people and different personalities. If you work this shift–and you might not see Richard, but you might see Joseph or somebody else– and he might not know new things that they've learned in Think it Through Group or whatever. That's the hardest thing. But overall, they did quite well in coming together and making it all work. It was just good that it was all real stuff that we were doing. Sure there were protocols, but **we were practicing what we really needed to do when we got home. We were all practicing it together and I learned from the other people too.**” (Phoenix1).

Considering All Opportunities for Achieving Outcomes

- ***We are creating an environment where maximum correct practice can be achieved.***

- In addition to skilled therapies deviled by licensed clinicians… consider:

- ***Curriculumed Groups*** led by Direct Care Staff who are Certified Brain Injury Specialists and Family Members.
  - Table top; classroom; practice output

- ***Functional Groups*** *led by Direct Care Staff who are Certified Brain Injury Specialists and Family Members.*
  - Community based practice output

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Your Comments/ Thoughts ?