Executive Cognitive Functions following TBI: Rehabilitation Perspectives

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Session Objectives

After this course, participants will be able to:

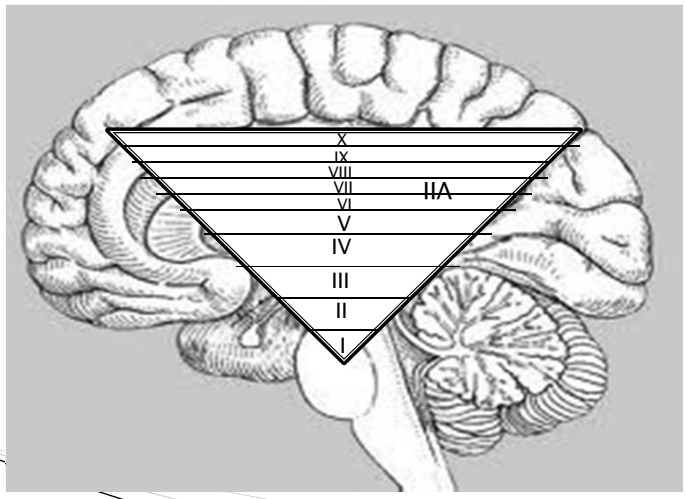
1) Identify the various components of executive cognitive functions and their impact on successful community participation following TBI.

2) Select appropriate evaluation approaches to assess and quantify executive cognitive functions.

3) Identify intervention approaches that clinicians can utilize to manage and improve executive cognitive functions

Recovery From Brain Injury

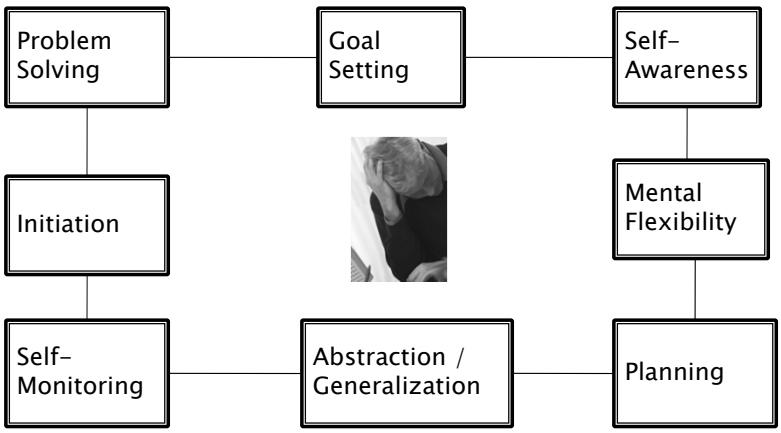
Rancho Los Amigos Levels of Cognitive Functioning (Hagen, 1998)



Defining Executive Cognitive Functions

- Various definitions and features:
  - *Higher order cognitive functions – selection, programming, and regulation of sensory inputs and motor output especially in non-routine situations (Glosser and Goodglass, 1990)*
  - *Metacognition*
  - *Those capacities that enable a person to engage successfully in independent, purposive, self-serving behavior (Lezak, 1995)*
  - *Involves acting upon the environment*

Categories of Executive Cognitive Functions (Zoltan, 2007)



Why are Executive Cognitive Functions of Importance to TBI Rehabilitation

- Have a significant impact in successful and satisfying adult role participation:
  - Employment
  - School
  - Parenting
  - Intimate Relationships
  - Friendships
  - Community and Leisure Activities

Rancho Level VII –

Automatic, Appropriate – Min Assistance for Daily Living Skills

- Consistently oriented to person and place, within highly familiar environments. Moderate assistance for orientation to time
- Able to monitor accuracy and completeness of each step in routine personal and household ADLs and modify plan with minimal assistance
- Superficial awareness of his/her condition but unaware of specific impairments and disabilities and the limits they place on his/her ability to safely, accurately and completely carry out his/her household, community, work and leisure ADLs
- Unrealistic planning for the future
- Unable to think about consequences of a decision or action
- Overestimates abilities
- Unaware of others' needs and feelings.
- Unable to recognize inappropriate social interaction behavior

Rancho Level VIII –

Purposeful, Appropriate – Stand-By Assistance

- Able to recall and integrate past and recent events
- Uses assistive memory devices to recall daily schedule, "to do" lists and record critical information for later use with stand-by assistance
- Initiates and carries out steps to complete familiar personal, household, community, work and leisure routines with stand-by assistance and can modify the plan when needed with minimal assistance
- Thinks about consequences of a decision or action with minimal assistance
- Overestimates or underestimates abilities
- Depressed / Irritable
- Low frustration tolerance/easily angered
- Self-centered
- Able to recognize and acknowledge inappropriate social interaction behavior while it is occurring and takes corrective action with minimal assistance

Rancho Level IX –

Purposeful, Appropriate – Stand-By Assistance on Request

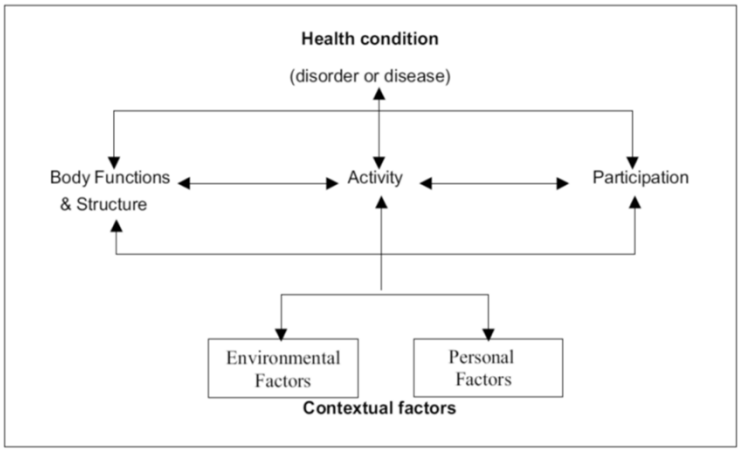
- Independently shifts back and forth between tasks and completes them accurately for at least two consecutive hours
- Initiates and carries out steps to complete familiar personal, household, work and leisure tasks independently and unfamiliar personal, household, work and leisure tasks with assistance when requested
- Accurately estimates abilities but requires stand-by assistance to adjust to task demands
- Acknowledges others' needs and feelings and responds appropriately with stand-by assistance
- Depression may continue
- May have low frustration tolerance
- Able to self monitor appropriateness of social interaction with stand-by assistance

Rancho Level X –

Purposeful, Appropriate – Modified Independent

- Able to handle multiple tasks simultaneously in all environments but may require periodic breaks
- Able to independently procure, create and maintain own assistive memory devices
- Independently initiates and carries out steps to complete familiar and unfamiliar personal, household, community, work and leisure tasks but may require more than usual amount of time and/or compensatory strategies to complete them
- Anticipates impact of impairments and disabilities on ability to complete daily living tasks and takes action to avoid problems before they occur but may require more than usual amount of time and/or compensatory strategies
- Able to independently think about consequences of decisions or actions but may require more than usual amount of time and/or compensatory strategies to select the appropriate decision or action
- Accurately estimates abilities and independently adjusts to task demands
- Periodic periods of depression may occur
- Irritability and low frustration tolerance when sick, fatigued and/or under emotional stress
- Social interaction behavior is consistently appropriate

Philosophy of Assessment and Treatment of Executive Cognitive Functions



International Classification of Functioning, Disability, and Health (WHO, 2001)

Assessment Considerations

1. Categories of executive cognitive functions are diverse, often necessitating varied assessment approaches

2. The impact of self-awareness deficit on the assessment process

3. The impact of goal setting difficulties on the assessment process

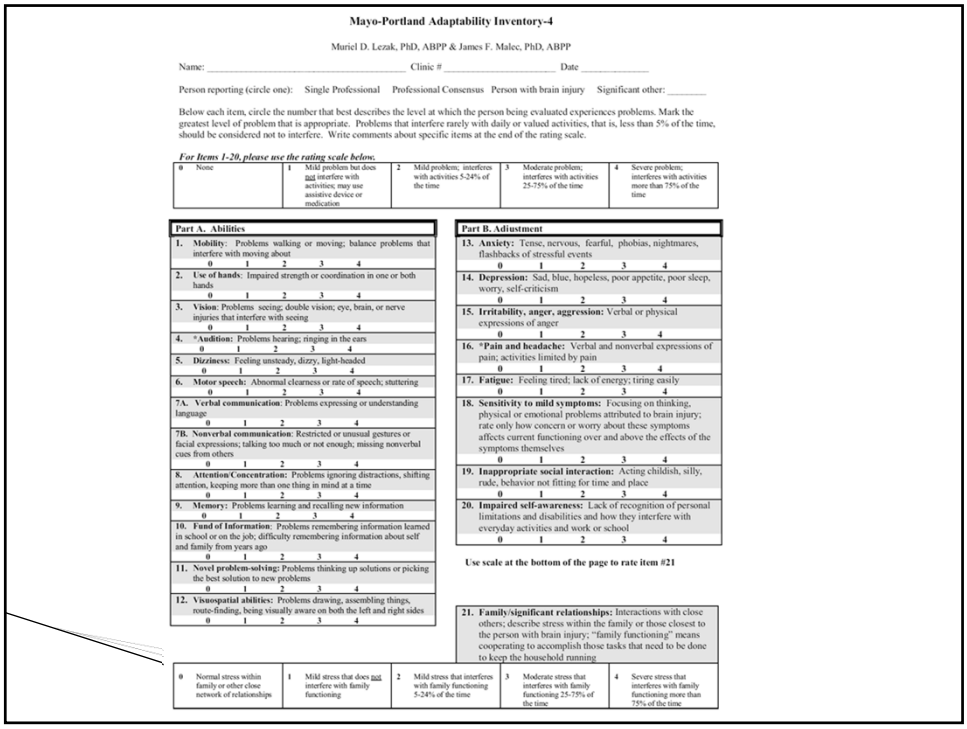
4. The importance of unstructured and/or natural environments to the assessment process

Assessment Approaches

- Top down vs. bottom up assessment
- Structured assessment versus informal observation
- Challenges of measurement

Measuring Community Participation

- Numerous scales available for use in public domain through the Center for Outcome Measurement in Brain Injury:
  - http://www.tbims.org/combi/list.html
- Can observe / evaluate impact of executive cognitive functions on various aspects of community participation
- Selection of instrument by therapist influenced by target behavior(s)



Mayo-Portland Adaptability Inventory-4

Muriel D. Lezak, PhD, ABPP & James F. Malec, PhD, ABPP

Name: _____ Clinic # _____ Date _____

Person reporting (circle one): Single Professional Professional Consensus Person with brain injury Significant other: _____

Below each item, circle the number that best describes the level at which the person being evaluated experiences problems. Mark the greatest level of problem that is appropriate. Problems that interfere rarely with daily or valued activities, that is, less than 5% of the time, should be considered not to interfere. Write comments about specific items at the end of the rating scale.

For Items 1-20, please use the rating scale below.

0 None	1 Mild problem but does not interfere with activities; may use assistive device or medication	2 Mild problem; interferes with activities 5-24% of the time	3 Moderate problem; interferes with activities 25-75% of the time	4 Severe problem; interferes with activities more than 75% of the time

Part A. Abilities

1. Mobility: Problems walking or moving; balance problems that interfere with moving about
0 1 2 3 4

2. Use of hands: Impaired strength or coordination in one or both hands
0 1 2 3 4

3. Vision: Problems seeing; double vision; eye, brain, or nerve injuries that interfere with seeing
0 1 2 3 4

4. *Audition: Problems hearing; ringing in the ears
0 1 2 3 4

5. Dizziness: Feeling unsteady, dizzy, light-headed
0 1 2 3 4

6. Motor speech: Abnormal clearness or rate of speech; stuttering
0 1 2 3 4

7A. Verbal communication: Problems expressing or understanding language
0 1 2 3 4

7B. Nonverbal communication: Restricted or unusual gestures or facial expressions; talking too much or not enough; missing nonverbal cues from others
0 1 2 3 4

8. Attention/Concentration: Problems ignoring distractions, shifting attention, keeping more than one thing in mind at a time
0 1 2 3 4

9. Memory: Problems learning and recalling new information
0 1 2 3 4

10. Fund of Information: Problems remembering information learned in school or on the job; difficulty remembering information about self and family from years ago
0 1 2 3 4

11. Novel problem-solving: Problems thinking up solutions or picking the best solution to new problems
0 1 2 3 4

12. Visuospatial abilities: Problems drawing, assembling things, route-finding, being visually aware on both the left and right sides
0 1 2 3 4

Part B. Adjustment

13. Anxiety: Tense, nervous, fearful, phobias, nightmares, flashbacks of stressful events
0 1 2 3 4

14. Depression: Sad, blue, hopeless, poor appetite, poor sleep, worry, self-criticism
0 1 2 3 4

15. Irritability, anger, aggression: Verbal or physical expressions of anger
0 1 2 3 4

16. *Pain and headache: Verbal and nonverbal expressions of pain; activities limited by pain
0 1 2 3 4

17. Fatigue: Feeling tired; lack of energy; tiring easily
0 1 2 3 4

18. Sensitivity to mild symptoms: Focusing on thinking, physical or emotional problems attributed to brain injury; rate only how concern or worry about these symptoms affects current functioning over and above the effects of the symptoms themselves
0 1 2 3 4

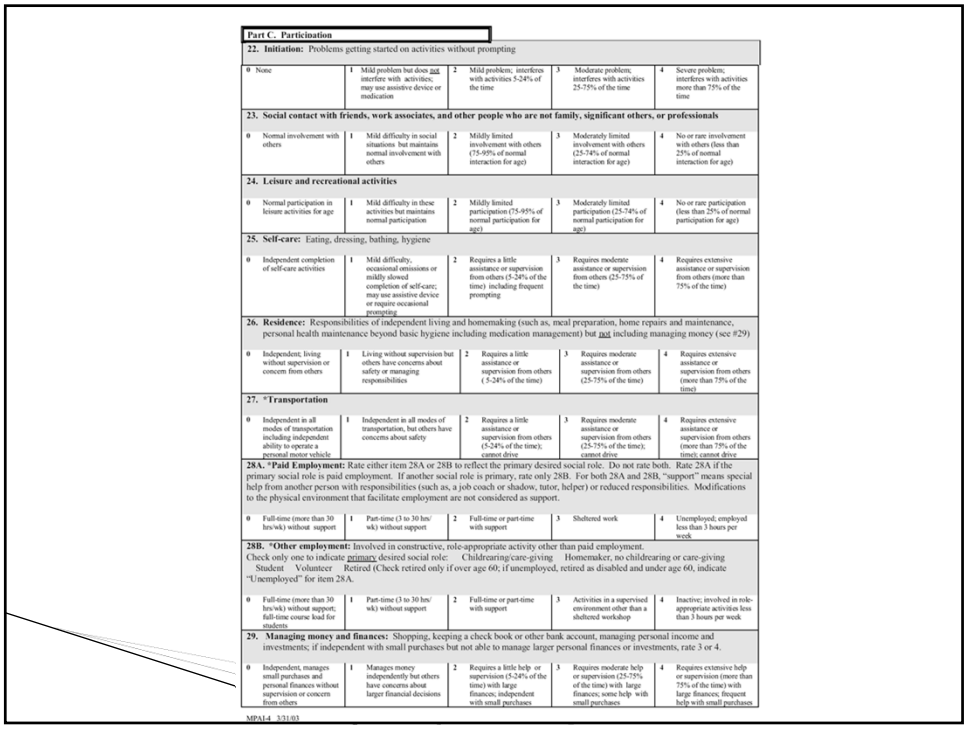
19. Inappropriate social interaction: Acting childish, silly, rude, behavior not fitting for time and place
0 1 2 3 4

20. Impaired self-awareness: Lack of recognition of personal limitations and disabilities and how they interfere with everyday activities and work or school
0 1 2 3 4

Use scale at the bottom of the page to rate item #21

21. Family/significant relationships: Interactions with close others; describe stress within the family or those closest to the person with brain injury; "family functioning" means cooperating to accomplish those tasks that need to be done to keep the household running

0 Normal stress within family or other close network of relationships	1 Mild stress that does not interfere with family functioning	2 Mild stress that interferes with family functioning 5-24% of the time	3 Moderate stress that interferes with family functioning 25-75% of the time	4 Severe stress that interferes with family functioning more than 75% of the time



Part C. Participation

22. Initiation: Problems getting started on activities without prompting

0 None	1 Mild problem but does not interfere with activities; may use assistive device or medication	2 Mild problem; interferes with activities 5-24% of the time	3 Moderate problem; interferes with activities 25-75% of the time	4 Severe problem; interferes with activities more than 75% of the time

23. Social contact with friends, work associates, and other people who are not family, significant others, or professionals

0 Normal involvement with others	1 Mild difficulty in social situations but maintains normal involvement with others	2 Mildly limited involvement with others (75-95% of normal interaction for age)	3 Moderately limited involvement with others (25-74% of normal interaction for age)	4 No or rare involvement with others (less than 25% of normal interaction for age)

24. Leisure and recreational activities

0 Normal participation in leisure activities for age	1 Mild difficulty in these activities but maintains normal participation	2 Mildly limited participation (75-95% of normal participation for age)	3 Moderately limited participation (25-74% of normal participation for age)	4 No or rare participation (less than 25% of normal participation for age)

25. Self-care: Eating, dressing, bathing, hygiene

0 Independent completion of self-care activities	1 Mild difficulty, occasional omissions or mildly slowed completion of self-care; may use assistive device or require occasional prompting	2 Requires a little assistance or supervision from others (5-24% of the time) including frequent prompting	3 Requires moderate assistance or supervision from others (25-75% of the time)	4 Requires extensive assistance or supervision from others (more than 75% of the time)

26. Residence: Responsibilities of independent living and homemaking (such as, meal preparation, home repairs and maintenance, personal health maintenance beyond basic hygiene including medication management) but not including managing money (see #29)

0 Independent; living without supervision or concern from others	1 Living without supervision but others have concerns about safety or managing responsibilities	2 Requires a little assistance or supervision from others (5-24% of the time)	3 Requires moderate assistance or supervision from others (25-75% of the time)	4 Requires extensive assistance or supervision from others (more than 75% of the time)

27. *Transportation

0 Independent in all modes of transportation including independent ability to operate a personal motor vehicle	1 Independent in all modes of transportation, but others have concerns about safety	2 Requires a little assistance or supervision from others (5-24% of the time); cannot drive	3 Requires moderate assistance or supervision from others (25-75% of the time); cannot drive	4 Requires extensive assistance or supervision from others (more than 75% of the time); cannot drive

28A. *Paid Employment: Rate either item 28A or 28B to reflect the primary desired social role. Do not rate both. Rate 28A if the primary social role is paid employment. If another social role is primary, rate only 28B. For both 28A and 28B, "support" means special help from another person with responsibilities (such as, a job coach or shadow, tutor, helper) or reduced responsibilities. Modifications to the physical environment that facilitate employment are not considered as support.

0 Full-time (more than 30 hrs/wk) without support	1 Part-time (3 to 30 hrs/wk) without support	2 Full-time or part-time with support	3 Sheltered work	4 Unemployed; employed less than 3 hours per week

28B. *Other employment: Involved in constructive, role-appropriate activity other than paid employment.
Check only one to indicate primary desired social role: Childrearing/care-giving Homemaker, no childrearing or care-giving
Student Volunteer Retired (Check retired only if over age 60; if unemployed, retired as disabled and under age 60, indicate "Unemployed" for item 28A.

0 Full-time (more than 30 hrs/wk) without support; full-time course load for students	1 Part-time (3 to 30 hrs/wk) without support	2 Full-time or part-time with support	3 Activities in a supervised environment other than a sheltered workshop	4 Inactive; involved in role-appropriate activities less than 3 hours per week

29. Managing money and finances: Shopping, keeping a check book or other bank account, managing personal income and investments; if independent with small purchases but not able to manage larger personal finances or investments, rate 3 or 4.

0 Independent, manages small purchases and personal finances without supervision or concern from others	1 Manages money independently but others have concerns about larger financial decisions	2 Requires a little help or supervision (5-24% of the time) with large finances; independent with small purchases	3 Requires moderate help or supervision (25-75% of the time) with large finances; some help with small purchases	4 Requires extensive help or supervision (more than 75% of the time) with large finances; frequent help with small purchases

MPAI-4 3/31/03

Part D: Pre-existing and associated conditions. The items below do not contribute to the total score but are used to identify special needs and circumstances. For each rate, pre-injury and post-injury status.

30. Alcohol use: Use of alcoholic beverages.

Pre-injury _____ Post-injury _____

0 No or socially acceptable use	**1** Occasionally exceeds socially acceptable use but does not interfere with everyday functioning; current problem under treatment or in remission	**2** Frequent excessive use that occasionally interferes with everyday functioning; possible dependence	**3** Use or dependence interferes with everyday functioning; additional treatment recommended	**4** Inpatient or residential treatment required

31. Drug use: Use of illegal drugs or abuse of prescription drugs.

Pre-injury _____ Post-injury _____

0 No or occasional use	**1** Occasional use does not interfere with everyday functioning; current problem under treatment or in remission	**2** Frequent use that occasionally interferes with everyday functioning; possible dependence	**3** Use or dependence interferes with everyday functioning; additional treatment recommended	**4** Inpatient or residential treatment required

32. Psychotic Symptoms: Hallucinations, delusions, other persistent severely distorted perceptions of reality.

Pre-injury _____ Post-injury _____

0 None	**1** Current problem under treatment or in remission; symptoms do not interfere with everyday functioning	**2** Symptoms occasionally interfere with everyday functioning but no additional evaluation or treatment recommended	**3** Symptoms interfere with everyday functioning; additional treatment recommended	**4** Inpatient or residential treatment required

33. Law violations: History before and after injury.

Pre-injury _____ Post-injury _____

0 None or minor traffic violations only	**1** Conviction on one or two misdemeanors other than minor traffic violations	**2** History of more than two misdeameanors other than minor traffic violations	**3** Single felony conviction	**4** Repeat felony convictions

34. Other condition causing physical impairment: Physical disability due to medical conditions other than brain injury, such as, spinal cord injury, amputation. Use scale below #35.

Pre-injury _____ Post-injury _____

35. Other condition causing cognitive impairment: Cognitive disability due to nonpsychiatric medical conditions other than brain injury, such as, dementia, stroke, developmental disability.

Pre-injury _____ Post-injury _____

0 None	**1** Mild problem but does not interfere with activities; may use assistive device or medication	**2** Mild problem; interferes with activities 5-24% of the time	**3** Moderate problem; interferes with activities 25-75% of the time	**4** Severe problem; interferes with activities more than 75% of the time

Impairment Specific Assessment Example

Rating Scale*

Table 1. Apathy Evaluation Scale, Clinician Version [AES-C]

Name: _____ Date: _____

Rater: _____

Rate each item based on an interview of the subject. The interview should begin with a description of the subject's interest, activities and daily routine. Base your ratings on both verbal and non-verbal information. Ratings should be based on the past 4 weeks. For each item ratings should be judged:

Not at All Characteristic	Slightly Characteristic	Somewhat Characteristic	A Lot Characteristic
1	1	3	4

__ 1. S/he is interested in things.	+ C Q
__ 2. S/he gets things done during the day.	+ B Q
__ 3. Getting things started on his/her own is important to her/him.	+ C SE
__ 4. S/he is interested in having new experiences.	+ C Q
__ 5. S/he is interested in learning new things.	+ C Q
__ 6. S/he puts little effort into anything.	- B
__ 7. S/he approaches life with intensity.	+ E
__ 8. Seeing a job through to the end is important to her/him.	+ C SE
__ 9. He/she spends time doing things that interest her/him.	+ B
__ 10. Someone has to tell her/him what to do each day.	- B
__ 11. S/he is less concerned about his/her problems than her/him should be.	- C
__ 12. S/he has friends.	+ B Q
__ 13. Getting together with friends is important to her/him.	+ C SE
__ 14. When something good happens, he/she gets excited.	+ E
__ 15. S/he has an accurate understanding of her/him problems.	+ O
__ 16. Getting things done during the day is important to her/him.	+ C SE
__ 17. S/he has initiative.	+ O
__ 18. S/he has motivation.	+ O

Note: Items that have positive versus negative syntax are identified by +/-. Type of item: C = cognitive; B = behavior; E = emotional; O = other. The definitions of self-evaluation (SE) and quantifiable (Q) items are discussed in the administration guidelines [see Syllabus]. (Marin, 1991 [see References]) For self-rated and informant-rated versions of AES, the response options are Not at all true, Slightly true, etc. The Apathy Evaluation Scale was developed by Robert S. Marin, M.D. Development and validation studies are described in Marin et al., 1991 [see References]. Supplementary administration guidelines are available from the author.

Special Considerations: Self-awareness Deficit

- It has long been observed that people with TBI may be less aware of the deficits resulting from their injury than people around them such as family members, doctors, and therapists
- Commonly associated with frontal lobe and sub-cortical limbic system damage
- Relationship between extent of problem and severity of injury

The Role of Awareness Deficit on the Assessment and Treatment Process

- Makes it difficult to participate in rehabilitation goal setting
- Negatively impacts compliance
- Makes it difficult to have a good relationship with therapists
- Negatively impacts outcomes
  - Makes it tougher to get back to work or school
  - Makes it hard to establish or maintain interpersonal relationships

Evaluating Self-Awareness Example – Comparing client, caregiver, and therapist versions of awareness questionnaire

Awareness Questionnaire
Clinician Form

Clinician Name:_____ Date:_____

Patient:_____ Patient #:_____

1	2	3	4	5
much worse	a little worse	about the same	a little better	much better

___ 1. How good is the patient's ability to live independently now as compared to before his/her injury?

___ 2. How good is the patient's ability to manage his/her money now as compared to before his/her injury?

___ 3. How well does the patient get along with people now as compared to before his/her injury?

___ 4. How well can the patient do on tests that measure thinking and memory skills now as compared to before his/her injury?

___ 5. How well can the patient do the things he/she wants to do in life now as compared to before his/her injury?

___ 6. How well is the patient able to see now as compared to before his/her injury?

___ 7. How well can the patient hear now as compared to before his/her injury?

___ 8. How well can the patient move his/her arms and legs now as compared to before his/her injury?

___ 9. How good is the patient's coordination now as compared to before his/her injury?

___ 10. How good is the patient at keeping up with the time and date and where he/she is now as compared to before his/her injury?

1	2	3	4	5
much worse	a little worse	about the same	a little better	much better

___ 11. How well can the patient concentrate now as compared to before his/her injury?

___ 12. How well can the patient express his/her thoughts to others now as compared to before his/her injury?

___ 13. How good is the patient's memory for recent events now as compared to before his/her injury?

___ 14. How good is the patient at planning things now as compared to before his/her injury?

___ 15. How well organized is the patient now as compared to before his/her injury?

___ 16. How well can the patient keep his/her feelings in control now as compared to before his/her injury?

___ 17. How well adjusted emotionally is the patient now as compared to before his/her injury?

1	2	3	4	5
completely	severely	moderately	minimally	not at all

_____18. To what extent is the patient's accurate self-awareness impaired by his/her brain injury?

Sherer, Boake, Levin, et al. (2004)

Assessment Considerations: Categories of Community Reintegration Goals (Turner, 2008)

1. Relationships (family, interpersonal relationships, friendships, social activities)

2. Work and education

3. Injury rehabilitation

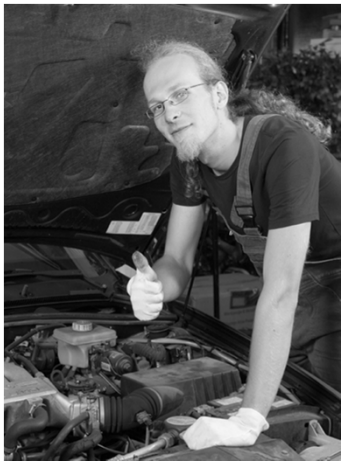
4. Health and leisure

5. Daily life management

6. General life / personal goals
   - Studies suggest clients are initially more aware of physical deficits than cognitive, emotional, and social difficulties, impacting nature of self identified goal setting (Turner et al, 2008; Kuipers et al, 2004)
   - Ability to address other aspects of functioning dependent upon increased self-awareness of deficits

Assessment Considerations:
The Environment and the Importance of "Natural"

- Executive cognitive problems generally don't affect well-structured tasks (Raskin, 2000)
  - Non-specific, open ended tasks can be especially useful
  - Everyday activities in unstructured settings



Executive Cognitive Functions: Key Issues in the Rehabilitation Process

A. Complexity of impairments affecting TBI

B. Self-esteem issues and fear of failure / success

C. Therapeutic relationship building

D. Client driven goal setting

E. The value of the therapeutic community

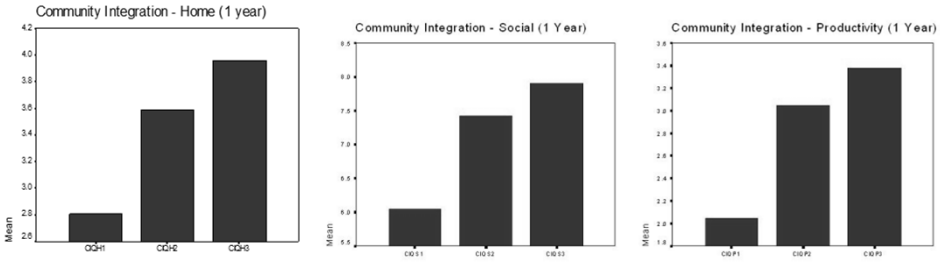
Step 1: Managing Awareness Deficits

- Recognizing limitations tougher when self-esteem and self-confidence issues present
- Awareness deficits may be complicated by psychological denial
- Optimal treatment achieved in context of trusting therapeutic relationship with clinician – need to overcome fear of failure / success
- Requires participation and *failure* on behalf of client

The Impact of Community Based Rehabilitation on Community Participation

Wheeler, Lane, McMahon (2005); Wheeler, 2012

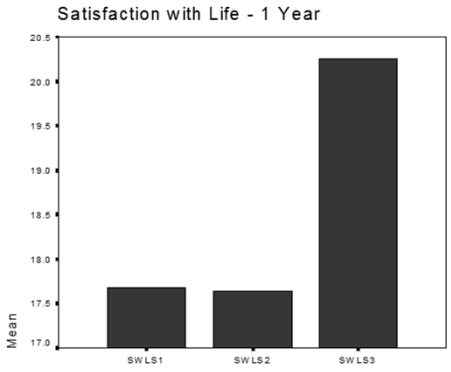
Measure = Community Integration Questionnaire



Graphs represent admission, 3 month, and 1 year follow during participation In community based rehabilitation.
Intervention included life skills coaching, group therapy, OT, SLP and Psychology

Life Satisfaction and TBI – 1 Year Follow-up (Wheeler, 2012)

- Clients making biggest functional gains and highest life satisfaction at 1 year were those with decreased satisfaction at 12 week period.



Therapeutic Relationships during Community Re-entry

- If relationships are always "great" during the therapy process – functional improvements may not be occurring
- The easiest way to avoid learning about a problem is to avoid trying new things

Managing awareness deficit

- A word of caution
  - **While patient self-awareness is generally felt to be beneficial or even required for successful rehabilitation, improvements in awareness have also been linked with emotional distress**

Executive Cognitive Functions – General intervention issues

1. Need to build incentives into the program
   - Rewards
   - Therapeutic community – Group therapy

2. Need involvement of client and caregivers in process

3. Treatment tasks should approximate "real" as close as possible

4. Need to teach / facilitate self-evaluation of tasks throughout categories of executive functioning

The Value of Group Activities

1) Facilitate assessment of social behaviors – social microcosm

2) Provides environment for receiving feedback regarding inappropriate social behaviors

3) Provides forum for practicing skills related to social competence

4) Provides motivating environment for goal setting

Example: Treatment of Planning and Organization Deficits

1. Have patient verbalize plan before, during, and after activity. Gradually fade out overt verbalizations

2. Self Verbalizations
   - What do I need to do?
   - What is it I want to accomplish?
   - What is my goal?

3. Incorporate questioning techniques into variety of tasks
   - What are we looking for?
   - Where do you suppose it is?
   - How can we find it?
   - How much time do we have to look?
   - Do you think we can find it?

Example: Verbal Disinhibition

- Ongoing nonverbal cuing by therapist(s)
- Client Self-Cues
  - Is it appropriate? Is it my business?
  - It is relevant? Does it pertain to topic?
  - Will people think more or less of me?
  - Is it sexual? Hostile? Rude?
  - Is it repetitive? Have I said it before?

Conclusions

- Executive cognitive functions significantly impact successful community participation / re-entry following TBI
- Evaluation includes determination of success and satisfaction in participation of home and community tasks and subsequently, impact of executive cognitive functions
- Assessment and treatment challenges associated with self-awareness deficits
- Participation in unstructured daily activities facilitates awareness of deficits and fosters learning / rehabilitation
- Therapeutic relationship and client / family participation central to optimal program outcome

Questions?

Thank you!

References

Glosser, G. & Goodglass, H. (1990). Disorders of executive control functions among aphasic and other brain damaged patients. Journal of Clinical and Experimental Neuropsychology, 12, 485-501.

Hagen, C. (1998). The Rancho Los Amigos Levels of Cognitive Functioning: The revised levels (3rded.). Downey, CA: Los Amigos Research and Educational Institute.

Kuipers, P., Carlson, G., Bailey, S., & Sharma, A. (2004). A preliminary exploration of goal setting in community based rehabilitation for people with brain impairment. Brain Impairment, 5, 30-41.

Lezak, M. (1995). Neuropsychological Assessment. New York: Oxford University Press.

References

Malec, J. & Lezak, M. (2003). Manual for the Mayo-Portland Adaptability Inventory (MPAI-4), Portland, OR: Oregon Health Science University.

Marin RS, Biedrzycki RC, Firinciogullari S (1991). Reliability and validity of the Apathy Evaluation Scale. Psychiatry Res, 38:143-62.

Raskin, S. (2000). Executive cognitive functions. In: Raskin, S., Mateer, C. (Eds.). Neuropsychological mMnagement of Mild Traumatic Brain Injury. NewYork, NY: Oxford University Press.

Sherer, M., Bergloff, P., Boake, C., High, W., & Levin, E. (1998a). The Awareness Questionnaire: Factor structure and internal consistency. Brain Injury, 12, 63-68.

Turner, B., Ownsworth, T., Turpin, M., Fleming, J., & Griffin, J. (2008). Self-identified goals and the ability to set realistic goals following acquired brain injury: a classification framework. Australian Occupational Therapy Journal, 55, 96-107.

References

Wheeler, S. (2012). The impact of intensive community based rehabilitation on community participation and life satisfaction following severe traumatic brain injury. In: Agriwal (Ed.), Brain Injury: Functional Aspects, Rehabilitation, and Prevention (pp. 95-120). Rijeka, Croatia: Intech Publishers.

Wheeler, S., Lane, S.,& McMahon, B. (2007). Community participation and life satisfaction following intensive community based rehabilitation using a life skills training approach. OTJR: Occupation, Participation, and Health, 27(1), 13-22.

World Health Organization [WHO]. (2001). International Classification of Functioning, Disability, and Health: ICF. Geneva: WHO.

Zoltan, B. (2007). Vision, Perception, and Cognition. Thorofare, NJ: Slack.

Resources

Apathy Evaluation Scale
- http://www.tbims.org/combi/aes/index.html

Awareness Questionnaire
- http://www.tbims.org/combi/aq/index.html

Mayo-Portland Adaptability Inventory
- http://tbims.org/combi/mpai/