NRI

Neurologic Rehabilitation Institute at Brookhaven Hospital

About the Study

NRI staff and management are attuned to the importance of patient outcomes and annually conducts an Outcome Validation Study to evaluate the quality of programming and services. The study looks at various aspects of the program as it relates to the patient including the patient's return to independence, social role return, vocational re-entry and self-management of aggressive behaviors. As the study evolves, we continually look for ways to improve our program and patient outcomes.

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Outcome Validation Study Highlights for 2009

Patient Demographics and Characteristics

Demographics and Characteristics

The NRI Outcome Validation Study for the period ending December 31, 2009 addressed the discharges of 18 individuals. There were 13 Males and 5 females. At admission, the average age was 41, with a range of 24 to 62. The average age at the time of injury was 32 with a range of birth to 59 years old. In terms of "years post injury at the time of admission", the average was 18 years post injury with a range of 1 month to 53 years. The average length of stay in the NRI program was 17 weeks with a range of 4 days to 5 years.

Mechanism of Injury

The discharged population included individuals with various causations of their acquired brain injury. This included medical issues such as severe fever as a child, anoxia, bilateral lower chronic extremity edema and Huntington's chorea. The group also experienced traumatic means of injury like motor vehicle accidents, assault resulting in a coma, domestic violence assault, construction accident, self-inflicted gun shot wound, tree falling on individual, and falling off a roof.

Lastly, several patients acquired a brain injury due to substance abuse overdose and falls due to drinking. All sustained severe injuries resulting in significant physical, medical, cognitive and behavioral deficits. Many exhibited post injury histories of aggressive behavior including aggression toward self and others, elopement issues, non-compliance and disinhibition. All had severe cognitive problems involving attention, arousal, selection, filtering, memory, information retrieval, learning, and impaired executive functioning.

Overall, the characteristics of individuals served by the program are consistent with past population samples. The NRI program specializes in this population and the level of severity of our patients is higher than the general population of brain injury individuals due in part to selection bias. Brookhaven Hospital's NRI program works diligently to serve a population that generally has a history of multiple placement failures in traditional treatment programs.

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Introduction

During 2009, the NRI program experienced significant change related to patient care such as enhancing occupational therapy and speech/language services, increasing recreational therapy, and utilizing more extensive job coaching activities. In addition, the outcome study moved to include more objective measures known to the brain injury community. These measures are the Brief Neuropsychological Cognitive Examination (Tonkonogy, 1997) and the Mayo-Portland Adaptability Inventory (MPAI-4) developed by Malec and Lezak (2003). The objective measures are coupled with previous categorical measures that address the areas of: Return to Independence, Social Role Return, Vocational Re-entry and Self Management of Behavior.

In using objective measures, the MPAI-4 has an Adjustment sub-scale that speaks to behavior management and as a pilot study, will take the place of the Self Management of Behavior category for 2009. Following is the NRI Outcome Validation Study for 2009.

Categorical Data Outcomes 2004-2009

TABLE 1. Return to Independence
The table below indicates the discharge destination of clients who completed the NRI program shifted towards returning home with minimal to moderate supports from 2004 to 2009.

	2004	2005	2006	2007	2008	2009
Return to independence with minimal to moderate support <6 hrs/day	13%	60%	45%	14%	14%	0%
Return to congregate living or extended supports in the home >6hrs/day	25%	10%	0%	14%	29%	50%
Return to group home with 24 hr/day support	12%	10%	33%	57%	14%	11%
Return to nursing home or hospital setting 24hr/day care	50%	20%	22%	15%	43%	39%

TABLE 2. Vocational Re-Entry
The return to meaningful life activities such as work, school and volunteering is an important measure of completing rehabilitation. The return to competitive and supported employment increased from 2005 to 2009.

	2004	2005	2006	2007	2008	2009
Return to competitive employment, school or vocational training program	0%	0%	11%	0%	14%	0%
Supported employment or volunteer work	0%	10%	11%	17%	14%	0%
Sheltered workshop or day activity program	13%	20%	11%	33%	29%	11%
Unable to work	75%	50%	45%	33%	0%	50%
Requires 24 hr/day supervision	12%	20%	22%	17%	43%	39%

TABLE 3. Social Role Return
The return to pre-injury social role is a determinant in an individual maintaining their independence over time. Returning to pre-injury social role and responsibilities increased in 2006, 2008, and 2009.

	2004	2005	2006	2007	2008	2009
Return home with independence and minimal modifications to social role	0%	0%	12%	0%	14%	28%
Return home to dependent care status	25%	70%	33%	33%	14%	11%
Return home with <2 hrs/day paid behavioral support	0%	10%	0%	33%	10%	0%
Return home with >2 hrs/day paid behavioral support	13%	0%	0%	0%	24%	11%
Attend day program providing structured care 3-5 days/week	12%	0%	33%	71%	14%	11%
24 hr/day Supervision	50%	20%	22%	0%	24%	39%

TABLE 4. Self Management of Behavior
The self-management of behavior is a key factor in long term success. Individuals completing the NRI program demonstrate an increase in their capacity to self-regulate behavior.

	2004	2005	2006	2007	2008	2009
No behavioral support services required	25%	30%	45%	66%	28%	See MPAI results
Weekly contact with therapist, 0-5 outbursts per week	0%	10%	0%	17%	28%	See MPAI results
2 or more contacts per week with therapist, 6+ outbursts per week	0%	20%	0%	0%	0%	See MPAI results
Requires daily structured behavioral program	25%	20%	33%	0%	0%	See MPAI results
24 hour placement	50%	20%	22%	17%	44%	See MPAI results

Objective Data Outcomes:

The Brief Neuropsychological Cognitive Examination (BNCE) is a 41 item assessment that examines the severity and nature of cognitive impairment using a brief set of tasks. It is a two-part instrument that offers a look at a patient's ability to process conventional information and contrast it with the ability to process new and incomplete information. The BNCE incorporates ten sub-tests that evaluate aphasia, agnosia, apraxia, amnesia, attention deficits, and executive functioning. The total score allows for an assessment of the individual's functionality and ability to live independently. Used as a pre/post measurement, NRI looks to evaluate individual improvement as well as program efficacy.

The Mayo-Portland Adaptability Inventory (MPAI-4) is a 29 item assessment instrument for those in post-acute treatment for acquired brain injury. It is a Likert scale rating system that may be completed by the individual, significant other, single professional or professional consensus. The instrument is composed of a total score and three sub-scale scores: the Ability sub-scale measures sensory, motor and cognitive abilities; the Adjustment sub-scale measures mood, interpersonal interaction and behavioral self-management; and the Participation sub-scale measures social contacts, money management and initiation. The MPAI-4 contains six items at the end that are not part of the overall score or sub-scales. Those items review pre/post injury functioning related to chemical dependency issues, psychotic symptoms, law violations and other possible physical (e.g., spinal cord injury) and cognitive impairments (e.g., dementia). These items are used to facilitate individual treatment planning and improving program curriculum.

Also used as a pre/post measure, the instrument allows the program a means to assess individual patients as well as an overall evaluation of programming. This is the first year NRI has incorporated more objective measures as a part of program evaluation. Following are the Brief Neuropsychological Cognitive Exam and the Mayo-Portland Adaptability Inventory results for 2009:

TABLE 5. BNCE and MPAI-4

2009 Results for BNCE and MPAI-4						
BNCE		**Mayo Portland**				
Admit	15.9		**Ability**	**Adjustment**	**Participation**	**Total**
D/C	16.7	**Admit**	52.3	57.9	60.2	56.8
Diff	+.8	**D/C**	52.9	54.5	60.1	55.4
		Diff	+.6	-3.3	-.1	-1.4
n = 8		n = 8				

Table Notes:

- BNCE scoring has a range of 0-30 with higher scores indicating a better level of functioning. The general cut-off score to live independently is 22.
- BNCE offers comparison sample groups.
- MPAI-4 scoring has a range of 0-116 with lower scores indicating a better level of functioning.
- MPAI-4 scores are converted to T-scores and offers a comparison between raters.
- All scores are averages.

Interpretation

From the table, the BNCE data and cut-off scores indicate that the NRI patients admitted during 2009 have severe deficits related to their injury. From the overall total score, the data also indicates that the patients, on average, did experience positive improvement (+.8). Recall that higher scores are better on the BNCE. This number equates to a 2.6% improvement as measured by the BNCE.

The Mayo Portland data total score indicates an overall improvement of (-1.4). Recall that lower scores are better on the MPAI-4. Looking at the sub-scales, the Ability scale, that measures issues such as mobility, motor/speech, attention/concentration, and memory, had a score increase of (+.6). There are many possible explanations for this finding one of which is in a global view, patient's memory skills did not improve due to the long-term impact of their disability.

The Adjustment sub-scale offers a more positive look at the data. Recall that this measure is taking the place of the Self Management of Behavior category from previous outcome studies. This sub-scale measures issues such as anxiety, depression, irritability, anger, aggression, inappropriate social interaction and impaired self-awareness. The data indicates an improvement of (-3.3) which is almost a 6% (-5.7) improvement of the average admission score.

The Participation sub-scale scores reflect a (-.1) improvement from admission to discharge. This sub-scale measures issues such as initiation without prompt, social contact, self-care, independent living skills, transportation, employment and managing money. Again, there are many possibilities for this finding one of which is that the ratings for transportation and employment are skewing the data. In other words, patients admitting to the program generally do not drive and usually not employed even in sheltered workshops. As such, those ratings on the sub-scale would indicate a "severe" problem area that may have minimal resolution.

Conclusion

In closing, it is important to note that this is the first year the NRI program has moved to objective measures for program evaluation. NRI continues to look at categorical outcomes related to independence, social role and vocational re-entry (see Tables 1-4). The MPAI-4 Adjustment scale replaced the Self Management of Behavior category as our first specific objective measure. Initial results indicate success in the program's ability to assist clients with the management of their behavior. We look forward in the coming years to continuing objective program evaluation and use categorical information as a cross reference of the objective data.