



## 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.*

### **NRI**

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## **Outcome Validation Study Highlights for 2010** **Patient Demographics and Characteristics**

### *Demographics and Characteristics*

The NRI Outcome Study for the period ending December 31, 2010 addressed the discharges of 6 individuals. There were 5 males and 1 female. At admission the average age was 43 with a range of 20 to 63. The average age at the time of injury was 36 with a range of 20 to 50 years old. In the terms of "years post injury at the time of admission," the average was 7 years post injury with a range of 6 months to 14 years. The average length of stay on the NRI program was 8 weeks with a range of 2 weeks to 6 months.

### *Mechanism of Injury*

The causation of the brain injury for the discharge population in this study includes motor vehicle and construction accidents. Other patients not included in this study acquired their brain injury due to substance abuse. All sustained severe injuries resulting in significant physical, medical, cognitive, and behavioral deficits. Many exhibited post injury history 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.

# Introduction



During 2010, the NRI program experienced significant change with our expansion to 28 beds for NRI and 64 total for the hospital. In addition, the hospital renovated an adjacent building to the NRI inpatient unit for other rehabilitative and administrative services. In relation to patient care, NRI enhanced occupational therapy, speech/language services, recreational therapy, and our physical health program with the addition of our fitness center. In 2010 the NRI outcome study continues to include more objective outcome 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.

In using objective measures, the MPAI-4 has an Adjustment sub-scale that speaks to behavior management and that sub-scale took the place of the Self Management of Behavior category in 2009. During 2010, the Self-Management of Behavior category was re-implemented. Following is the NRI Outcome Validation Study for 2010.

## Categorical Data Outcomes 2005-2010

**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 for 2010.

	2005	2006	2007	2008	2009	2010
Return to independence with minimal to moderate support <6 hrs/day	60%	45%	14%	14%	0%	13%
Return to congregate living or extended supports in the home >6hrs/day	10%	0%	14%	29%	50%	17%
Return to group home with 24 hr/day support	10%	33%	57%	14%	11%	37%
Return to nursing home or hospital setting 24 hr/day care	20%	22%	15%	43%	39%	33%

**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, supported or sheltered workshop employment increased from 2009 to 2010.

	2005	2006	2007	2008	2009	2010
Return to competitive employment, school or vocational training program	0%	11%	0%	14%	0%	0%
Supported employment or volunteer work	10%	11%	17%	14%	0%	13%
Sheltered workshop or day activity program	20%	11%	33%	29%	11%	29%
Unable to work	50%	45%	33%	0%	50%	42%
Requires 24 hr/day supervision	20%	22%	17%	43%	39%	16%

**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 with a decrease in 2010.

	2005	2006	2007	2008	2009	2010
Return home with independence and minimal modifications to social role	0%	12%	0%	14%	28%	4%
Return home to dependent care status	70%	33%	33%	14%	11%	21%
Return home with <2 hrs/day paid behavioral support	10%	0%	33%	10%	0%	0%
Return home with >2 hrs/day paid behavioral support	0%	0%	0%	24%	11%	4%
Attend day program providing structured care 3-5 days/week	0%	33%	71%	14%	11%	8%
24 hr/day Supervision	20%	22%	0%	24%	39%	63%

**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.

	2005	2006	2007	2008	2009	2010
No behavioral support services required	30%	45%	66%	28%	See MPAI results	0%
Weekly contact with therapist, 0-5 outbursts per week	10%	0%	17%	28%	See MPAI results	33%
2 or more contacts per week with therapist, 6+ outbursts per week	20%	0%	0%	0%	See MPAI results	16%
Requires daily structured behavioral program	20%	33%	0%	0%	See MPAI results	13%
24 hour placement	20%	22%	17%	44%	See MPAI results	38%

### **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 2010:

**TABLE 5. BNCE and MPAI-4**

<b>2010 Results for BNCE and MPAI-4</b>						
<b>BNCE</b>		<b>Mayo-Portland</b>				
			<b>Ability</b>	<b>Adjustment</b>	<b>Participation</b>	<b>Total</b>
<b>Admit</b>	14.5	<b>Admit</b>	50.7	54.3	50.9	53.0
<b>D/C</b>	17.0	<b>D/C</b>	48.0	55.2	57.0	52.2
<b>Diff</b>	+2.5	<b>Diff</b>	-2.7	+0.9	+6.1	- 0.8
n = 6		n = 6				

**Table Notes:**

- BNCE: in general, a total score <22 indicates the individual will struggle living alone.
- BNCE: higher scores indicate a better level of functioning.
- MPAI-4: lower scores indicate a better level of functioning.

## *Interpretation*

From the table, the BNCE data and cut-off scores indicate that the NRI patients admitted during 2010 have severe deficits related to their injury. With an average admission score of 14.5, the individuals in the study will struggle to live without significant support systems. From the average discharge score, the data indicates that the patients, on average, did experience positive improvement (+2.5). Higher scores on the BNCE indicate higher performance. The level of improvement observed in 2010 equates to a 17% improvement as measured by the BNCE.

The Mayo-Portland data total score indicates an overall improvement of (- 0.8). In general, on the Mayo-Portland the lower scores indicate better performance. In looking at the sub-scales, the Ability sub-scale, that measures issues such as mobility, motor/speech, attention/concentration, and memory, had a score decrease of (-2.7) for an improvement of approximately 1.5%. The Adjustment sub-scale, measures issues such as anxiety, depression, irritability, anger, aggression inappropriate social interaction, and impaired self awareness. This data shows an increase of (+0.9). This indicates a decline of 0.9% which may be reflective of the severity of deficits at admission and the extent/duration of problems post-injury. The Participation sub-scale reflects a (+6.1) increase. This sub-scale measures functional abilities such as: initiation without prompting; social contact; self-care; independent living skills; transportation; employment and managing money. 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 or not employed even in a sheltered workshop. As such, those ratings on the sub-scale would indicate a "severe" problem area that may have minimal resolution.

## *Conclusion*

In closing, this is the second year that the NRI program has used objective measures for program evaluation. NRI continues to look at categorical outcomes related to independence, social role return and vocational re-entry (see Tables 1-4) as a cross reference to the objective measures. Overall results indicate positive outcomes for the individuals we serve in terms of the amount of care and supervision required at discharge, the return to a less restrictive placement; participation in avocational and volunteer activities and improved self-management of behavior. We will continue to develop and refine our outcome measures as a part of the research base for individuals who have experienced a brain injury.