

## **NRI**

### **Outcome Validation Study Highlights for 2019**

#### **Demographics and Characteristics**

The NRI Outcome Study for the period ending December 31, 2019, addressed the discharges of 21 individuals. There were 17 males and 4 females with ages at admission ranging from 19 to 67 years. The average length of stay (LOS) on the NRI program was 45.4 weeks with a range of 20 days to 1207 days. This compares to an average LOS of 30 weeks in 2016, 44 weeks in 2017, and 46 weeks in 2018.

#### **Mechanism of Injury**

The etiology of the brain injuries for the discharge population in this study includes motor vehicle accidents, anoxia, and physical assault. Patients sustained moderate to severe injuries resulting in significant physical, medical, cognitive, and behavioral deficits. Many showed post-injury history of aggressive behavior including aggression toward self and others, elopement issues, non-compliance issues, and impaired impulse control. Patients had a range of cognitive problems involving attention, planning, organization, problem solving, and auditory, verbal and visual memory.

#### **Program Overview**

The NRI program provides its patients individual and group therapy across a variety of modalities. Individual sessions tend to focus on restoration or compensation for those deficits that pose the greatest barrier to independence and community reintegration. Group sessions serve to bolster the gains made in individual sessions by addressing similar deficits but in a group-training context. Recreational therapy, both on and off campus, is also offered frequently. For those interested in culinary activities, a cooking class meets weekly for NRI patients. Volunteer opportunities are provided through a local Food Bank.

Our community living options (CNR-Oklahoma) continues to offer a less-restrictive environment for our patients that have had successful progress within the inpatient program. Here, patients provided an appropriate level of structure with greater independence and the opportunity to initiate and complete tasks with minimal assistance such as cooking, domestic chores and budget shopping in the community. In addition, new opportunities for volunteer and other prevocational activities are under development with various organizations in the community, including a clubhouse model for higher functioning patients. NRI has developed a more integrated relationship with CNR facilities in Iowa. That has benefitted NRI through additional admissions from that state and allowed a smoother, finely tuned transition for our Iowa patients.

## Outcome Measures

The NRI outcome study continues to include objective outcome measures including the Mayo-Portland Adaptability Inventory (MPAI-4) developed by Malec and Lezak (2003). To expand the utility of the MPAI-4 data we also analyze the tool's subscales. An additional measure is the Disability Rating Scale (Wright, J. 2000) which was added in 2017. The objective measures above are combined with the subjective categorical measures that have historically been collected at NRI including the areas of Return to Independence, Social Role Return, Vocational Re-entry and Self-Management. Following is the NRI Outcome Validation Study for 2019.

### Categorical Data Outcomes 2011-2019

<b>TABLE 1. Return to Independence</b>									
The table below indicates that the discharge destination of clients who completed the NRI program primarily returned to congregate living with moderate supports for 2019.									
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Return to independence with minimal to moderate support <6 hrs/day	6%	24%	35%	17%	26%	17%	17%	15%	0%
Return to congregate living or extended supports in the home >6hrs/day	17%	65%	38%	19%	29%	16%	58%	33%	14%
Return to group home with 24 hr/day support	29%	19%	19%	27%	32%	0%	26%	22%	57%
Return to nursing home or hospital setting 24 hr/day care	0%	19%	27%	27%	26%	25%	19%	26%	24%

<b>TABLE 3. Social Role Return</b>									
The return to pre-injury social role is an important outcome measure for neurorehabilitation programs. The rating scale for this domain was modified in 2017, making comparison with prior years difficult. 2019 scores are similar to those from 2018.									
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Return home with independence and minimal modifications to social role	11%	14%	35%	10%	16%	8%	15%	11%	5%
Return home or congregate living with moderate modifications to social role								33%	38%
Significant modifications required preventing return to social role								52%	52%

**TABLE 2. Vocational Re-Entry**

The return to meaningful life activities such as work, school, and volunteering is an important outcome measure for neurobehavioral rehabilitation programs. A large percentage of patients were capable of participating in supported employment/volunteer work or day program activity in 2019.

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Return to competitive employment, school or vocational training program	6%	619	11%	10%	5%	0%	11%	15%	0%
Supported employment or volunteer work	22%	9%	0%	17%	26%	25%	15%	22%	38%
Sheltered workshop or day program activity	17%	19%	0%	23%	21%	0%	4%	22%	33%
Unable to work	44%	29%	79%	23%	16%	17%	70%	37%	24%
Requires 24 hr/day supervision	16%	11%	24%	10%	27%	32%	58%		

**TABLE 4. Self-Management of Behavior**

The self-management of one's behavior is a key factor in long-term success. This domain was modified in 2017 to improve specificity. The vast majority of discharged patients in 2019 continued to require weekly contact with a therapist but this might indicate a greater emphasis on mental health counseling rather than behavioral dyscontrol per se. Further training and investigation into this metric is recommended.

	2011	2012	2013	2014	2015	2016	2017	2018	2019
No behavioral support services required	11%	23%	4%	23%	0%	0%	70%	19%	10%
Weekly contact with therapist, 0-5 outbursts per week	44%	57%	24%	43%	47%	33%	30%	67%	71%
2 or more contacts per week with therapist, 6+ outbursts per week	6%	10%	24%	10%	0%	0%	0%	11%	14%

## Objective Measures Outcomes 2018

**TABLE 5. MPAI-4 Scores – Patients Over 30 Days**

	Mayo-Portland Adaptability Inventory - 4				
	Ability	Adjustment	Participation	Total	(N =)
<b>Admission</b>	53	66	60	62	<b>16</b>
<b>Discharge</b>	49	53	54	54	<b>16</b>
<b>Change</b>	8	20	10	14	

**TABLE 6. MPAI-4 Scores – Patients Less Than 30 Days**

	Mayo-Portland Adaptability Inventory - 4				
	Ability	Adjustment	Participation	Total	(N =)
<b>Admission</b>	63	64	64	65	<b>4</b>
<b>Discharge</b>	54	53	55	61	<b>4</b>
<b>Change</b>	14	17	13	7	

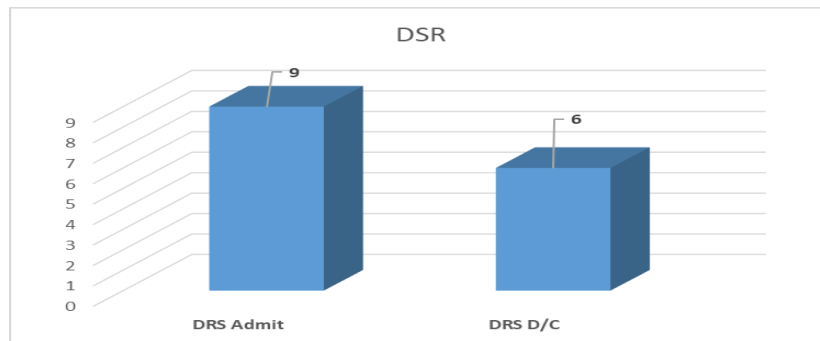
**Table Notes:** MPAI-4 Scores report as t-scores (Mean=50; Standard Deviation=10). Lower scores indicate better function.

- 60 suggests severe limitations
- 50-60 suggests moderate to severe limitations
- 40-50 suggests mild to moderate limitations

**Interpretation**

The Mayo-Portland Adaptability Inventory (MPAI-4) scores indicate significant overall improvement of our patients. Lower scores indicate a higher level of functioning. Upon admission (Table 5) in 2019, long term patients’ average Total score was 63 (Severe), reflecting severe deficits in body, function, activity limitations and participation restrictions. This is up from 60 in 2018 indicating those that discharged in 2019 initially had more severe deficits from their injuries. The average long-term discharge score was 54, a 9 point improvement (14%) from the category of Severe Limitations to the Moderate/Severe range. The magnitude of these outcomes is similar to 2018. A breakout evaluation of short-stay cases (Table 6), with an average 28-day LOS is presented but the disparate characteristics of those patients argues against interpretation.

**Figure 3. DRS Scores**



**Interpretation**

We began collecting Disability Rating Scale (DRS) scores in 2017 and Figure 3 shows the change in DRS scores for a sample of 20 patients that discharged in 2019. For comparison, patients with TBI will, on

average admit to acute rehabilitation with a DRS of 12 and discharge with a score of 6. At one and two-years post TBI, scores will average 2.9 and 2.6 respectively. Our patients improved an average of 3 points suggesting continued recovery in this phase of rehabilitation.

### **Conclusion**

The NRI program has used categorical and objective measures for program evaluation for the more than ten years. Taken collectively, 2019 data suggest that NRI continues to admit patients with very severe deficits affecting all domains of function. Despite this fact, NRI programming continues to have a positive impact on its patients.

A handwritten signature in black ink, appearing to read "R.G. Burrows", with a long horizontal flourish extending to the right.

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