Improving Functional Recovery in Medically Complex Stroke Patients: Preliminary Outcomes from a Highly-Specialized Acute Inpatient Stroke Rehabilitation Program

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1. Introduction:

Stroke is the leading cause of neurological disability in the U.S., with approximately 30% of 6.5 million survivors left severely disabled (AHA, 2000). Unfortunately, these patients may require more intensive post-acute care and for longer periods than typically provided within conventional medical/rehabilitation units (Hankey et al., 2007). How to structure severe stroke acute rehabilitation is underspecified. The Kessler Institute developed the Medically Complex Stroke Rehabilitation Program (MCSRP) to provide an optimal interdisciplinary recovery pathway targeting severe deficits. The purpose of this study to learn whether an initial MCSRP patient group improved in functional independence during acute rehabilitation as assessed by the standard Functional Independence Measure (FIM).

2. Methods:

Fifteen stroke survivors with severe functional deficits were admitted. MCSRP protocols were based on stroke service quality improvement assessments and standard recommended stroke care. Protocols included physician led management of a stroke specialist team for prevention of stroke-related medical complications, recurrent stroke prophylaxis, management of secondary medical conditions, and optimizing cognitive and functional recovery. Each patient was administered three hours of combined daily functional retraining, speech and swallowing therapy, and cognitive-behavioral therapy. The demographic/clinic characteristics of subjects within this study can be seen in Table 1.

3. Results:

Z-statistic showed significant improvements between admission and discharge FIM total ($p < .01$), motor ($p < .01$), and cognition ($p < .05$) scores. Additionally, there were significant improvements on 9 out of 18 (50%) FIM-items between admission and discharge (see Figure 1). An examination of FIM outcomes by type of paresis (right and left sided) revealed no significant (Mann-Whitney U Test: $P > .05$) differences on FIM change total, motor, and cognition scores (see Table 2).

Post discharge, 27% of MCSRP patients went home and 73% continued rehabilitation in sub-acute care. MCSRP patients discharged to the community tended to be younger survivors (average age: 66 years) with longer hospital stay (average LOS: 49 days) and made greater functional gains (FIM-total change = 24.75) relative to the majority of patients transitioning to sub-acute care (average age: 72 years; 38 day LOS; FIM-total change = 10.91).

Table 1. Demographic and Clinical Characteristics of MCSRP and Total KIR Patients during Study Period

Variables	Observation
Sample Size: MCSRP vs. Total Stroke Population at KIR	15 vs. 1,263
Mean Case Mix Index: MCSRP vs. Total Stroke Population at KIR	2.06 vs. 1.70
Mean Age (years): MCSRP vs. Total Stroke Population at KIR	70.13 vs. 71.25
Gender (% female): MCSRP vs. Total Stroke Population at KIR	60% vs. 50%
Mean length of stay in days: MCSRP vs. Total Stroke Population at KIR	41 vs. 19 days
Mean days from onset to rehabilitation admission: MCSRP vs. Total Stroke Population at KIR	20.77 vs. 10.18 days
Paresis type: % left body, right body, bilateral	73% , 27%, 0%
Mean admission FIM total, FIM motor, FIM cognition	25.00, 15.27, 9.73

Figure 1: Percentage of Improvement on Individual FIM Items. Note: The FIM items are hierarchically arranged in order of training difficulty (Granger: NECC, 2007). Red bars represent statistically significant FIM-items (at the $p < .05$ level).

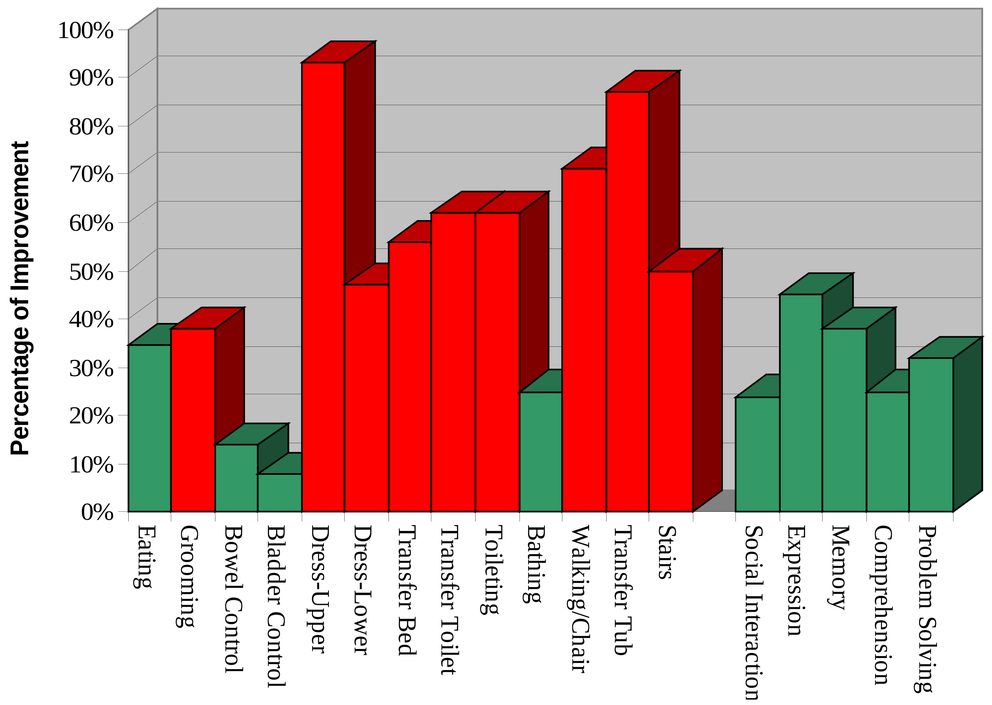

Table 2: Mean FIM Outcomes as a Function of Paresis Type

	Left Sided Paresis	Right Sided Paresis
FIM Total Change	13.00	15.09
FIM Motor Change	8.25	10.27
FIM Cognitive Change	4.75	4.82

4. Discussion:

— Severely disabled stroke patients evidenced improved functional independence from MCSRP (see Figure 1), especially on FIM items that are considered difficult to train on the "hierarchical staircase to independence" model (see Granger: NECC, 2007) .

—The percentage of MCSRP patients discharged to the community in our study is modest (i.e., 27%), but reflects the severity of their functional abilities prior to their rehabilitation, as evidenced by their low admission FIM scores (see Table 1). Granger et al. (1992) similarly reported that stroke patients with admission FIM scores ranging between 18-29 had low community discharge rates (i.e., 25% were discharged to community). Thus, our pilot data is in line with larger outcome studies that reflect low community discharge rates for severely disabled stroke patients after receiving intensive post-acute care.

— Patient characteristics (e.g., age but not paresis type) and program variables (e.g., LOS) moderated their functional outcomes and destination of discharge. These variables should be considered when trying to optimize outcomes during the acute rehabilitation period.