

THE HOPE NETWORK ACUITY SCALE (HAS):

Development, Validation and Applications of a Neuro Rehabilitation Acuity Measure

OVERVIEW

Required caregiver effort in neurological rehabilitation encompasses both demands for caregiving needs and protective supervision supports. To quantify this unique dimension of care, the Hope Network Acuity Scale (HAS) was developed. This study provides preliminary analysis of the psychometric properties of the HAS in post-acute brain injury and neurological rehabilitation settings. The HAS can potentially facilitate staffing, supervision and placement decisions and serve as a relevant functional outcome measure.

METHOD

- The HAS is an 8-item measure composed of two 4-item subscales (Behavioral and Medical Acuity).
- Reliability (internal and interrater), validity (construct, discriminant and concurrent) and sensitivity to change were investigated with data collected from current transitional/long term post-acute residential clients.

SAMPLE (N = 240)

- Post-acute transitional or long-term residential rehabilitation setting
 - Mean Age = 48.0 years old; 66.7% male**
- A smaller cohort of 105 consecutive transitional residential patients assessed at admission and discharge to assess concurrent and discriminant validity and sensitivity to change.
 - Mean LOS = 76.7 days**
 - Median time from injury to admission = 47 days (range = 9 – 2,144). About 75% of cases were admitted within 3 months from injury.**

RESULTS – INTERRATER RELIABILITY (1-WAY RANDOM ICC)

(N = 104)

Medical Subscale	.94 (95% CI .92 -.96)
Behavioral Subscale	.90 (95% CI .86 -.93)
Total Scale	.95 (95% CI .93 -.97)

RESULTS – DESCRIPTIVES AND CONSTRUCT VALIDITY

	Mean	SD	Skew	Kurtosis	Item-Total Correlation	Cronbach's Alpha if Deleted
ADLs / Transfers	1.32	1.07	0.32	-1.12	.79	.75
Mobility / Orthotics	1.14	1.07	0.44	-1.09	.71	.79
Skilled Medical Care	1.39	1.26	0.16	-1.62	.55	.87
Bowel /Bladder	1.02	1.16	0.69	-1.05	.70	.79
Medical Total	4.87	3.76	0.45	-0.90	Cronbach Alpha = .84	
Fall Risk	1.38	1.02	0.20	-1.07	.48	.65
Aggression	0.76	0.87	0.95	0.07	.30	.74
Confused Behavior	1.11	0.99	0.34	-1.05	.60	.57
Precautions	1.05	1.15	0.42	-1.43	.59	.57
Behavioral Total	4.27	2.94	0.48	-0.56	Cronbach Alpha = .70	
Acuity Total	9.14	5.91	0.41	-0.68		

HOPE NETWORK ACUITY SCALE (HAS)

MEDICAL RATING:	0	1	2	3	SCORES
ADLs/TRANSFERS Global description of assistance needed	Independent; can include independent use of assistive device; no staff assistance or oversight	SBA/contact guard/set up; 1 staff assist; staff required at times to set up, cue, or minimal physical assistance to complete	Minimum to moderate assist; 1 staff assist; staff required for physical assistance—more than hand on patient as CD	Maximum assist; use of transfer device; requires 2 or more staff; 1 person needed for physical management of care and/or transfers	
MOBILITY/ORTHOTICS Global description of physical assistance needed for mobility in primary environment; independence is rated after transfer to W/C; Not related to orientation	Independent ambulation or independent propelling and maneuvering of W/C both in and out of building	SBA/contact guard; independently uses device to ambulate (i.e. walker, cane); requires AFO to ambulate	Minimum to moderate assistance; 1 staff with walker or W/C; brace schedule requires staff monitoring; staff presence required for physical assistance—more than hand on patient as CD	Maximum assist 2 or more staff with walker; completely dependent for mobility in W/C; 1 staff needed for physical management of mobility or significant medical devices for stabilization	
SKILLED MEDICAL CARE Separate from bowel/bladder management	No wounds; no PES; no BS checks; no insulin; no oxygen; no drains or tubes	Simple dressing changes; monitoring of oral intake/food/tolerances; non-insulin dependent diabetic; no BS checks; use of inhaler less than 1x/month; use of incentive spirometry	Skilled nursing dressing change; dysphagia diet; PEG for supplemental hydration; non-insulin dependent diabetic with BS checks; status post craniotomy in last 6 months; seizure Hx longer than 6 months with AED meds; presence of shunt placement longer than 6 months; use of intrathecal medication in last week	Extensive wound care/clinic; primary PEG feeding; PEG status; insulin dependent with BS checks; craniotomy without replacement; seizure Hx in last 6 months with AED meds; shunt placement or reprogramming in last 6 months; use oxygen; redness; CMAP/BIPAP-daily; critical collar; TLSO, halo, or other fracture; presence of tubes/drains; isolation precautions	
BOWEL/BLADDER Patient's level of awareness and ability to physically self-manage	Continent and fully independent with both bowel and bladder; no presence of tubes, drains or other services	Continent of bowel and bladder with cues and/or assistance with brief, clothing, and clean-up management; self-calls independently	Incontinent of bowel and bladder or average of 1+ accidents per shift; 1-2 staff management of brief changes; self-calls with set up assistance	Incontinent of bowel and bladder; requires staff management of catheter; presence of colostomy; bowel program ordered with more than oral meds; 2+ staff for care management	
MEDICAL RATING TOTAL:					
BEHAVIORAL RATING:	0	1	2	3	SCORES
FALL RISK Global description of unplanned descents to floor	No current risk; no impaired safety awareness	Low risk; no current risk for falls but with impaired safety awareness	Moderate risk; use of W/C or bed alarms; Hx of falls in the past 3 months	High risk; W/C and bed alarms with 1:1 staffing for impulsivity and impaired safety awareness; Hx of falls in last month	
AGGRESSION Agitation, anger, or irritability that is unexpected or occurring outside of planned interventions	No aggression; no threats toward self or others	Verbal irritability; mild swearing; responsive only to specific staff; requires infrequent verbal interventions	Significant swearing; under-responsive to program direction on care; scheduled activity routines; and therapy; use of physical and verbal direction 1-3 times/day for aggression; refusal or chronic delays for non-essential treatment	Posturing or verbally threatening imminent harm to self or others; physical aggression towards others or property; presence of self-harm behavior or suicide risk; frequent use of physical and verbal direction 3+ times/day for aggression	
CONFUSED BEHAVIOR Areas of concern related to orientation and participation in care routines and demands of environment	No impairments or non-contributory (alert and oriented x4)	Readily redirectable; behavior present but doesn't significantly interfere with therapies or routines; requires infrequent verbal intervention for safety	Difficult to redirect at times; behavior interferes with therapies or care in a timely fashion; may require extra time or staffing present to complete care; not attending to pressing personal care needs; confused wandering at facility; requires frequent verbal or physical intervention for safety 1-3 times/day	Persistently difficult to redirect; uncontrolled or constant impulsive behaviors; 3-hour refusal or unawareness of basic care needs placing patient at risk for safety or medical complexities; pulling at or softening of tubes/drains; use of miltibabdominal binder on a scheduled behavior program; refuses medical devices; requires monitoring for likely AWOL; flight related to confusion; requires verbal or physical intervention for redirection 3+ times/day	
PRECAUTIONS Specialized supervision; support provisions	No special supervision needs; fits into 1:3 staff to patient ratio or less	1:2 staff to patient ratio	15-minute checks; requires cues or interventions for safety W/C or bed alarms; wander guard	Line of sight or more intense supervision; wander guard with additional intervention protocol; in-house therapies only; 2 staff for travel outside of building/campus	
BEHAVIORAL RATING TOTAL:					
COMBINED TOTAL:					

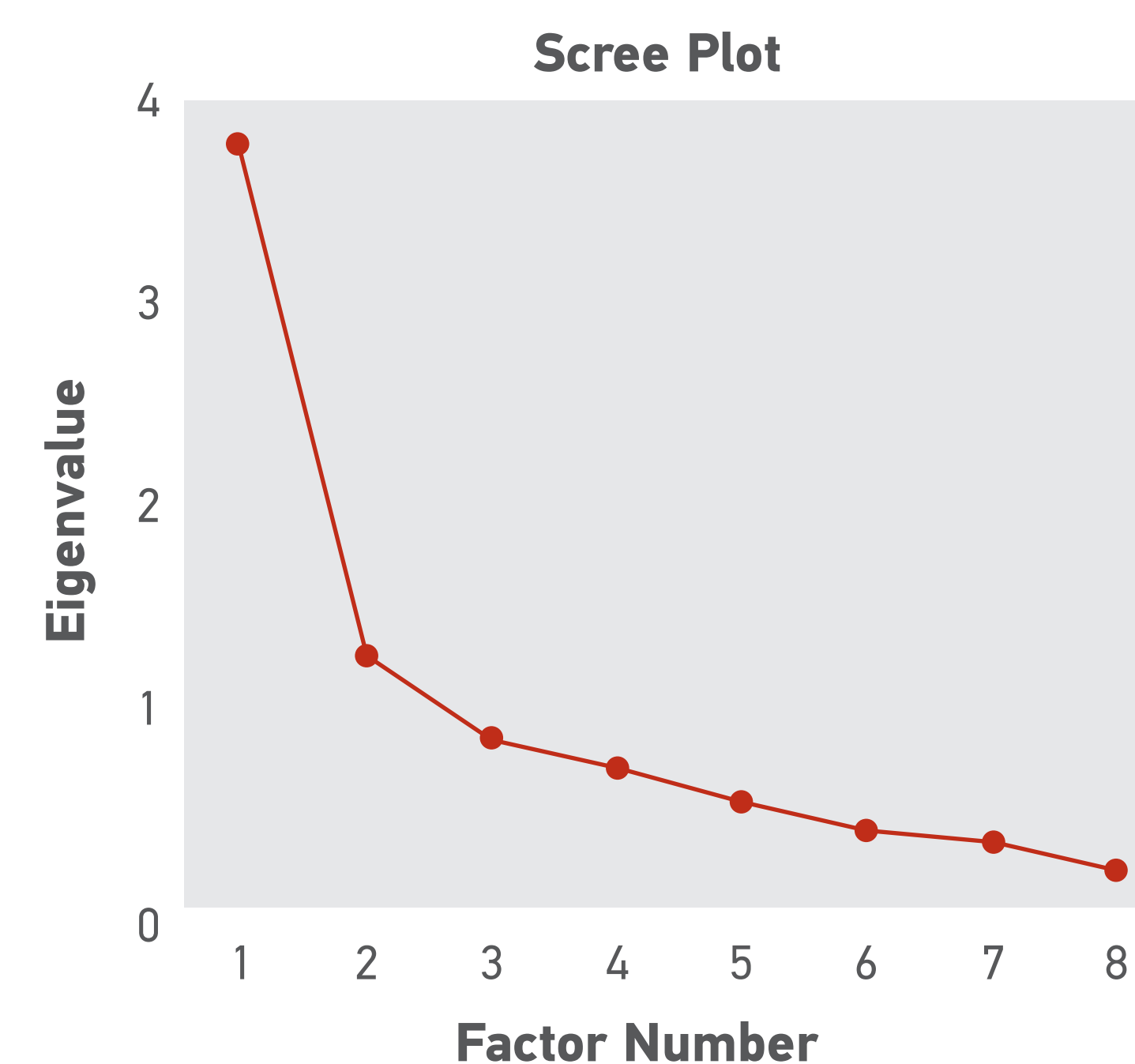
RESULTS – CONCURRENT VALIDITY

- The HAS Total Score significantly correlated with the Supervision Rating Scale (Boake, 1996) at admission ($r_s = .53, p < .001$) and discharge ($r_s = .66, p < .001$).
- The HAS Total Score significantly correlated with the Mayo-Portland Adaptability Inventory (Malec, 2005) at admission ($r = .80, p < .001$) and discharge ($r = .81, p < .001$).

Boake, C. (1996). Supervision rating scale: a measure of functional outcome from brain injury. Archives of physical medicine and rehabilitation, 77, 765-772.

Malec, J. (2005). The Mayo Portland Adaptability Inventory. The Center for Outcome Measurement in Brain Injury. <http://www.tbims.org/combi/mpai> (accessed November 23, 2018).

RESULTS – CONSTRUCT VALIDITY (EFA) CONT.



Pattern Matrix	Factor 1	Factor 2
ADLs/Transfers	.980	
Mobility/Orthotics	.740	
Skilled Medical Care	.595	
Bowel/Bladder	.732	
Fall Risk		.512
Aggression		.395
Confused Behavior		.790
Precautions		.607

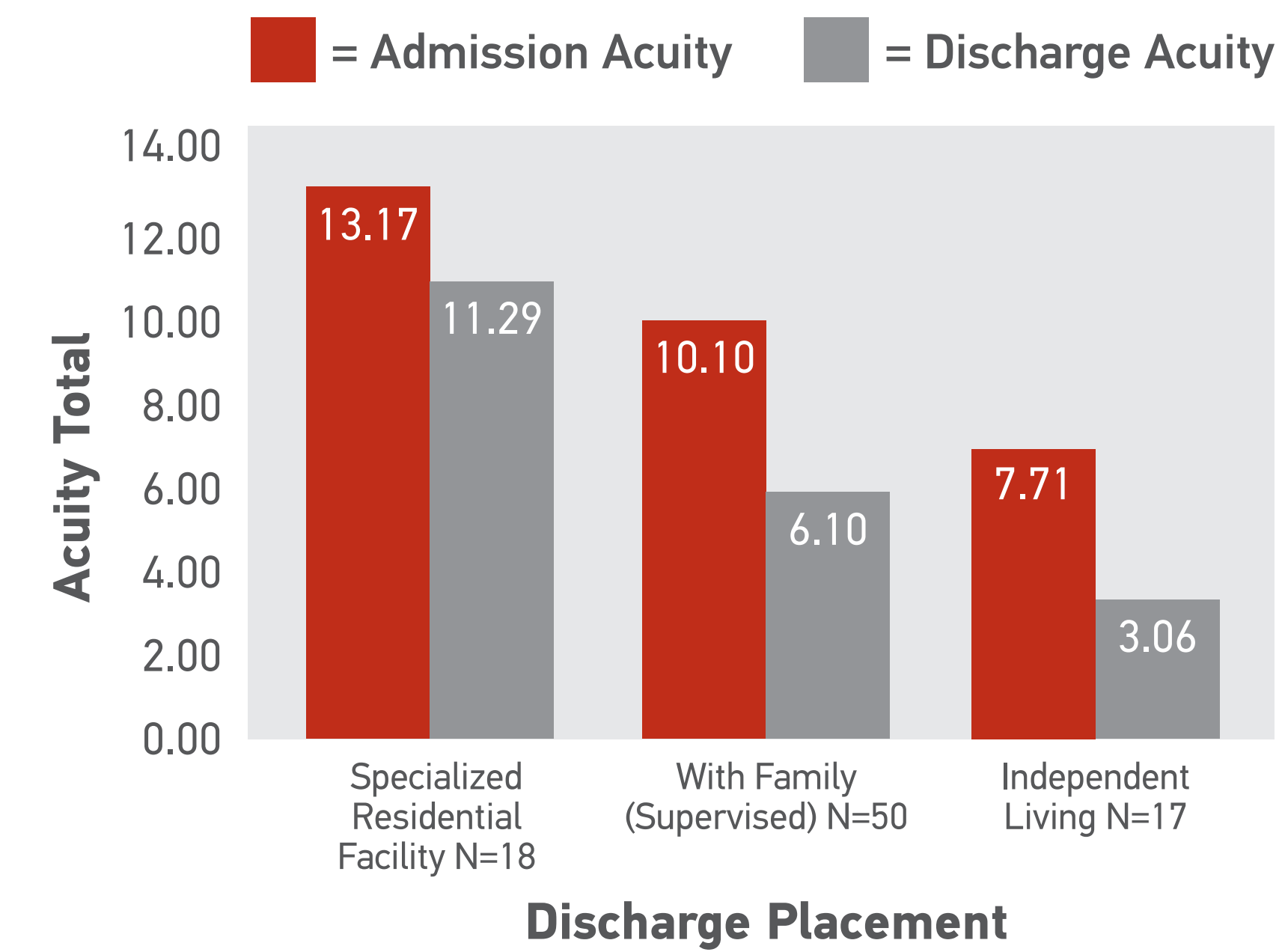
Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser.

RESULTS – ADMISSION & DISCHARGE SCORES

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	TotalScore Admission	11.40	102	5.42
	TotalScore Discharge	7.97	102	6.0
Pair 2	Medical Admission	6.36	102	3.51
	Medical Discharge	4.17	102	3.91
Pair 3	Behavioral Admission	5.04	102	3.06
	Behavioral Discharge	3.80	102	3.33

Paired t-tests found statistically significant change from admission to discharge for Total Acuity ($t(101) = 7.04, p < .001$) as well as Medical ($t(101) = 8.27, p < .001$) and Behavioral ($t(101) = 4.28, p < .001$) Subscales.

RESULTS – DISCRIMINANT VALIDITY/SENSITIVITY TO CHANGE



In addition to demonstrating sensitivity to change from admission to discharge, HAS discharge scores showed overall discrimination between discharge placements (Kruskal Wallis: $H = 26.42, p < .001$) with those in specialized residential homes having significantly higher discharge acuity than those living with family ($p = .001$) or independent living ($p < .001$). Those living with family had significantly higher discharge acuity than those in independent living ($p = .042$).

CONCLUSIONS

- Preliminary development of the HAS shows it to be a promising measure of demand on caregiver effort in post-acute neurological rehabilitation treatment and a practical measure of outcome.
- While more work is needed, initial results indicate the HAS displays generally sound psychometric properties and potential clinical utility for staffing, supervision, and placement decisions.
- Currently available functional measures quantify functional ability, but are only indirectly related to work demand.
- The use of the HAS can improve clinical communication and resource allocation by providing a standardized, quantifiable descriptor of actual required care and supervision demands in neurological rehabilitation.