Determining Supervision and Care Needs

The Development, Validation and Utility of the Hope Network Acuity Scale (HAS) Neuro Rehabilitation Acuity Measure

Martin Waalkes, PhD, ABPP, CBIST

Special thanks to:
• Amy Walters, LPN
• Michele Tomlinson, Ph.D.
• Nate Kaufman, BS
• Holly Cramblet, MA, LLP, BCBA

Outline, 60 minutes

1. (5 minutes) The concept of acuity and the dimensions of protective supervision and attendant care in neuro rehabilitation. Review of literature on acuity measures. a. Martin Waalkes

2. (5 minutes) Introduction of the Hope Network Acuity Scale (HAS). Initial development process, Two-factor structure, Rating format, Review of item elements, Research design for validation, Item development trials. a. Martin Waalkes

3. (10 minutes) HAS Interrater reliability trial outcomes, item descriptive statistics, factor structure outcomes. a. Martin Waalkes

4. (15 minutes) Correlational findings with other outcome and treatment measures, cross-sectional and longitudinal patterns. Relationships of acuity to discharge placement. a. Martin Waalkes

5. (10 minutes) Acuity measures as a business and management tool for resource allocation and cost projection. a. Martin Waalkes

6. (5 Minutes) Reflections on the role of Acuity as a proxy for functional outcome. Directions for future research and validation trials. a. Martin Waalkes

7. (10 minutes) Questions and discussion on the utilization and applications of acuity measurement in neuro rehabilitation. a. Martin Waalkes

Objectives

At the conclusion of this activity, the participant will be able to:

1. Identify acuity as a variable of injury severity and complexity influencing treatment resource demands.

2. Rate acuity with the HAS instrument by noting patient characteristics in inpatient or residential placement.

3. Identify relationships of acuity to functional outcomes, cost and resource demands, and placement decisions.

Program Description

• How do you measure the required care and supervision workload in neuro rehabilitation?

• The Hope Network Acuity Scale (HAS), a two-factor 8-item rating of medical and neurobehavioral acuity, addresses this need. The HAS demonstrates excellent interrater reliability and internal consistency, and factor analysis confirms the two-factor structure.

• Significant correlations with functional outcome measures and supervision ratings, evidence of improvement over the course of treatment, and expected stratification of outcomes on the discharge continuum support validity. Implications for use as a placement tool, measure for efficiency, and even as a working tool for assigning resources or cost estimating will be explored.

Presenter

Dr. Martin Waalkes is a licensed psychologist specializing in rehabilitation psychology with Hope Network Neuro Rehabilitation where he has worked for 29 years. At Hope Network, Dr. Waalkes is the Director of Neuro Rehabilitation. Dr. Waalkes provides clinical services to patients and their families in the post-acute and residential treatment settings of Hope Network. He supervises the psychology services and oversees the clinical activities and clinical program development for Hope Network locations in Michigan. He also provides consultation and clinical services at Spectrum Health Neuro Rehabilitation. Dr. Waalkes has a Ph.D. in clinical psychology from Michigan State University. He is board certified in Rehabilitation Psychology from the American Board of Professional Psychology.

BIA of Michigan Disclosure

Presenter, Martin Waalkes, PhD, ABPP, CBIST has no financial interest to disclose.
Some Questions

- How will we know if some patients require more care and supervision time than others?
- How can we determine if care workloads are the same from one program to the next?
- How do we know where to place a patient in the available program options based on care needs?
- How can we objectively support how much attendant care and supervision a person will need?
- How can we predict what the supervision element of rehabilitative care for a patient will cost?

.....Acuity, That’s how!

What is Acuity?

- Acuity is the measure of required care and supervision needs of a patient.
- It is a workload measure

Typical Measures of Acuity

Nursing: used to capture workloads of:
- Procedures
- Care interventions
- Education
- Therapeutic and psychosocial interventions
- Oral medication administration frequencies
- Complicated drugs and other medication administration routines.


Related Concepts: Severity vs. Acuity

Severity is a characteristic of the injury and is related to outcome. There have been several efforts to develop a broad injury severity measure, but the focus is on the complexity of the injury for the patient, with only secondary, inferred implications on the resulting impact on caregivers.

http://emedicine.medscape.com/article/434076-overview#showall

Acuity is a direct measure of resulting reliance on others for care and supervision. It is independent of, but related to severity, and can be multi-determined. Acuity can be influenced by:

- Severity
- Arousal
- Environmental supports or aggravations
- Treatment unit architecture
- Treatment patterns
- Risk tolerance
- Family and cultural expectations
- Licensing and policy requirements

Related Concepts – NOT ACUITY

Injury Diagnostic features: A measure of patient injury level severity that may predict workload
- Ranchos Los Amigos Scale for Level Of Cognitive Function (RLAS)
- Glasgow Coma Scale, LOC +/-, Days of PTC

Functional Capacity: A measure of patient skills indirectly related to workload
- MPAI-4 (Malec, 2005)
- Neurological Impairment Scale (NIS) (Turner-Stokes, et al., 2014)
- ASIA scale for SCI injury level and extent
- Neuropsychological testing and discipline clinical scales

Complexity: A measure of patient diagnostic and demographic qualities indirectly related to workload
- Oxford Case Complexity Assessment Measure (OCCAM) (Troigros, O., et al., 2014)
- Case Mix Index (CMI). Diagnostic and utilization algorithms that are part of the DRG payment system
- Global Assessment of Functioning (GAF)
- Diagnosis count

Risk: The likelihood in which failure to meet care needs will result in harm or undesired outcomes for the program or stakeholders
- Braden Score Index risk assessment tool for skin wounds
- Johns Hopkins Fall risk assessment
Acuity – A Dependent or Independent Variable?

- A DEPENDENT variable: Acuity is determined by objective things like severity of injury, complexity of prescribed care, and the limitations of available equipment. Acuity can also be influenced by intangibles features of the family, institutional risk tolerance, and advanced directives.

- An INDEPENDENT variable: Aggregated across a treatment unit, observed acuity can dictate the hours of staff time devoted to care, or increase the costs of providing service.

Types of Acuity in Neuro Rehab: Medical Acuity

Definition: Medical Acuity
- The needed coverage and urgency/intensity of clinical service and monitoring required by activities for consumer medical care needs

Measures:
- Vanderbilt University Hospital Acuity Ratings
- Care and Needs Scale (Soo, C., et.al. 2010)
- WIN (Workload Indicator For Nursing)
- Numerous local acuity scales

Types of Acuity in Neuro Rehab: Behavioral Acuity

Definition: Neurobehavioral Acuity
- Frequency and vigilance required for safety monitoring and behavioral direction due to cognitive and behavioral features

Measures:
- Vanderbilt University Hospital Acuity Ratings
- Supervision Rating Score

Dimensions of Acuity: Intensity (Urgency)

- What level or speed of response and resources are required to address care needs?
- What is the severity of implications for not addressing the needs in a timely manner?

Examples:
- Line of sight supervision
- Contact guard assist
- Physical restraints
- Two-person transfer

Dimensions of Acuity: Coverage

- What part of the patient’s day and lifestyle is influenced by care needs?
- Typically measured in hours or proportion of time devoted to protective supervision or care.
  - 2 hours of attendant care support
  - Waking hours supervision
  - 1:3 15 min check general supervision
  - PRN assist
  - Assisted living
  - Structured placement vs. supervised placement

Acuity Dimensions

URGENCY/INTENSITY

COVERAGE

<table>
<thead>
<tr>
<th>High Intensity</th>
<th>Low Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Coverage (Wound Care)</td>
<td>High Coverage (Unstable Care)</td>
</tr>
<tr>
<td>Low Intensity (Routine Vital)</td>
<td>Low Intensity (PRN Level 1)</td>
</tr>
</tbody>
</table>
Related Concepts: Attendant Care – The Provision of Care

**Definition:**
- **Attendant Care Coverage**
  - The degree to which a person requires continuous direct service from an attendant care provider over the dimensions of time, setting, and context to meet all stipulated care needs.
  - **Measures:**
    - Hours of care/time interval (e.g. 4 hrs 2 times /Day)

**Definition:**
- **Attendant Care Intensity**
  - The quantity, magnitude, vigilance and immediacy of interventions and procedures, and potentially number of caregivers to meet physical care needs
  - **Measures:**
    - Staffing ratios, procedure frequencies, medication intervals, X-person transfers.

Related Concepts: Supervision – The Capacity to Intervene

**Definition:**
- **Protective Supervision Coverage**
  - The degree to which the a person requires risk monitoring and cognitive assistance for behavior regulation for basic safety over the dimensions of time, setting, and context.
  - **Measures:**
    - Supervision Rating Scale (Boak, 2000)
    - Level of care (supervised vs. structured)
    - Hours of Service provided

**Definition:**
- **Protective Supervision Intensity**
  - The required level of vigilance, responsiveness, and capacity for control required of a risk event.
  - **Measures:**
    - Supervision Rating Scale (Boak, 2000)
    - Presence of control features, physical capacity for responsiveness, or level of vigilance (check frequencies).
    - Locked settings, arms-length proximity, and auditory monitoring are examples of intensity specification.

Another formulation?

- **Medical Acuity:**
  - Attendant Care

- **Neurobehavioral Acuity:**
  - Protective Supervision

There Are a Host of Specialized Options

Hope Network Acuity Scale (HAS) Development

**Objectives**
- Meaningful for staffing and workload determination
- Clinically descriptive of the burden of care
- Efficiently administered by line supervisory staff
- Generalizable within Hope Network (Neurobehavioral, Transitional Post-acute, Long term care, Community treatment)
- Applicable to acute care as an admission screening tool
- Sensitive to the nuances of post-acute rehab care
- Functional as an outcome measure
- Robust for research and transferable to other settings (acute care, IRF, home based care)

Development of the HAS Beta Version

- Literature Search
- Peer programs
  - Proprietary scales for local use
- **Initial priorities**
  - Two factor measure equal part medical and neurobehavioral
  - Ascending scale of acuity (high numbers = high acuity)
  - Suiited to the post-acute environment
  - Emphasizing the experience of the direct caregiver
  - Ratings by supervisory caregiver staff at the shift level
  - Clear language at the direct care level
  - Capture attendant and supervisory care needs
The Two Sides of Acuity in a Brain injury Environment

Definition: Medical Acuity
• The frequency of service and monitoring required for care activities for consumer medical needs

Definition: Neurobehavioral Acuity
• Frequency and vigilance required for protective safety monitoring and behavioral direction due to cognitive and behavioral features

Coverage and intensity concepts apply to both subscales

Hope Network Acuity Scale (HAS)

Medical Acuity
• ADLs/Transfers
• Mobility/Orthotics
• Skilled Care
• Bowel/Bladder Care

Neurobehavioral Acuity
• Fall Risk
• Aggression
• Confused Behavior
• Precautions

Researched, but not used:
• High Utilizer
• Safety/Community Interactions

• No Instructions other than the 1 page document

Medical Acuity: ADLs/Transfers

0 1 2 3
• Independent
• Can include the independent use of an assistive device. No staff assistance or oversight
• 1 staff assist
• Staff required intermittently to provide set up, verbal cues or minimal level of physical assistance to complete
• Min to Mod assistance
• 1 staff assist
• Staff presence required for actual physical assistance (more than a hand on the patient as with CG)
• Max assistance
• Use of transfer device or lift
• Requires 2 or more staff
• More than 1 staff person needed for physical management of care and/or transfers

Medical Acuity: Mobility/Orthotics

0 1 2 3
• Independent ambulation or propelling and maneuvering of W/C both inside and outside of building
• Independence is rated AFTER they are transferred to their walker
• This is not an orientation question
• SBA/Contact Guard/Device to ambulate, Requires AFO to ambulate, Requires assistance in Community
• Ind. w/walker or AFO, Independent inside building
• Moderate, 1-3 staff, a walker or W/C, has a bionic schedule which is followed during the day or evening
• Actual physical assistance mg., more than CG
• Max Assistance, 2 or more staff with W/C mobility or completely dependent for W/C mobility: Cervical collar; Halo
• >1 staff needed for physical management of mobility

Medical Acuity: Skilled Care

0 1 2 3
• No wound issues
• No PEG
• No BS checks
• No insulin
• No O2
• No drains or other tubes
• Simple dressing changes
• Monitoring of oral intake/food intake/food log/calorie counts
• Non-insulin dependent diabetic w/o BS checks
• Use of rescue inhaler less than 1 x per time per month
• Use of incentive spirometry
• Skilled nursing dressing change
• Dysphagia diet
• PEG for supplemental hydration
• Non-insulin dependent diabetic with BS checks
• s/p cranioplasty within last 6 months
• Seizure hx longer than 6 months ago w/AED medication
• Presence of shunt placement longer than 6 months
• Use of rescue inhaler/Nebulizer PRN within the last week
• Extensive wound care issues/wound clinic
• Primary PEG feedings
• NPO status
• Insulin dependent w/BS checks
• s/p craniotomy w/o replacement
• Seizures hx within last 6 months w/AED medication
• Shunt placement in last 6 months or shunt reprogramming in last 6 months
• Uses O2, nebulizer, CPAP/BiPAP on daily basis
• Cervical collar, TLSO, HALO, or other fixator device
• Presence of other tubes/drains (i.e. trach, wound drains)
• Isolation precautions

Medical Acuity: Bowel/Bladder Care

0 1 2 3
• No diarrhea
• No incontinence
• No other bowel issues
• No urinary incontinence
• No other bladder issues
• Simple bowel care: rectal suctioning, stoma care
• Bowel care: No rectal suctioning
• Complex bowel care: stoma care, Foley catheter
• Complex bladder care: No catheter
• Complex bowel/urinary care: No complex bowel care
• Complex bladder care: No complex bladder care

Medical Acuity: Fall Risk

0 1 2 3
• No risk
• Low risk
• Moderate risk
• High risk

Medical Acuity: Confused Behavior

0 1 2 3
• No confusion
• Low level confusion
• Moderate confusion
• High level confusion

Medical Acuity: Precautions

0 1 2 3
• No precautions
• Low level precautions
• Moderate precautions
• High level precautions

Medical Acuity: Aggression

0 1 2 3
• No aggression
• Low level aggression
• Moderate aggression
• High level aggression

Medical Acuity: Safety/Community Interactions

0 1 2 3
• No safety/interaction
• Low level interaction
• Moderate interaction
• High level interaction

Medical Acuity: High Utilizer

0 1 2 3
• No high utilizer
• Low level high utilizer
• Moderate high utilizer
• High level high utilizer

Medical Acuity: No Instructions other than the 1 page document

0 1 2 3
• No instructions
• Low level instructions
• Moderate instructions
• High level instructions
Neurobehavioral Acuity: Confused Behavior

- Areas of concern related to orientation and participation in care routines and demands of the environment

0 = No limitations or non-participation (patient and refused x 3)
1 = Readily noticeable
2 = Behavior present but not significantly impacting care in a clinical setting
3 = Requires frequent verbal interventions for safety
4 = Persistently difficult to redirect

- Uncooperative or somnolent (more than 3 per 1000 total behaviors)
- Refused or complete non-compliance with basic care (e.g.,个人 hygiene routines)
- Pacing or self-restraint of interventions
- Use of extrabedward orders or ordered formal behavior program
- Requiring medical devices (e.g., helmet, oral suction, catheters, sedation)

- Requires monitoring for risk of injury or suicide behavior related to evaluation or observation
- Requires systematic physical interventions for safety redirection more than 1 hour per day

Medical Acuity: Bowel/Bladder

- This includes patient’s level of self-awareness and ability to physically self-manage

<table>
<thead>
<tr>
<th>Fall Risk</th>
<th>ADLs/Transfers</th>
<th>Mobility/Orientation</th>
<th>Skilled Care</th>
<th>Bowel/Bladder</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

Total Medical Acuity Score Sample

Neurobehavioral Acuity: Precautions

- What level of staffing does the patient require to maintain their physical safety in the building?

0 = No special supervision needed
1 = Fits into 3:1 staffing or less
2 = 2:1
3 = 1:1
4 = Line of sight or more intense supervision

Neurobehavioral Acuity: Aggression

- Agitation that is unexpected or occurring outside of planned interventions

0 = No aggression
1 = Verbal irritability
2 = Significant activation
3 = Physical aggression towards other patients, staff, or property

- Presence of self-injurious behaviors or suicide attempt or active monitoring of risk
- Frequent use of physical and verbal interventions more than 3 times per day for agitation
- Requires or chronic delays of non-essential treatment and scheduled therapy

Neurobehavioral Acuity: Fall Risk

- How concerned are the staff that this patient will fall?

0 = No current risk for falls
1 = Low Risk
2 = Moderate Risk
3 = High Risk

- No current risk for falls, but with impaire safety awareness
- Use of w/c, bed alarms on falls in 3 months
- Use of w/c, bed alarms on falls in last month
- Requires infrequent verbal or physical interventions for safety redirection more than 3 times per day
- Requires infrequent verbal or physical interventions for safety redirection more than 3 times per day

- Requires frequent verbal or physical interventions for safety redirection more than 3 times per day
- Requires frequent verbal or physical interventions for safety redirection more than 3 times per day
- Requires constant verbal or physical interventions for safety redirection more than 3 times per day

8/26/2019
### Total Medical Acuity Score Sample

<table>
<thead>
<tr>
<th>Fall Risk</th>
<th>ADLs/ Transfers</th>
<th>Mobility/ Orthotics</th>
<th>Skilled Care</th>
<th>Bowel/ Bladder</th>
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<td>9</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety/ Community</th>
<th>Aggression</th>
<th>Confused Behavior</th>
<th>Precautions</th>
<th>High Utilizer</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

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### Initial Roll-Out Procedures

- Test runs for functional utility in our Neurobehavioral unit
- Weekly data from transitional settings for impressions
- Quarterly data on Long-Term Residential including Community Living, establishing scope of functional utility at the log post-acute interval
- Multiple drafts until consensus on language from the rater pool
- Drafts eventually “Locked Down” for the study.

Two items were thought relevant, but did not hold up to analysis:
- High Utilizer
- Safety/ Community interactions

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### Reliability Study

1. **Test Runs for Functional Utility in our Neurobehavioral Unit**
2. **Weekly Data from Transitional Settings for Impressions**
3. **Quarterly Data on Long-Term Residential Including Community Living, Establishing Scope of Functional Utility at the Log Post-Acute Interval**
4. **Multiple Drafts Until Consensus on Language from the Rater Pool**
5. **Drafts Eventually “Locked Down” for the Study.**

Two items were thought relevant, but did not hold up to analysis:
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### HAS Interrater Reliability Trial

208 Acuity Scale ratings on 104 consumers were performed

- Each consumer had two completed ratings performed on the same day by staff members familiar with the consumer, one by the Residential Supervisor (designated rater) or A) and one by another (non-designated rater) or B) staff member.
- A one-way random Intraclass correlation (ICC) is calculated for reliability. This particular ICC is used because there are potentially two different raters for each participant. It is the most conservative ICC.
- B raters:
  - Shift Lead (86.5%)
  - Rehabilitation Technician (5.8%)
  - Nurse (2%)
  - Other staff member (5.8%)

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### Interrater Reliability: (Descriptive Statistics A/B Scores)

<table>
<thead>
<tr>
<th>Interrater Reliability Trial Descriptive Statistics</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Rater A Total</td>
<td>164</td>
<td>0</td>
<td>23.00</td>
<td>7.80</td>
</tr>
<tr>
<td>Rater A Behavioral</td>
<td>164</td>
<td>0</td>
<td>12.00</td>
<td>3.97</td>
</tr>
<tr>
<td>Rater A Medical</td>
<td>164</td>
<td>0</td>
<td>12.05</td>
<td>3.97</td>
</tr>
<tr>
<td>Rater A Total</td>
<td>164</td>
<td>0</td>
<td>23.00</td>
<td>8.16</td>
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<tr>
<td>Rater B Behavioral</td>
<td>164</td>
<td>0</td>
<td>12.00</td>
<td>7.67</td>
</tr>
<tr>
<td>Rater B Medical</td>
<td>164</td>
<td>0</td>
<td>12.00</td>
<td>7.67</td>
</tr>
<tr>
<td>Rater B Total</td>
<td>164</td>
<td>0</td>
<td>23.00</td>
<td>8.16</td>
</tr>
<tr>
<td>Rater B Total</td>
<td>164</td>
<td>0</td>
<td>12.00</td>
<td>7.67</td>
</tr>
<tr>
<td>Rater B Medical</td>
<td>164</td>
<td>0</td>
<td>12.00</td>
<td>7.67</td>
</tr>
<tr>
<td>Valid N (list wise)</td>
<td>164</td>
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### RESULTS: IRR Intercorrelation Data

<table>
<thead>
<tr>
<th>Scale</th>
<th>ICC (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Subscale</td>
<td>.94 (95% CI .92 - .96)</td>
</tr>
<tr>
<td>Behavioral Subscale</td>
<td>.90 (95% CI .86 - .93)</td>
</tr>
<tr>
<td>Total Scale</td>
<td>.95 (95% CI .93 - .97)</td>
</tr>
</tbody>
</table>

* 1-way random ICC
**Table 2. Intraclass Correlation Coefficient – Acuity Total**

<table>
<thead>
<tr>
<th>Intraclass Correlation</th>
<th>95% Confidence Interval</th>
<th>F Test with True Value 0</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Value</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Measures</td>
<td>0.952</td>
<td>40.44</td>
<td>103</td>
<td>104</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One-way random effects model where people effects are random.

**Table 2. Intraclass Correlation Coefficient – Medical Acuity Total**

<table>
<thead>
<tr>
<th>Intraclass Correlation</th>
<th>95% Confidence Interval</th>
<th>F Test with True Value 0</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Value</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
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<tbody>
<tr>
<td>Single Measures</td>
<td>0.943</td>
<td>34.037</td>
<td>103</td>
<td>104</td>
<td>0.000</td>
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</tbody>
</table>

One-way random effects model where people effects are random.

**Table 2. Intraclass Correlation Coefficient – Behavioral Acuity Subscale**

<table>
<thead>
<tr>
<th>Intraclass Correlation</th>
<th>95% Confidence Interval</th>
<th>F Test with True Value 0</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Value</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
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<tbody>
<tr>
<td>Single Measures</td>
<td>0.902</td>
<td>19.437</td>
<td>103</td>
<td>104</td>
<td>0.000</td>
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</tbody>
</table>

One-way random effects model where people effects are random.

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**Validation Studies**

- Does the test measure what it is supposed to measure?
- Does it show changes that are meaningful to the concept?

**Dataset Descriptive Statistics**

- **Full Dataset** (Transitional initial scores and long-term residents) (Used for inter-item correlations and factor analyses)
  - N = 240
  - Mean age = 48.0 (SD = 15.06; Range = 18 - 87)
  - 66.7% Male

- **Transitional Dataset** (Used for outcome and correlational analyses)
  - N = 105
  - Mean age = 46.9 (SD = 16.54; Range 18-87)
  - 61% Male
  - Ave LOS 76.7 days (SD = 67.46, range = 11-375)

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**Construct Validity: Corrected Item – Total Correlations for Subscale Items**

<table>
<thead>
<tr>
<th>Medical Acuity: α = .84</th>
<th>Behavioral Acuity: α = .70</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADLs/Transfers</td>
<td>.79</td>
</tr>
<tr>
<td>Mobility/Orientation</td>
<td>.71</td>
</tr>
<tr>
<td>Skilled Medical Care</td>
<td>.75</td>
</tr>
<tr>
<td>Bowel/Bladder</td>
<td>.75</td>
</tr>
</tbody>
</table>

**EFA: Total Variance Explained**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigenvalue</th>
<th>% of Variance</th>
<th>Cumulative Variance %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.89</td>
<td>48.58</td>
<td>48.58</td>
</tr>
<tr>
<td>2</td>
<td>1.15</td>
<td>14.39</td>
<td>62.97</td>
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**Item Scores: Full Sample Descriptive Statistics**

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**Item Scores: Full Sample Descriptive Statistics**

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**Construct Validity: Corrected Item – Total Correlations for Subscale Items**

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RESULTS: Construct Validity (EFA)

Factor Analysis: Pattern Mix Factor Loadings

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Concurrent Validity:
Spearman's Rho: HAS and SRS

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Concurrent Validity:
Pearson Correlations: HAS and MPAI

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Concurrent Validity:
Pearson Correlations: HAS and MPAI

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*Note: Change computed as (Discharge – Intake) so that a negative score is a reduction in symptoms (i.e. a good thing!).

No Need to Edit
Table X. Descriptives: Discharge HAS Scores by Discharge Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Total Acuity Mean</th>
<th>Total Acuity SD</th>
<th>Medical Acuity Mean</th>
<th>Medical Acuity SD</th>
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<th>Behavioral Acuity SD</th>
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<tr>
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<td>1.67</td>
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Data for preceding slide -- HIDE

No need to edit

Possible Future Studies

- Relationships to rank-ordering of patients
- Relationships to objective supervision provided (forthcoming)
- Relationships to any other measure of perceived workload
- Relationships to Fall documentation (forthcoming)
- Relationships to all Incident Reports
- Relationships to program costs
- Relate to E scores, ABS scores, or Dementia screening tools (MOCA)

Discriminant Validity: HAS Scores at Discharge by Discharge Placement

<table>
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<tr>
<th>Location</th>
<th>Total Acuity Test Stat</th>
<th>Total Acuity Sig</th>
<th>Medical Acuity Test Stat</th>
<th>Medical Acuity Sig</th>
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*Bonferroni corrected
HAS as a Program Management Tool

Uses of An Acuity Measure

• Staffing levels in individual and congregate settings
• Supervision and attendant care determination
• Thresholds for placement decisions
• Quantifying risk response implications
• Determining program costs and pricing

Uses of An Acuity Measure (cont.)

• Outcome measure
  • Acuity is a discharge criteria – "No 1:1, No Alarms"
  • Aftercare planning element – "Requires 16 hours waking hours supervision"
  • Benchmark for a successful outcome – "Discharged with independence for self-care"

• Acuity is a proxy for recovery of independence
• The patient is reducing the help they need from a provider.

HAS Admission Scores by Pathway

(see figure on next slide) HIDE SLIDE

NO NEED TO EDIT

HAS Admission Scores by Clinical Pathway

HAS Admission Scores by Program Assignment
### HAS Change Statistics by Clinical Pathway

<table>
<thead>
<tr>
<th>Clinical Pathway</th>
<th>Average MPAI-4 T-Score</th>
<th>Average HAS Score FY 2018</th>
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<tr>
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<tr>
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<td>51.7</td>
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<td>Med &amp; Cog Complex Neuro Rehab (13)</td>
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<td><strong>Grand Total (89)</strong></td>
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*Note: Change computed as (Discharge – Intake) so that a negative score is a reduction in symptoms (i.e. a good thing).

### Changes in Acuity Admission to Discharge by Clinical Pathway

![Graph showing changes in acuity](image)

### What Happens to Acuity in Post-Acute Residential Placement?

- **4%** Acuity Increased (got worse)
- **12%** Acuity remained or increased by 1
- **84%** Acuity Decreased by >1 (got better)

**Why does acuity increase?**

- Some people get worse.
- Some people become more active as they get better and emerge into agitation or impulsivity risks.
- New interventions and medications may reflect progress, but increase care complexity (e.g. Serial Casting).
- It is more complex and time consuming to assist some alert, complex patients than provide efficient total care.

### Why Do Some Patients INCREASE Acuity?

- Waking into greater activity levels
- Function of arousal and requirements for intervention
- Creating inadvertent dependence through caregiving vigilance

### Long-Term Residents 2018 Findings

![Pie chart showing changes in HAS scores](image)

**2018 4th Quarter HAS Scores for Long-Term Residential**

<table>
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<th>Hope E</th>
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<td>Hope Woods (40)</td>
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*Final Quarter (Q4) Q3 2018 (N=27)*

**Legend:**
- Increased
- Maintained
- Decreased
Ideas for Further Development in Applications

- Inclusion in initial assessment for placement and clinical pathway consideration
- Program placement
- Staffing considerations (1:1)
- Setting staffing profiles
- Rate Setting (Acuity + Clinical Pathway = Individual Service Profile prediction)
- Use as an outcome measure (already underway…)
- Use to understand the timing of longitudinal change
- Use as a discharge planning criteria

References

The Hope Network Acuity Scale (HAS) is a behavioral rating scale that quantifies the care workload associated with the support and supervision of adults living with brain injury, within a post-acute transitional residential setting.

## MEDICAL RATING:

### ADL/TRANSFERS
- **Global description of assistance needed**
  - Independent; can include independent use of assistive device; no staff assistance or oversight
  - SIBA/contact guard/utint; 1 staff assist; staff required at times to set up, cue, or minimal physical assistance to complete
  - Minimum to moderate assistance; 1 staff assist; staff required for physical assistance — more than hand-on patient as CG
  - 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
  - SIBA/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 CG
  - 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 PEG; no BS checks; no insulin; no oxygen; no drains or tubes
  - Simple dressing changes; monitoring of oral intake/food log/salaries; non-insulin dependent diabetic; no BS checks; use of inhaler less than 1/month; use of incentive spirometry
  - Skilled nursing dressing change; dysphagia diet; PEG for supplemental hydration; non-insulin dependent diabetic with BS checks; status post craniotherapy in last 6 months; seizure Hz longer than 6 months with AED meds; presence of short placement longer than 6 months; use of inhaler/nebulizer PRN in last week
  - Extensive wound care/lines; primary PEG feeding; NPO status; insulin dependent with BS checks; craniotherapy without replacement; seizure Hz in last 6 months with AED meds; short placement or reprogramming in last 6 months; uses oxygen, nebulizer, CPAP; BIPAP daily; tracheostomy, LTO, halo, or other fixator; presence of tubes/drips; isolation precautions

### BOWEL/BLADDER
- **Patient’s level of awareness and ability to physically self-manage**
  - Continent and fully independent; 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-caths independently
  - Incontinent of bowel and bladder or average of 1-accidents per shift; 1-2 staff management of brief changes; self-caths with set-up assistance
  - Incontinence 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

## BEHAVIORAL RATING:

### 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; Hz of falls in the past 3 months
  - High risk; W/C and bed alarms with 1:1 staffing for impulsive and impaired safety awareness; Hz 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; refusals or chronic delays of non-essential treatment
  - Posturing or verbally threatening eminent harm to self or others; physical aggression towards others or property; presence of self-harm behavior or suicidal 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 x/s)
  - 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
  - Previously difficult to redirect; uncontrolled or constant impulsive behaviors 3+ hours; refusal or unwillingness of basic care needs prompting patient at risk for safety or medical complexities; pulling at or self/removal of tubes/drips; use of mitts/abdominal 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

### 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

## MEDICAL RATING TOTAL:

## BEHAVIORAL RATING TOTAL:

## COMBINED TOTAL: