Predicting Potential for Positive Outcomes in Slow-stream Rehabilitation

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Background
The Halvar Jonson Centre for Brain Injury is a residential rehabilitation facility for patients who are slow to recover following moderate to severe head injuries or strokes. When prospective patients and their families come to the facility, they hear lots of stories about improvements other patients have made. However, there is currently no evidence-based technique to predict how a patient will be functioning by the time they are discharged.

Outcome measures from patients admitted to the facility have been collected since 1994. Although some analysis of this data has occurred (Gray & Burnham, 2000), it has not been used to link outcomes directly to individuals’ strengths and challenges. This type of rehabilitation is unusual because it is typically quite slow, with patients staying between six and eighteen months. Similar programs tend to treat few clients, so there is little quantitative data available to illustrate the benefits of such a program.

There are several potential benefits to being able to predict how a patient will be functioning following rehabilitation. For example, it would help patients and their families decide whether conducting rehabilitation in the Halvar Jonson Centre for Brain Injury is their best option. Also, predicting a patient’s functional level would be helpful in discharge planning, which begins when a patient is first admitted. Finally, this information would demonstrate the type of outcomes one could expect from this unique patient population, which would address a gap in current research.

Objectives
Develop a statistical model that will predict the likely outcome of a Halvar Jonson Centre for Brain Injury patient’s rehabilitation based on their current strengths and challenges.

Method
Data consisted of patient performance measures taken at admission, after every three months of treatment, and at discharge. The records were from 1,031 patients admitted between January 1994 and June 2012. A database was compiled with all identifying information removed. The performance measures indicate how much assistance patients require with various skills. The following eight outcome variables were formed:

1. Eating combines ‘feeding’ and ‘swallowing’
3. Sphincter combines ‘bladder management’ and ‘bowel management’
4. Transfers combine ‘bed to chair/wheelchair transfer’, ‘tub or shower transfer’, and ‘toilet transfer’
5. Locomotion combines ‘walking/wheelchair mobility’ and ‘stair mobility’
6. Verbal Communication combines ‘auditory comprehension’ and ‘verbal expression’
7. Written Communication combines ‘reading’ and ‘writing’

Several predictive models were evaluated using discharge performance on each of the eight measures above as the dependent variables and intake performance on a series of outcome measures of functioning as the independent variables.
Results
Variation in functional ability at time of discharge was best predicted by patient age, time between injury and admission, and functional performance on the outcomes measures at admission. There was no significant difference between stroke patients and patients with acquired brain injury. The models showed that expected gain in functional performance decreases with increasing age and greater days between injury and admission. This finding is logically sound, as these variables are related to rate of recovery and severity of injury.

Conclusions
The predictive models created help to understand how patients improve in specific domains following rehabilitation at the Halvar Jonson Centre for Brain Injury. These models predict both how a patient will improve, and indicate how much of their ultimate performance cannot be predicted when they are admitted. Having this information upon admission allows for a realistic discussion of how a patient’s functioning may improve following rehabilitation. It is typical for patients and family members to expect a full recovery. Sharing quantitative data with them at the outset can help to realign expectations.

Future research will focus on investigating how to best inform patients and their families about what to expect from rehabilitation at the Halvar Jonson Centre for Brain Injury. The challenge in this will be to communicate typical results achieved by similar patients, while also recognizing that everyone is different. This means that some patients will either exceed or fail to meet average expectations. Therefore it is necessary not only to communicate the typical performance of similar patients, but also the range of performance outcomes that are representative.

Upon completion of this research, the predictive models were shared with facility clinicians, who have expressed interest in this topic and provided positive response to the concept of using these predictions. It is a challenge to make use of these predictions for discussions with patients and their families, because there is a usually large gap between the family and patient’s hopes and the expected outcomes. We will continue to explore the best way to use these predictions to inform our own practice and to create realistic expectations for patients that continue to be motivating.

Lessons Learned
This research project highlighted an unanticipated challenge to the process of outlining recovery scenarios. Many times clinicians are frustrated that patients and families have unrealistic expectations about rehabilitation outcomes. However, during this work, we discovered that clinicians also like to expect better outcomes than past results would predict. This presents all of us, patients and clinicians, with the challenge of keeping our expectations realistic, while not reducing our aspirations for the best outcomes.

The full report can be found at www.mentalhealthresearch.ca

References

About the Author: M. Alanna Kerr has been working in the field of Speech-Language Rehabilitation since completing her MSc in human communication disorders at Dalhousie in 2001. She has been working exclusively with stroke and brain injury patients at the Halvar Jonson Centre for Brain Injury since 2007. Earlier academic pursuits include an undergraduate degree in statistics and an MSc in Animal Breeding from the University of Guelph, in which she explored the use of statistical methods to predict genetic breeding values of livestock. Later work included similar analyses for forestry.

Russell Hemingson has been a Unit Manager in Acquired Brain Injury at the Halvar Jonson Centre for Brain Injury for the past 13 years. He has worked exclusively in stroke rehabilitation for the past four years. Russell plays a key role in maintaining the data management system for the centre.