Cognition and functional independence in geriatric rehabilitation:

Examining the Montréal Cognitive Assessment (MoCA) and the Kohlman Evaluation of Living Skills (KELS).

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Abstract

Evaluation of cognitive status is a crucial element of geriatric assessment and rehabilitation. The Montreal Cognitive Assessment (MoCA) is a newer cognitive screening tool designed to assess a broader range of cognitive domains. Interest in the MoCA is growing, but as of yet, we know very little about its relationship with an individual's ability to perform tasks of daily living. The objective of this study was to evaluate the relationship between mental status, as measured by the MoCA, and degree of autonomy in day-to-day functioning as measured by the Kohlman Evaluation of Living Skills (KELS).
A prospective cohort of patients aged 65 and older admitted to an inpatient geriatric rehabilitation service (n = 47) were assessed using the MoCA and KELS at both admission and discharge. Using one-way ANOVA tests, MoCA scores of patients deemed 'independent' on the KELS were compared with those of patients 'needing assistance' in day-to-day activities. Results show that patients who function independently in their daily activities score significantly higher on the MoCA than those who require assistance at both admission ($p < 0.05$) and discharge ($p < 0.01$). The findings support our prediction that patients with higher mental status scores function more autonomously in their activities. Therefore, the MoCA seems not only useful for assessing mental status but may also help clinicians anticipate how well patients will function in their instrumental activities of daily living once discharged from the rehabilitation setting.

Introduction

Cognitive screening is an integral part of geriatric assessment, diagnosis and treatment.

In older adults, research has shown that cognitive status, as assessed by global measures of cognitive ability, are significant correlates of function (Baird, et al, 2001; Twamley, et al., 2002) and rehabilitation outcome (Ruchinskas, et al., 2001). In fact, Zimnavoda et al., (2002) found a strong correlation between the MMSE and the KELS and the MMSE was the strongest predictor of performance on the KELS.

In the context of such studies, and geriatric assessment more generally, the most commonly used screening tool is the MMSE. As a new screening tool, the MoCA is gaining popularity. Nonetheless, the extent of published data regarding its broader validity or clinical utility is still limited.

Objective: Evaluate the relationship between mental status, as measured by the MoCA, and degree of autonomy in day-to-day functioning as measured by the Kohlman Evaluation of Living Skills (KELS).

Hypothesis: There will be a significant difference on the MoCA between patients who can manage their activities independently and those who require assistance. More specifically, those who are independent will obtain higher MoCA scores.

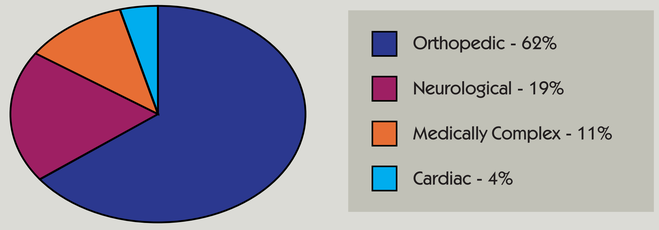
Method

Participants

A sample of 47 patients admitted to the geriatric rehabilitation in-patient service at Bruyère Continuing Care was recruited. The service adopts an interdisciplinary treatment approach designed to optimize independent function in the frail elderly. For the purposes of this study, patients with aphasia, a diagnosis of delirium upon admission and those who could not effectively communicate in English were excluded.

- Participants were on average 83.5 years old (range 70 to 102 years, SD=6.38) with a mean of 12.5 years of education (range 7 to 24 years, SD= 3.5).
- Sixty-eight percent (68%) were female.
- In most cases (62%), an orthopedic injury was cited as the health condition responsible for admission to our unit. Neurological conditions prompted the admission in 19% of cases and the remaining patients were admitted for management of medically complex conditions (11%), and cardiac issues (4%). See Figure 1
- Average total FIM at the time of admission was 70.4 (sd=11.9).
- Patients had an average length of stay on the unit of 41 days (sd=15.13).

Figure 1. *Distribution of the Most Responsible Health Condition for admission to the Geriatric Rehabilitation Service*



Measures

Montreal Cognitive Assessment (MoCA): As noted above, this is a relatively new one-page 30-point test administered in 10 minutes. The items on the MoCA assess orientation, short-term memory, visuo-spatial abilities, attention/concentration, language, and aspects of executive functioning. Data on its psychometric properties are limited, but preliminary results suggest that it has good test-retest reliability and internal consistency (Nesreddine, et al, 2005).

The Kohlman Evaluation of Living Skills (KELS): The KELS is an occupational therapy evaluation that is designed to determine a person's ability to function in basic living skills. The administration combines interview questions and tasks. It can usually be administered and scored in 30 to 45 minutes. Seventeen living skills are tested under five areas: Self-care, Safety and Health, Money Management, Transportation, Telephone, and Work and Leisure. The KELS helps to identify the areas in which a person can perform and those in which the person needs assistance. This tool has been validated in geriatric populations to assess performance in both instrumental (IADL) and basic activities of daily living (ADL), and as an assessment tool for the ability to live independently.

Procedure

The research assistant made contact with the patients as soon as possible after admission and administered the MoCA and the KELS. Participants then participated in the rehabilitation program which typically consisted of daily physiotherapy, occupational therapy intervention several times per week, engagement in structured social activities and implementation of therapeutic strategies within day to day activities with the help of the nursing staff. Within a few days of discharge, the research assistant repeated the MoCA and the KELS

Analyses and Results

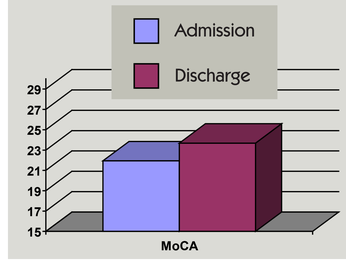
Statistical analyses:

Descriptive statistics were used to outline our sample's cognitive, emotional, medical and functional status. The evaluate differences in performance on both screening measures, we applied independent samples t-tests. Paired t-tests were used to ascertain changes in scores over time. Bi-variate correlations were used to assess the degree of association among the variables. Quantitatively, succesful rehabilitation was defined as RFG > 0.5. Clinically, successful rehabilitation was defined as discharged home with or without health services. Using these definitions, we applied independent group t-tests in orderto compare the admission mental status scores of patients who would be deemed successful rehabilitation clients to those of patient who had not attained these criteria for success. Sensitivity and specificity of the MoCA for detecting successful rehabilitation candidates were derived using crosstabulations.

Description of cognitive and functional status of geriatric rehabilitation patients

- As whole, the sample obtained a mean MoCA score at admission of 21.94 (sd=4.41). Patients score slightly higher on the mental status testing at discharge with a mean of 23.68 on the MoCA (sd= 4.09). See Figure 4.
- Applying the recommended cut-off score of 26/30 for the MoCA resulted in only 25% of our sample having "normal" cognitive status at the time of admission. At the time of discharge, 39% of the patients achieved "normal" score on the MoCA.
- As a whole, the sample obtained mean scores of 5.1 and 4.8 on the KELS at admission and discharge respectively
- Performance on the KELS suggested that about half of the patients would be capable of living independently at the time of admission (49% of our sample scored <5.5 on KELS)
- This proportion increased to 60% at the time of discharge

Figure 2. *MoCA scores for entire sample at admission and discharge*



Mental status of independent geriatric patients and those needing assistance

We compared the mental status (MoCA scores) of patients deemed independent on the KELS to that of patients rated as requiring assistance. This was done separately for admission and discharge.

- Multivariate analyses using the MoCA scores as the repeated measure dependent variable (within-subject factor) and the KELS scores at admission as the between-subject independent variable were done. Results revealed a significant change in MoCA scores over time ($F=4.75$, $p<0.05$) and a significant difference between the groups (Independent vs. Require Assistance) at both admission and discharge ($F=6.7$, $p=0.01$). The interaction was not significant. See Table 1 and Figure 3.
- Analogous multivariate analyses using KELS scores at discharge as the between-subject factor yielded similar findings for the MoCA over time $F=5.10$, $p<0.05$) and the differences between the groups ($F=11.77$, $p<0.01$). The interaction remained non-significant. See Table 1 and Figure 4.

Table 1. *Mean (standard deviation) MoCA scores at admission and discharge according the level of function (KELS) at admission and discharge (n=32)*

	Independent at admission	Assisted at admission
	(KELS<5.0)	*(KELS>5.0)*
MoCA at admission	24.19 (4.7)	20.81 (4.2)
MoCA at discharge	25.63 (2.9)	22.00 (4.4)
	Independent at discharge	**Assisted at discharge**
	(KELS<5.0)	*(KELS>5.0)*
MoCA at admission	23.90 (4.1)	19.50 (4.4)
MoCA at discharge	25.30 (2.9)	20.92 (4.6)

Figure 3. *MoCA scores at admission and discharge according to level of function at admission*

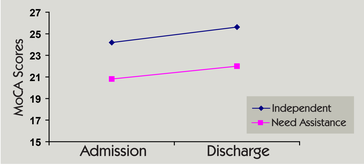
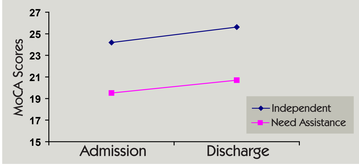


Figure 4. *MoCA scores at admission and discharge according to level of function at discharge.*



Discussions

Summary of key findings

- The results support our hypothesis in that there is a significant difference between "independent" patients and those who "need assistance" on mental status testing, as measured by the MoCA. Patients who are independent in their daily activities obtain significantly higher scores on the MoCA than patients who require assistance. This held true over time and regardless of the point at which their level of autonomy was assessed.

Implications and future studies

- While acknowledging the limitations inherent to brief measures of cognitive status, the MoCA seems not only be useful for assessing mental status but may also help clinicians anticipate patients' level of autonomy in regards to instrumental activities of daily living and therefore be better able to support families as they make discharge arrangements.
- From a diagnostic point of view, Razani et al. (2009) note that diagnosis of dementia requires some understanding of patients' functional abilities. As such, these findings support the notion that the MoCA can aid in distinguishing patients who would satisfy criteria for a diagnosis of dementia from those who may not.
- Qualitative examination of the scores shows that the MoCA scores of "Independent" patients approach the cut-off score recommended by the authors, whereas the scores of patients "Requiring Assistance" are more clearly below this threshold. Evaluation of the MoCAs sensitivity and specificity, perhaps with different cut-scores, may help us to further evaluate this measure's role in geriatric rehabilitation and the prediction of level of function in day to day activities.
- Future studies should further expand the criterion validity of the MoCA by examining its relationship with variables such as rehabilitation outcome and discharge destination. This would permit broader appreciation for the MoCAs clinical utility, beyond the identification of cognitive impairments

References

Baird, A., Podell, K., Lovell, M., & Bell McGinty, S. (2001). Complex Real-World Functioning and Neuropsychological Test Performance in Older Adults. The Clinical Neuropsychologist, 15 (3), 369-379.

Kohlman Thompson, L. (1992). The Kolhman Evaluation of Living Skills. American Occupational Therapy Association. Rockville MD.

Nasreddine, Z., Philips, N., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., Cummings, J., & Chartkow, H. (2005). The Montreal Cognitive Assessment, MoCA: A Brief Screening Tool for Mild Cognitive Impairment. Journal of the American Geriatric Society, 53, 695-699.

Razani, J., Wong, J., Dafaeebolni, N., Edwards-Lee, T., Lu, P, Aleassi, C., Josephson, K. (2009). Predicting Everyday Functional Abilities of Dementia Patients with the Mini-Mental State Exam. Journal of Geriatric Psychiatry and Neurology, 22 (1), 62-70.

Ruchinskas, R., Singer, H., & Repetz, N. (2001). Clock Drawing, Clock Copying, and Physical Abilities in Geriatric Rehabilitation. Archives of Physical Medicine and Rehabilitation, 82, 920-924.

Twamley, E., Doshi, R., Nayak, G., Palmer, B., Golshan, S., Heaton, R., Patterson, T., & Jeste, D. (2002). Generlized Cognitive Impairments, Ability to Perform Everyday Tasks, and Level of Independence in Community Living Situations of Older Patients with Psychosis. American Journal of Psychiatry, 159 (12), 2013-2020.

Zimnavoda, T., Weinblatt, N., & Katz, N. (2002). Validity of the Kohlman Evaluation of Living Skills (KELS) with Israeli Elderly Individuals Living in the Community. Occupational Therapy International, 9 (4), 312-325.