Factors correlated with Falls in Inpatient Stroke Patients

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Background

❖ Falls in stroke patients represent a significant source of morbidity. Accurate identification of patients at high risk of falling may enable appropriate distribution of fall prevention resources which will in turn enhance care quality and in turn facilitate patient recovery.

❖Although this problem has been approached by other research groups[1-3], there is no single clinically accepted and widely used instrument, thus further work in this area is warranted[4-6].

❖ We have developed a model that correlates factors measurable within the first 72 hours of admission. We intend to use this set of correlations to develop a predictive model of falls

Objective

❖ To develop a model to predict falls in the inpatient stroke patient population using data stemming from admission documentation and relevant to the rehabilitation population of patients. These factors were chosen because they are routinely collected data on every stroke inpatient.

❖ To obtain this objective ,we have correlated falls to based on:

- **Functional Independence Measure (FIM)**
- **Demographic information**
- **Case mix group (CMG), which incorporates the presence or absence of comorbidities**

Methods

❖ Retrospective chart analysis of 3112 consecutive stroke patients undergoing inpatient acute rehabilitation..

❖ We analyzed falls with respect to the number of hospitalization days until a fall occurred.

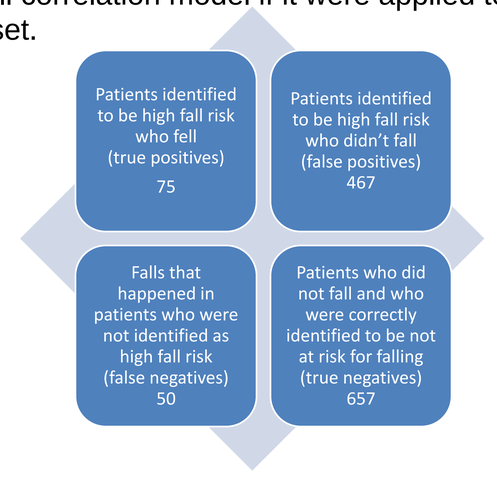
❖We used a stepwise survival analysis to reveal which factors significantly predict fall risk

Results

Table 1: Demographics of inpatient acute stroke patients. Of this group of patients, 2.3% were Asian, 19.3% were African American, 4.6 % were Hispanic, and 71.5 were Caucasian

Variables	*Mean*	*St dev*
Age (yrs)	71.5	13.2
Education (yrs)	12.7	3.1
Length of stay (days)	19.1	11.8
Gender (M=1,F=2)	1.5	0.50

Figure 1: Contingency table showing the results of our fall correlation model if it were applied to this data set.



❖The admission FIM score subsets which contributed in a statistically significant manner to the fall-correlation model were eating, stairs, and toilet transfer. The high performing to low performing comparison for eating revealed a hazard ration of 1.15 hazard ratio0.016; for stairs hazard ratio was 0.691, p-value 0.01; and for toileting hazard ration was 1.3, p-value 0.06. Each item is scored on a 7 point ordinal scale ranging from 1 (total dependence) to a score of 7 (total independence).

❖Gender was also correlated with falls, with males being more likely to fall. The female vs. male hazard ratio was 0.727, p-value 0.04. In addition, older patients' fall risk appeared to be lower than younger patients with patients in the group age 63 or less being more likely to fall than those older than 63. The age hazard ratio was 0.982, p-value 0.003. CMG which incorporates the presence or absence of co morbidities was also correlated with falls. Increasing burden of CMG had a hazard ratio of 1.3, p-value of 0.0001.

Discussion

❖Using a retrospective analysis, predict ion of patients who will fall during their inpatient stay would be possible with a sensitivity of 60 and a specificity of 58. These are comparable levels of specificity and sensitivity to currently used instruments such as the Conley score which has sensitivity and specificity of 69.49% and 61% respectively[1].

Conclusion and Implications for Practice

❖ Our results suggest that stroke patients who fall during their inpatient stay can be identified within the first 72 hours of admission to acute rehabilitation. Future work will test this model.

References

1. Lovallo, C., S. Rolandi, et al. (2010). "Accidental falls in hospital inpatients: evaluation of sensitivity and specificity of two risk assessment tools." Journal of Advanced Nursing **66**(3): 690-696.
2. Ashburn, A., D. Hyndman, et al. (2008). "Predicting people with stroke at risk of falls." Age and Ageing **37**(3): 270-276.
3. Mackintosh, S. F., K. D. Hill, et al. (2006). "Balance score and a history of falls in hospital predict recurrent falls in the 6 months following stroke rehabilitation." Archives of Physical Medicine and Rehabilitation **87**(12): 1583-1589.
4. Maeda, N., J. Kato, et al. (2009). "Predicting the Probability for Fall Incidence in Stroke Patients Using the Berg Balance Scale." Journal of International Medical Research **37**(3): 697-704.
5. Nyberg, L. and Y. Gustafson (1995). "Patient falls in stroke rehabilitation – a challenge to rehabilitation strategies." Stroke **26**(5): 838-842.
6. Nyberg, L. and Y. Gustafson (1997). "Fall prediction index for patients in stroke rehabilitation." Stroke **28**(4): 716-721.

This work is supported by the Kessler Foundation and the Select Medical Corporation

This project has been approved by Kessler's IRB