Evaluation of a fall-risk assessment tool implemented in an EMR System

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Abstract and Objective

This paper examines the routine clinical use and the validity of a built-in fall-risk assessment tool to identify patients at high risk for falls, which has implemented in the enterprise electronic medical record (EMR) system of a tertiary teaching hospital in Korea. The tool was developed using an evidence-based approach as a fall safety initiative. It is consisted of nine items with dichotomous score and the sum score ranges from 0 to 9. The cutoff score is six. A retrospective analysis of 1,934 inpatient admissions in 2007 was conducted. Falls status was ascertained from the hospital's accident self-report system and the review of electronic nursing records in the EMR system. This validity study assessed the sensitivity, specificity, positive predictive values and negative predictive values with the associated 95% CI. The results showed much low sensitivity at the current cutoff score. We found many weaknesses of the tool and great opportunities to improve our fall prevention practice.

Keywords:

Falls, Risk assessment, Validation studies

Methods

A retrospective case-control design was implemented at one acute care hospital in Korea in 2007. The study sample was drawn from a tertiary teaching hospital in Seoul. The hospitalized fallers (cases) were 403 admissions of 205 patients and the non fallers (controls) were 1,904 admissions of 1,729 patients. The controls were selected randomly among the 56,651 admissions to become ten folds of cases. The fall-risk assessment tool was developed by the fall safety initiative committee of the hospital about three years ago. They used evidence-based approaches by reviewing and synthesizing current evidences. Since then, the present effort is the first validation study. The patient data were extracted from the clinical data repository of the EMR system.

Results

The case group was older and had longer length of stays in hospital than the control group significantly. The routine clinical use rate of the tool was 79.9% based on admissions. The confusion matrix of Table 1 shows the rate of correct prediction was 50.63%.

Table 1-Confusion matrix (cutoff = 6)

	Score <6 (low risk)	6 ≤ Score (high risk)	total
Faller (cases)	17	386	403
Non Faller (controls)	1,458	1,874	3,332
total	1,475	2,260	3,735

Table 2 shows the sensitivity, specificity, PPV, NPV, Odds and 95% CI of the tool. Based on the current cutoff score, the sensitivity was quite low.

Table 2-Analysis of fall assessment

Cut-off score	Sensitivity	Specificity	PPV	NPV	Odds	95% CI
0	1	0	0.175	-	-	-
1	0.779	0.234	0.177	0.834	1.079	0.834 - 1.397
2	0.486	0.528	0.179	0.829	1.059	0.854 - 1.312
3	0.295	0.784	0.224	0.840	1.517	1.193 - 1.929
4	0.169	0.904	0.272	0.837	1.921	1.420 - 2.598
5	0.094	0.956	0.314	0.833	2.284	1.531 - 3.408
6	0.042	0.984	0.362	0.829	2.751	1.502 - 5.038
7	0.007	0.994	0.200	0.825	1.183	0.332 - 4.210
8	0.002	0.998	0.250	0.825	1.576	0.164 - 15.193

Conclusion

The results showed high use rate of the tool, but sensitivity at the current cutoff score was quite low. The findings suggested urgent needs to be lower the cutoff score and to refine the tool as well as the application guideline. Also the findings imply that assessment timing would be problematic. Once applying the tool would not be sufficient in acute care settings because patient's conditions are continuously changed. For a further research, we plan to examine the possibilities to use the daily available nursing practice data in the EMR systems to monitor risk for falls.