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Determining Predictors for High Fall Risk in an Inpatient Rehabilitation Facility

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Introduction

"Best practice for prevention of falls should include a fall prevention program with policies and procedures that are designed for differential interventions based on specific populations and units" (ICSI, 2012).

Sentara Norfolk General Hospital (SNGH) uses the Johns Hopkins Fall Risk Assessment Tool (JHFRAT) on all acute care units. Although the tool shows promising results in the acute care hospital setting, the JHFRAT has not been validated for use in an Inpatient Rehabilitation Facility (IRF). Several studies have cited the potential benefits of using the Functional Independence Measure (FIM) score as a predictor of risk for falling in an IRF.

Purpose

The purpose of this study was to test the efficacy of our current fall risk assessment tool, the (JHFRAT), and identify other possible predictors of falls through FIM scores, common diagnoses, age and gender.

Johns Hopkins Fall Risk Assessment Tool

The JHFRAT contains 8 categories with scores from 3-30. Higher scores indicate a higher risk of falling.

In the current sample:

- 8.3% patients were low fall risk
- 68% patients were moderate fall risk
- 23.6% patients were high fall risk
- Of the 49 patients who fell only 39% were deemed "high fall risk" using JHFRAT

The Functional Independence Measure

- IRF's use FIM® as a tool to measure the level of a patient's disability. FIM includes 16 areas that focus on toileting, transfers, locomotion, communication and social cognition.
- FIM uses a scale from 1-7 to designate major gradations in behavior from 1, indicating total dependence, to 7, indicating complete independent functioning.
- FIM is documented on admission by nursing and therapists as the patient performs activities of daily living.

Methods

Exempt status was obtained from the Eastern Virginia Medical School Institutional Review Board (EVMS IRB).

A retrospective chart review was done for each patient to obtain the admission (FIM®) scores per category and total FIM score, JHFRAT admission score, whether the patient had fallen in the past six months, admission diagnosis, length of stay, age, gender, and whether the patient fell during their admission.

Sample

The sample consisted of 672 patients (61% male), aged 18 to 89 (average 57 y.o.), who were discharged from the IRF between January 1, 2014 and December 31, 2015. Patients had an average length of stay of 13 days. Six percent (49 patients) of the sample fell during their stay and 18.6% reported falling in the last 6 months. The analyses and results are based on a total of 40 patient falls as 9 patients had incomplete data.

Results

Multiple independent-samples t-tests revealed that patients who fell scored significantly lower on eating, bathing, bed transfer, toilet transfer, walk/wheelchair, comprehension, expression, social interaction, problem solving, and memory. Table 1 represents the results from a multiple logistic regression analysis in which all significant t-test variables are considered predictors in one model.

Table 1

	B	SE	Wald	p	95% CI	Exp B
CVA Left	1.03	.40	6.72	.01	[1.29 6.07]	2.79
Eating	-.12	.14	.74	.39	[.68 1.16]	.89
Bathing	-.04	.21	.04	.85	[.64 1.44]	.96
Bed Transfer	-.43	.22	4.08	.04	[.43 .99]	.65
Toilet Transfer	.20	.26	.76	.38	[.78 1.89]	1.22
Walking	-.37	.26	2.00	.16	[.41 1.15]	.69
Comprehension	.02	.23	.003	.95	[.61 1.68]	1.02
Expression	.24	.23	1.03	.31	[.80 2.01]	1.27
Social interaction	-.29	.29	1.59	.21	[.48 1.18]	.75
Problem solving	.41	.29	2.00	.16	[.85 2.63]	1.50
Memory	-.69	.83	5.54	.02	[.28 .89]	.50

The overall model in Table 1 had a positive predictive value of 5.0%, the model accurately predicted 2/40 falls; and a negative predictive value of 99.8%, the model accurately identified nearly every patient who did not fall.

The FIM had poor but statistically significant accuracy with an AUC = .646 (p = .001) and the JHFRAT had unacceptable accuracy with an AUC = .551 (p = .236).
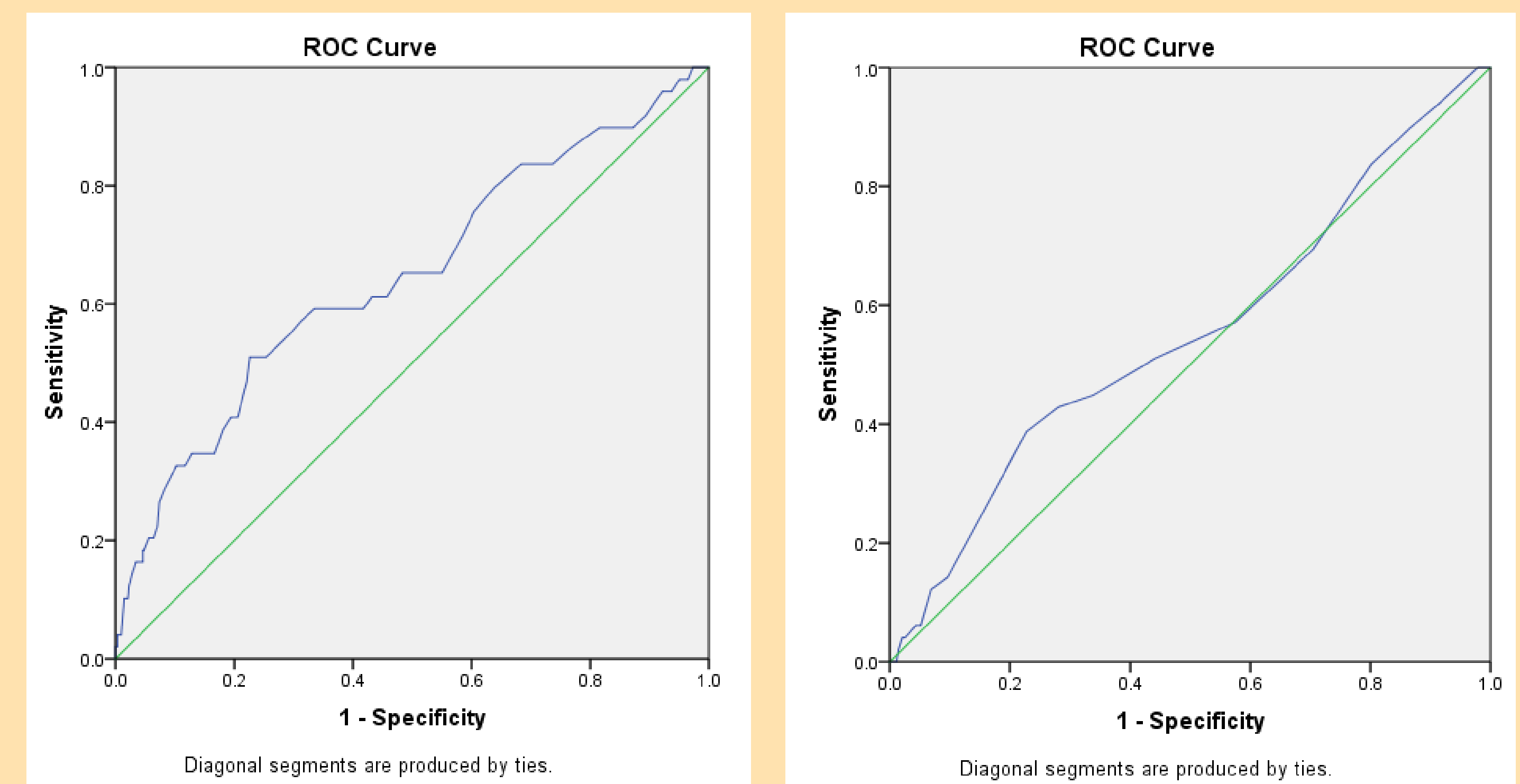
A.   B.

Figure 1. ROC Curves for the FIM (A) and the JHFRAT (B)
Receiver Operating Characteristic curve (ROC curve) shows the tradeoff between sensitivity and specificity (any increase in sensitivity will be accompanied by a decrease in specificity). Area under the ROC curve (AUC) is a measure of test accuracy.

Logistic regression revealed that the patient's Total FIM score was a significant predictor of falling; For every one-unit increase in FIM score, a patients' odds of falling is reduced by .96. The JHFRAT did not significantly predict the odds of falling. See Table 2.

Table 2

	B	SE	Wald	p	95% CI	Exp B
FIM	-.04	.01	16.53	<.001	[.95 .98]	.96
JHFRAT	.05	.04	1.59	.21	[.98 1.13]	1.05

Discussion

For the purpose of falls prevention, it is important that a predictive tool has low false negative rates. The JHFRAT failed to correctly identify any of the patients who fell on our unit. Although not as high as desired, the false negative rate of the combination between some FIM sub-scores and a diagnosis of CVA left was better than that of total FIM and total JHFRAT. With the new model, we were able to correctly identify 2 out of the 40 patients who fell on our unit between January 2014 and December 2015. Future research should investigate whether there are other valid and reliable tools that may be used as predictors of fall risk for an IRF.

Acknowledgments