

A Multi-Site Project Comparing the Predictive Accuracy of the Cubbin-Jackson and Braden Skin Risk Tools in Critical Care Patients

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Background

- Hospital acquired pressure injury (HAPI) treatment costs range from \$500 to \$100,000.
- Patients are five times more likely to acquire a HAPI when admitted to a critical care setting.
- In 2016 the system ICUs had a total of 58 HAPIs. Nurses currently use the Braden Scale to determine a patient's risk for pressure injury.
- Critical care nurse practice forum (CCNPF) literature review findings:
 - Cubbin-Jackson has the best psychometric properties for the ICU.
 - Scant literature examining properties of the two tools on the same patients.

Purpose

The purpose of this study was to examine the predictive accuracy of the Cubbin-Jackson skin risk assessment compared to the Braden skin risk assessment for skin changes over time in the critical care patient population.

Project Aims:

- Validate the use of the Cubbin-Jackson skin risk assessment in ICU patients
- Compare the predictive accuracy of the Cubbin-Jackson and the Braden Scale for the same patients during their ICU stay

Methodology

This project was a retrospective correlational study of all adult patients (over the age of 18) admitted to the intensive care units (ICUs) across 5 of 12 Sentara hospitals.

- 4137 of matched pairs of data were used for the analyses.
- Cubbin-Jackson assessment built in electronic health record (EHR) for end-user access to documentation.
- Sidebar summary built in EHR to mimic Braden scale functionality and provide supplemental guidance to nursing when scoring each category.
- An inter-rater reliability audit was completed by site primary investigators (PI).
- Site investigators met bi-weekly to review documentation compliance and data issues
- Data were collected from the EHR through an automated report from October 2017-November 2018.
- Data were validated throughout the project

Intervention:

- The oncoming RN completed the Braden Scale while the off-going RN completed the Cubbin-Jackson assessment
- Assessments must have been completed within 1 hour of each other to be included.
- All skin care and treatments were based on the Braden skin risk assessment score as per current hospital policy.

Skin Risk Assessment Tools

Cubbin-Jackson Categories	Braden Categories
Age	Sensory/Perception
Weight	Moisture
Mobility	Mobility
Mental Condition	Activity
Nutrition	Nutrition
Hemodynamics	Friction/Shear
Respiration	Scoring
General Skin Condition	<i>Cubbin & Jackson:</i> Low Risk; ≥ 35 ; At Risk 31-35; High Risk ≤ 30
Incontinence	<i>Braden:</i> At Risk 15-18; Moderate 13-14
Hygiene	

Results

Validity Analysis:

There was a significant positive correlation between the Cubbin-Jackson and Braden Scale scores, $r = .806$, $p < .001$ showing evidence of construct validity between the scales.

Braden Scale	No Skin Change	Skin Change	Total
Not at Risk	1146 (100.0%)	0 (0.0%)	1146 (100.0%)
At Risk	2966 (99.2%)	25 (0.8%)	2991 (100.0%)
Total	4112 (99.4%)	25 (0.6%)	4137 (100.0%)
PPV 0.8%	NPV 100.0%	Sensitivity 100.0%	Specificity 27.9%

Table 1. Probability of patients who screen at risk to develop a skin change based on Braden Scale

Cubbin-Jackson Scale	No Skin Change	Skin Change	Total
Not at Risk	757 (100.0%)	0 (0.0%)	757 (100.0%)
At Risk	3355 (99.3%)	25 (0.7%)	3380 (100.0%)
Total	4112 (99.4%)	25 (0.6%)	4137 (100.0%)
PPV 0.7%	NPV 100.0%	Sensitivity 100.0%	Specificity 18.4%

Table 2. Probability of patients who screen at risk to develop a skin change based on Cubbin-Jackson Scale

- Both tools correctly identified 100% of the patients who developed a change in their skin integrity.
- We fit a Receiver Operating Characteristic curve (ROC curve) to examine the tradeoff between sensitivity and specificity of the continuous predictors.
- Both the Braden scale (AUC = .76, $p < .001$; Figure 1A) and the Cubbin-Jackson scale (AUC = .75, $P < .001$; Figure 1B) ranked as good predictors.

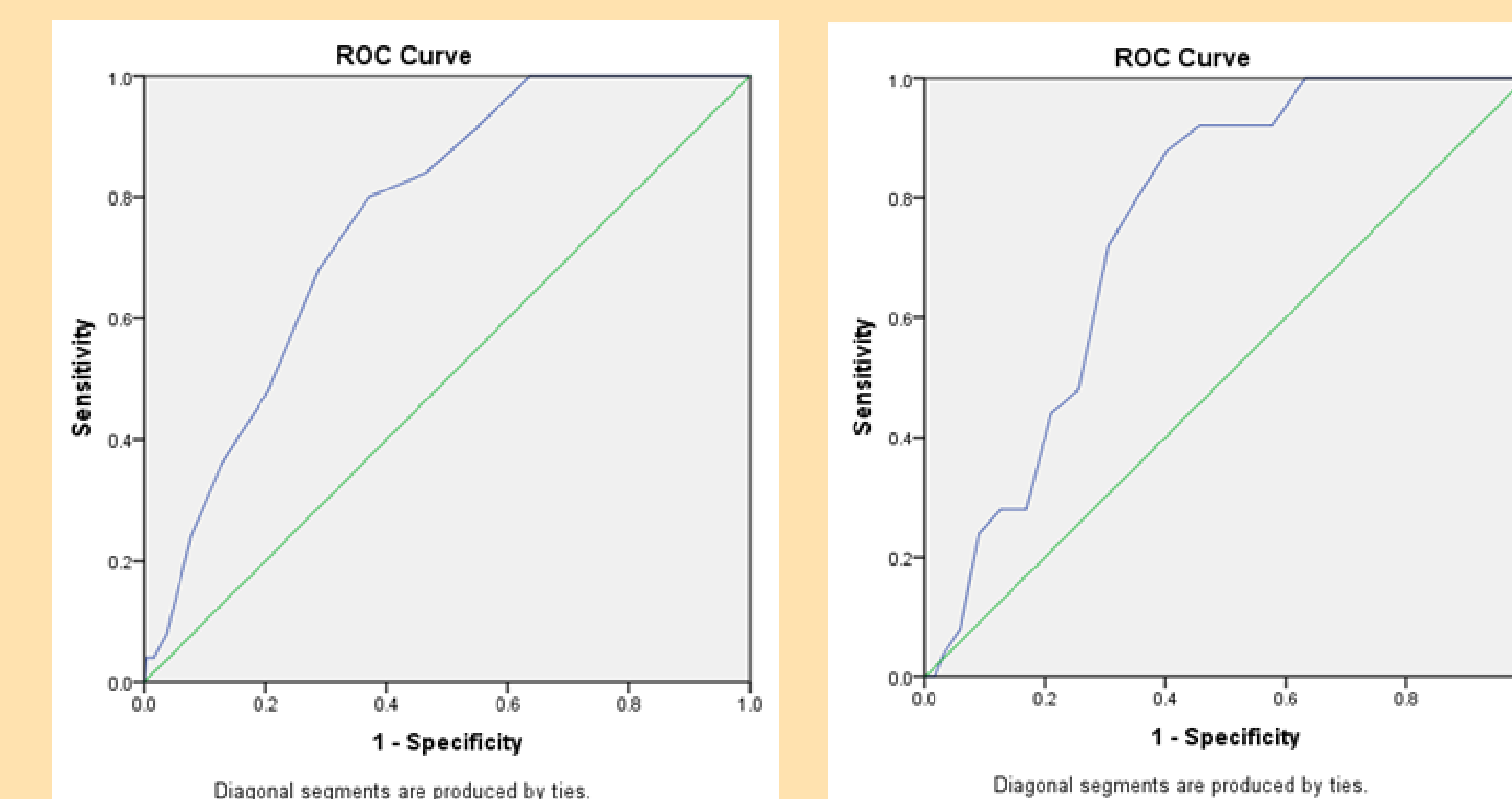


Figure 1. ROC curves examining the tradeoff between sensitivity and specificity; A - the Braden scale; B - Cubbin-Jackson scale

Discussion

- The Cubbin-Jackson and Braden Scale tools were positively correlated ($r = .80$, $p < .001$) showing validity in predicting skin changes.
- The Cubbin-Jackson and Braden tools both identified 100% patients that had a skin change
- The Cubbin-Jackson identified more patients as “at risk” thus providing a wider net for capturing at risk patients.
- Informal clinician feedback favored the Cubbin-Jackson tool with RN's stating that it was more specific to the conditions encountered in the ICU.

Limitations

- Units were holding non-critical care level patients
- Leadership changes on participating units
- Assessments not completed within 1 hour of each other or not at all.

