

IS THE BRADEN MOBILITY SUBSCALE ALONE AS PREDICTIVE AS THE BRADEN SCALE?

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DEVASTATING EFFECTS OF PRESSURE ULCER

Back of head and ears

Spinal Injury Network, accessed 2011



Stage 1



Stage 2



Stage 3



Stage 4



Pressure injury can cause pain, severe infection, long hospital stays or risk of death

IMPACT OF PRESSURE INJURY

- Number of PU: 2.5 million
- Cost: \$9.1 to \$11.6 billion per year in the US
- Cost to individual: \$20,900 to \$151,700 per PU
- Lawsuit: 17,000 annually (2nd after wrongful death, > falls or emotional distress)
- Complications: Severe pain, serious infections
- Death: About 60,000 per year as a direct result of PU

AHRQ, Accessed 2012

Additional Cost for managing patients with pressure injury is estimated at AUD\$12.2 million in Western Australia

Mulligan et al., 2011

PREVENTING PRESSURE INJURY ~

Assess risk of pressure injury using risk assessment scale like the Braden scale
(Braden scale has been well validated in many studies to predict risk of pressure injury)

Pancarbo-Hidalgo, 2006

Lyder, 2008 – AHRQ publication

Institute preventive interventions to patient's identified as 'at risk' for developing pressure ulcer

Lyder, 2008 – AHRQ publication

At the study site - Pressure injury is assessed routinely on admission using the Braden scale

BRADEN RISK ASSESSMENT SCALE (ABRIDGED VERSION)

BRADEN SCORE											
SENSORY		MOISTURE		ACTIVITY		MOBILITY		NUTRITION		FRICTION	
4	No Impairment	4	Rarely Moist	4	Walk Frequently	4	No Limitation	4	Excellent	4	
3	Slightly Impaired	3	Occasionally Moist	3	Walk Occasionally	3	Slightly Limited	3	Adequate	3	No Apparent Problem
2	Very Limited	2	Moist	2	Chair Bound	2	Very Limited	2	Probably Adequate	2	Potential Problem
1	Completely Limited	1	Constantly Moist	1	Bed Bound	1	Immobile	1	Very Poor	1	Problem

Braden Score	Risk Level
≤ 9	Very high risk
10-12	High risk
13 – 14	Medium risk
15-16	Low risk
≥ 17	No risk

PROBLEMS WITH USING RISK ASSESSMENT SCALE (1)

- Comprise of many subscales
- Complex scoring



- Nurses to consider all risk factors independent of the scores obtained on any validated pressure ulcer prediction scales

Lyder 2008 – AHRQ publication

PROBLEMS WITH USING RISK ASSESSMENT SCALE (2)

Findings of a systematic review found Braden scale:

- Most validated
- Best predicted pressure injury compared to Clinical Judgment, Norton and Waterlow scales

BUT

Use of validated risk assessment scale appears to have no significant effect on incidence of pressure injury

Pancorbo-Hidalgo, 2006

Predicting risk of pressure ulcer

≠

Reducing incidence of pressure ulcer

Anthony, 2010

IS THERE AN ALTERNATIVE? (1)

In a 3 arm cluster randomised study in Riyadh, Saudi Arabia evaluated effectiveness of Braden Scale

Clinical Judgment

vs

Braden Scale

✓ RR=0.478
(95% CI: 0.279 – 0.82, p=0.009)

× RR=0.657
(95% CI: 0.384 – 1.123, p=0.167)

BUT

(Saleh, 2008)

Limitations of Clinical Judgment

- × Lacks structure
- × Inconsistent assessment
- × Issues with reliability and repeatability

Pancarbo-Hidalgo, 2006

IS THERE AN ALTERNATIVE? (2)

Nurses implement preventive interventions based on assessment of patient's mobility impairment

Fisher et al 2004

Immobility is a significant risk factor for pressure ulcer development

Lindgren, 2004

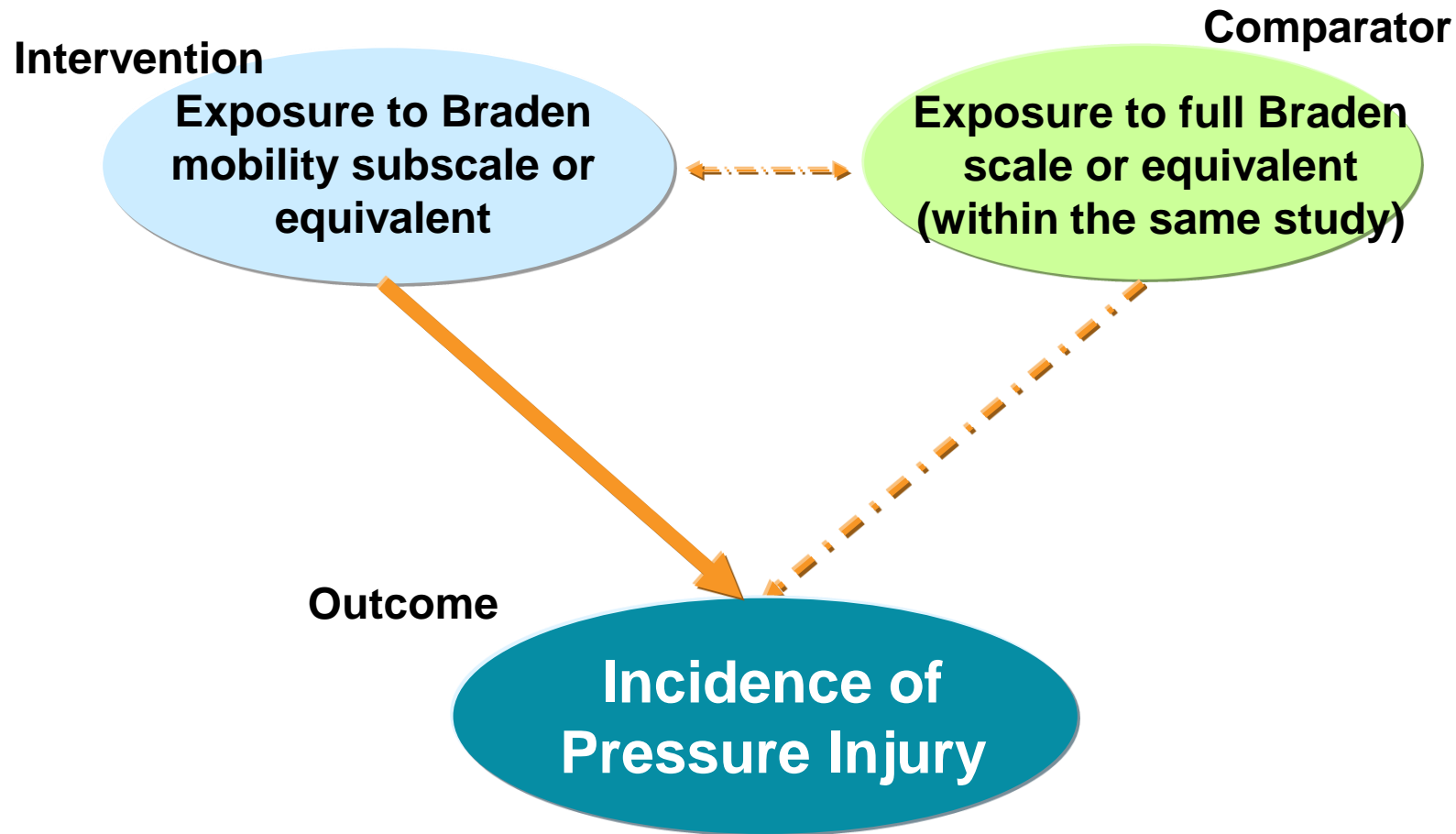
IS THERE AN ALTERNATIVE? (3)

Braden subscale	Preventive Interventions									
	Repositioning	Angle of bed below 30°	Pillows or foam wedges	Mattress	Heels off bed/float	Chair cushion	Padding between bony prominence	Consult Dietitian	Protect skin from moisture	Protect skin from friction & shear
Sensory perceptual							(1)1.76(NS) (2)1.98 (3)0.776			
Moisture	X		X	(1) 1.64 (2) 1.39 (3) 0.51				(1) 1.94 (2) 0.98 (3) 0.41(NS)	(1) 20.84(NS) (2) 2.39 (3) 1.7	
Activity	X		(1) 2.87 (2) 2.29 (3) 1.11					(1) 2.92 (2) 2.89 (3) 1.69		
Mobility	(1) 4.08 (2) 3.87 (3) 2.98	(1) 4.94 (2) 3.84 (3) 2.37	(1) 2.56 (2) 2.46 (3) 1.72	(1) 3.43 (2) 2.59 (3) 1.42	(1) 4.25 (2) 1.77 (3) 1.43	(1) 2.32 (2) 1.89 (3) 1.89	(1) 2.88 (2) 2.09 (3) 0.186			
Nutrition								(1) 1.25 (2) 2.42 (3) 0.95		
Friction-Shear		(1) 2.04 (2) 1.69	X		(1) 2.12 (2) 1.40		(1) 2.18 (2) 2.09		(1) 1.89 (2) 0.51 (NS)	(1) 5.64 (2) 3.32

Nurses choose 7 out of 10 pressure ulcer preventive interventions based on the Braden mobility subscale.

(Magnan, 2009)

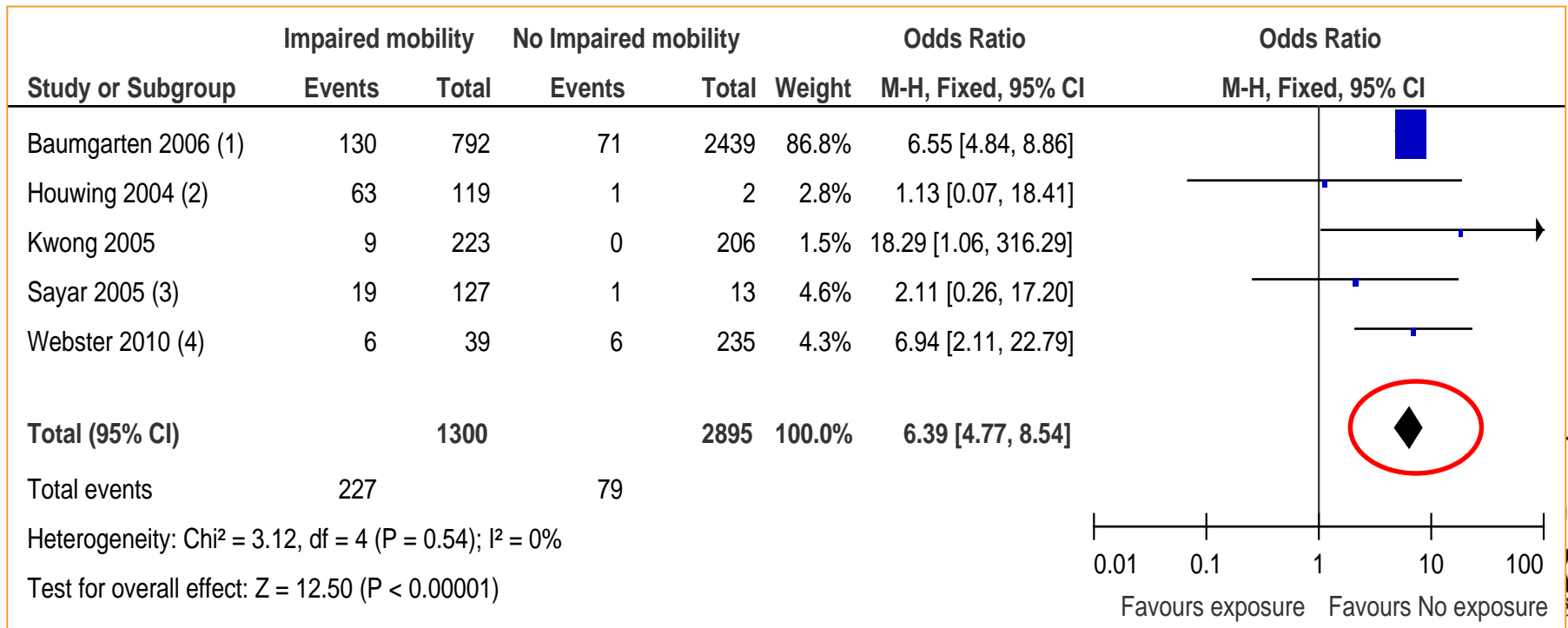
SYSTEMATIC REVIEW



MOBILITY IMPAIRMENT AND LIKELIHOOD OF PRESSURE INJURY

11 Cohort studies with comparable groups

- **Meta-analyses and narrative synthesis favoured no exposure to impaired mobility assessed using mobility assessment**



MOBILITY ASSESSMENT VS VALIDATED FULL RISK ASSESSMENT SCALES AND LIKELIHOOD OF PRESSURE INJURY

- One study favoured the use of mobility subscale assessment over the full RAPS scale (Modified Norton scale) (Lindgren, 2004)
- One study showed comparable results of likelihood of pressure injury for mobility assessment and Braden Scale (Perneger, 2002)

THE STUDY



IMPETUS FOR USING BRADEN MOBILITY SUBSCALE AS ASSESSMENT TOOL

- Using the Braden mobility subscale as an assessment of pressure injury is a novel idea – Systematic review found no studies found that has used or suggested the use of the Braden mobility subscale alone as an assessment tool
- Easy to use. Only 4 levels of scores – higher probability for more accurate assessment. **Reduce nurses' time (++++)**
- Potential benefit to patients as nurses would be more keen to use mobility assessment – as it is assessed frequently as part of the routine nursing assessment - more effective screening
- If the Braden mobility subscale is found to be comparable to the full Braden scale, it would make significant contribution to the way nurses perform pressure injury risk assessment

RESEARCH QUESTION

Is the Braden Mobility subscale comparable to the Braden Scale in predicting Pressure Injury?

SETTING

1000 bed acute care tertiary hospital in Singapore



METHOD

Study Design

- Retrospective Case-Control

Sample size calculation

- Effect size was computed based on means of 2.61 (SD=0.78) and 2.91 (SD=0.48) for patients with and without incidence of pressure injury (Chan, 2009), power 80%, significance 0.05

Sample Size

- 200 inpatient's medical records

Data collection period

- October 2011 to July 2012 - 11 months



TARGET POPULATION

Inclusion criteria

- Adult patients
- Case
 - Hospital acquired pressure injury reported in the electronic hospital occurrence report
- Control
 - No pressure injury

Exclusion criteria

- Paediatrics patients
- Has pressure injury on admission
- Pressure injury acquired from the Operating Room or Emergency Room

MATCHING CRITERIA

- Gender – Male / Female (62%)
- Age - < 65 / ≥ 65 (64%) ($p=0.099$)
- Surgery – No / Yes (44%)
- Length of stay – 2 to 21 days/ ≥ 22 days (56%)
($p = 0.396$)
- Had been to ICU/HD – No / Yes (27%)

RESULTS



REPORTING OF PRESSURE INJURY OCCURRENCE

Accidental findings of 61 records of unreported hospital acquired pressure injury that were excluded from control group
Stage I = 52
Stage II = 9

100 cases identified in e-HOR
Stage I = 31
Stage II = 68
Stage III = 1

86 cases reported in e-HOR at 1st occurrence
Stage I = 20
Stage II = 65
Stage III = 1

14 cases remained
Stage I = 6
Stage II = 7
Stage III = 1

11 cases reported in e-HOR at 2nd occurrence
Stage I = 3
Stage II = 7
Stage III = 1

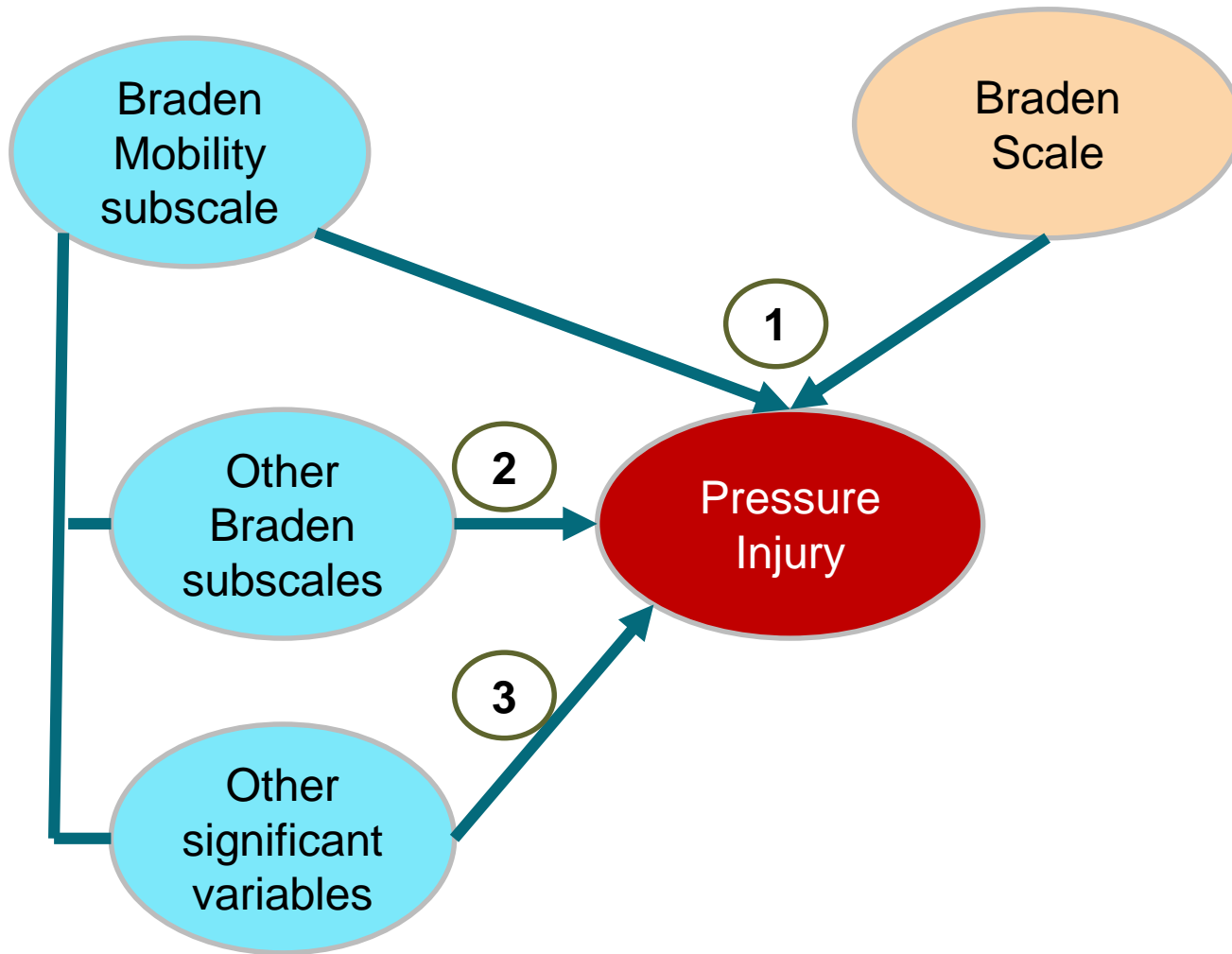
3 cases remained
Stage I = 1
Stage II = 2

2 cases reported in e-HOR at 3rd occurrence
Stage II = 2

1 case remained
Stage I = 1

1 case reported in e-HOR at 4th occurrence
Stage I = 1

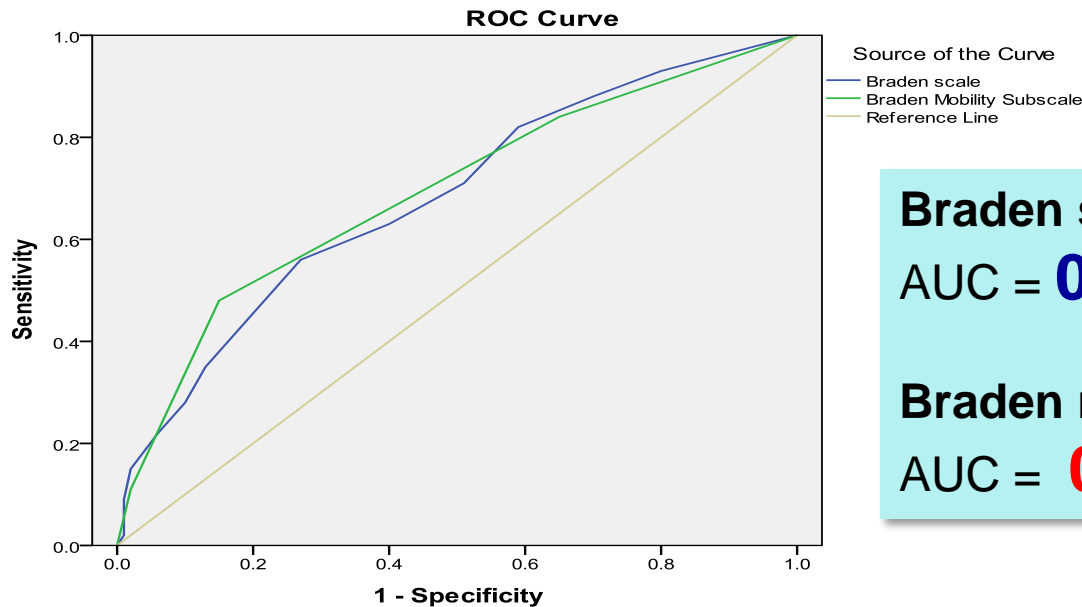
Data Analysis Plan



PREDICTOR OF PRESSURE INJURY: COMPARISON BETWEEN BRADEN SCALE VS BRADEN MOBILITY SUBSCALE

Models	Odds ratio (95% CI)	p	Coefficients (Omnibus tests)	R square	Percentage correct
Braden Scale					
Model 1: Cut-off score ≤ 16 (Low risk or higher)	3.350 (1.772 to 6.332)	<0.001	14.787 (p<0.001)	7.1% to 9.5%	62.5%
Model 2: Cut-off score ≤ 14 (Moderate risk or higher)	3.5 (1.595 to 7.679)	0.002	10.882 (p=0.001)	5.3% to 7.1%	59%
Model 3: Cut-off score ≤ 12 (High risk or higher)	8.647 (1.922 to 38.898)	0.005	12.176 (p<0.001)	5.9% to 7.9%	56.5%
Model 4: Cut-off score ≤ 9 (Very high risk)	4.125 (0.453 to 37.573)	0.209	1.974 (p=0.160)	1% to 1.3%	51.5%
Braden Mobility Subscale					
Model 1: Cut-off score ≤ 3 (Slightly limited mobility or worse)	2.827 (1.440 to 5.548)	0.003	9.68 (p=0.002)	4.7% to 6.3%	59.2%
Model 2: Cut-off score ≤ 2 (Very limited mobility or worse)	5.231 (2.664 to 10.270)	<0.001	26.2 (p<0.001)	12.3% to 16.4%	66.5%
Model 3: Cut-off score = 1 (Immobile)	6.056 (1.307 to 28.073)	0.021	7.293 (0.007)	3.6% to 4.8%	54.5%

ACCURACY OF BRADEN SCALE VS BRADEN MOBILITY SUBSCALE



Braden scale

AUC = **0.681** (95% CI: 0.608 to 0.754)

Braden mobility subscale

AUC = **0.691** (95% CI: 0.618 to 0.765)

Optimal Cut-off Score	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Accuracy
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Braden Scale

≤ 17	0.56 (0.462 - 0.653)	0.73 (0.636 - 0.807)	0.675 (0.568 - 0.766)	0.624 (0.534 - 0.706)	0.645
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Braden Mobility Subscale

≤ 2	0.48 (0.385 - 0.577)	0.85 (0.767 - 0.907)	0.762 (0.644 - 0.85)	0.62 (0.537 - 0.697)	0.665
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DO OTHER BRADEN SUBSCALES ADD TO THE PREDICTIVE MEASURE?

Braden subscale Model 2 (cut-off score ≤ 2)	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Sensory	.229	.676	.115	1	.735	1.257	.334	4.727
Activity	-.380	.457	.691	1	.406	.684	.279	1.675
Mobility	1.743	.515	11.454	1	.001*	5.714	2.062	15.676
Nutrition	.448	.384	1.366	1	.243	1.566	.738	3.321
Constant	-.506	.197	6.623	1	.010	.603		

χ^2 (4, n=200) = 28.41, $p < 0.001$
 $R^2 = 13.2\%$ to 17.7%
 % correct = 66.5%

DO OTHER SIGNIFICANT FACTORS ADD TO THE PREDICTION?

Backward logistic regression by removing non-significant factors one at a time (x11)



$\chi^2 (5, n=200) = 67.8, p < 0.001$
 $R^2 = 28.8\% \text{ to } 38.3\%$
 % correct = 74.5%

Category (no. of variables)	Significant Factors (variables)
Demographic (x5)	<ul style="list-style-type: none"> • Discipline • Type of admission
Co-morbidity (x8)	<ul style="list-style-type: none"> • Anaemia
Intrinsic factors (x10)	<ul style="list-style-type: none"> • Needs help in turning in bed • Level of consciousness • Get-up-and-go test
Extrinsic factors (x5)	<ul style="list-style-type: none"> • Use of diapers during hospitalisation • Use of absorbent products/diapers on admission
Medications (x7)	<ul style="list-style-type: none"> • Vasopressors • Sedation
Laboratory tests (x8)	-
Braden subscales (x6)	• All except Braden moisture and friction subscale (model 2)

Significant Independent Predictor	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI	
							Lower	Upper
Discipline Medical			10.977	2	.004			
Discipline Orthopaedics (1)	1.251	.407	9.464	1	.002	3.493	1.574	7.750
Discipline Surgical (2)	-.210	.478	.194	1	.660	.810	.318	2.067
Anaemia (1)	1.652	.534	9.554	1	.002	5.215	1.830	14.863
Vasopressor (1)	2.204	.537	16.873	1	.000	9.061	3.166	25.937
Braden mobility subscale model 2 (1)	1.782	.381	21.876	1	.000	5.941	2.816	12.537
Constant	-1.361	.280	23.590	1	.000	.256		

SUMMARY

- Braden mobility subscale is better at predicting pressure injury than Braden scale
- Braden mobility subscale is the **only significant predictor** of pressure injury compared to other subscales
- Braden mobility subscale is the second most important predictor of pressure injury. Vasopressors (1) Anaemia (3) Orthopaedics (4)
- Missed reporting of pressure injury events. Not reporting means that pressure injury incidence remains low and not seen as a problem. Resulting in minimal focus on managing/eradicating pressure injury as the problem would not be surfaced.
- 14% of pressure injury not reported at the first occurrence. Adverse event reporting is less than desirable.

CONCLUSION & IMPLICATION TO PRACTICE

Conclusion

- The Braden Mobility Subscale is comparable and perhaps superior to the Braden scale in predicting pressure injury

Implication to Practice

- Replace Braden Scale with the Braden Mobility Subscale as a tool for assessing Pressure Injury risk
- Greater care to be taken of patients in the ICU setting, receiving vasopressors and who are Anaemic. More research is also required in this area
- Explore other more accurate methodology such as cross-sectional study for ascertaining incidence of pressure injury instead of the current voluntary event reporting

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THANK YOU

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