Original Research Article

A study on predictive value of pressure sore by the Braden scale in surgical intensive care units

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Abstract

A study on predictive value of pressure sore by the Braden scale in surgical intensive care units was conducted during the period of October 2018 to October 2019. 50 patients of age group above 40, post-operative hospital stay more than 48 hours, post-operative patients who were admitted in the Department of General Surgery, Government Stanley Medical College and Hospital were included. All patients were thoroughly examined and given scores according to Braden scale. According to the scores the patients were categorized as severe risk, high risk, moderate risk and mild risk. All patients were regularly examined for development of pressure sores 4 times at post-operative day -1, 7, 14 and 28 days or at the time of discharge. Based on scores patients were advised regarding preventive measures of pressure sores. All patients were monitored. All patients were followed up for a period of six months. Comparison of total Braden scale score revealed S.D of 1.57 and p-value of 0.0005 for those who developed pressure sore which was highly significant. The sensitivity of the scale was 90% and specificity of the scale was 93.70% with the cut off value at 16. Thus the Braden scale was highly significant and has high predictive value in predicting pressure sore in intensive care units.

Key words

Braden, Pressure sores, Intensive care unit, Bed sore.

Introduction

The Braden scale is one of the most widely used risk assessment scale for pressure sores [1-3]. It measures the risk for development of a pressure ulcer by using 6 subscales, each denoting a factor that has been found to contribute to pressure ulcer formation: mobility, activity, sensory perception, skin moisture, nutritional state, and

friction/shear. Each of the subscales is scored from 1 to 4 (1–3 for friction/shear), with 1 representing the highest risk. The total Braden score ranges from 6 to 23 [4-9].

A lower total Braden score means a greater risk of pressure ulcers developing [10, 11]. Eighteen is the cutoff score that is generally accepted for predicting risk of pressure ulcers; however, a score of 16 has been recommended for ICU patients [12].

Braden scale has been tested in various settings, such as acute care settings, nursing homes, and tertiary care hospitals [6, 10, 12, 13]; however, only a validity evaluations were conducted on patients in the ICU, where the challenges to prevention of pressure ulcers are the greatest.

Furthermore, only 4 of the subscales (skin moisture, mobility, friction/ shear, and sensory perception) were significantly associated with development of pressure ulcers in ICU patients [12]. Therefore, it is uncertain to what extent the Braden scale should be the risk assessment instrument of choice in ICUs.

Aim was to study the predictive value of Braden scale in intensive care units for developing pressure ulcer.

Materials and methods

Place of study: Department of General Surgery – Govt. Stanley medical College and Hospital.
Duration: 1 year
Study design: Observational study
Sample size: 50
$$SS = Z^{2*}(P)*(1-P)/ C^2$$
Where:
Z= Z Value
P = percentage picking a choice
C= confidence interval

Patient selection
Inclusion criteria
- Post-operative hospital stay > 48 hours.
- Post-operative patients Age >40 years.

Exclusion criteria
- Patients who already had bed sores on the time of admission.
- Post-operative patients whose hospital stay < 48 hours

Methodology
Written informed consent was obtained from all subjects before enrolment in the study. All patients who were admitted in post-operative surgical ward were included as per inclusion criteria. All patients were thoroughly examined and given score according to Braden scale (**Table – 1**). According to the scores, the patients were categorized as severe risk, high risk, moderate risk and mild risk. All patients were regularly examined for development of pressure sores 4 times at post-operative day - 1, 7, 14 and 28 days or at the time of discharge. Based on scores patients were advised regarding preventive measures of pressure sores. All patients were monitored. All patients were followed up for a period of six months. All details regarding the study was recorded according to the pre designed proforma.

Results and Discussion

We evaluated the predictive value of Braden scale in pressure sore in intensive care units. The age distribution of sample was 51% of participants were below 50 years while 27.5% were in 51-60 years and 21.6% were in 61-70 years (**Table – 2**). Among the participants 54.9% were female patients and 45.1 were males (**Table – 3**). Among the 51 participants, 10 patients got bed sore which was 19.6% of the patient developed bed sore (**Table – 4**). Among the patients who developed pressure sore, totally 10 patients developed pressure sore, in which 7.8 percent developed grade 1 pressure sore, 7.8 percent developed grade 2 pressure sore, and around 3.9 percent developed grade 3 pressure sore (**Table – 5**). The area under the curve with confidence interval of 95% was 0.971 with LB 0.929 and RB 1.000. The p-value was 0.0005 which was highly significant (**Table – 6**).

Table – 1: Braden scale.

Risk factors	Day of Assessment			
	Day 1	Day 2	Day 3	Day 4
Sensory perception	Completely limited	Very limited	Slightly limited	No impairment
Moisture	Constantly moist	Often moist	Occasionally moist	Rarely moist
Activity	Bedfast	Chairfast	Walks occasionally	Walks frequently
Mobility	Completely immobile	Very limited	Slightly limited	No limitations
Nutrition	Very poor	Probably inadequate	Adequate	Excellent
Friction and shear	Problem	Potential problem	No	

Table – 2: Age distribution.

Age (Years)	Frequency	Percentage
< = 50 years	26	51.0
51 - 60 years	14	27.5
61 - 70 years	11	21.6
Total	51	100.0

Table – 3: Gender distribution.

Gender	Frequency	Percentage
Female	28	54.9
Male	23	45.1
Total	51	100.0

Table – 4: Bed sore.

Bed sore	Frequency	Percentage
Yes	10	19.6
No	41	80.4
Total	51	100.0

Table – 5: Grade of pressure sore.

Grade of pressure sore	Frequency	Percentage
Grade I	4	7.8
Grade II	4	7.8
Grade III	2	3.9
NA	41	80.4
Total	51	100.0

Table – 6: ROC curve.

Case Processing Summary	
BED Sore	Valid N (list wise)
Positive	10
Negative	41

Table – 7: Area under the curve.

Area	P value	95% CI	
		LB	**UB**
.971	0.0005 **	.929	1.000
** Highly Significant at P < 0.01 level			

Table – 8: Coordinates of the Curve.

Positive if Less Than or Equal To	Sensitivity	1 – Specificity
10.000	0.000	0.000
11.500	.200	0.000
12.500	.300	0.000
13.500	.400	.024
14.500	.900	.049
15.500	.900	.073
16.500	1.000	.122
17.500	1.000	.244
18.500	1.000	.439
19.500	1.000	.732
20.500	1.000	.951
22.000	1.000	1.000

Table – 9: Cut off.

Cut off	16
Sensitivity	90%
Specificity	93.70%

Table – 10: Comparison of Total Braden Score by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
TOTAL BRADEN SCORE	Bed Sore	10	13.30	1.57	8.332	0.0005**
	No Bed Sore	41	18.37	1.76		
**** Highly Significant at P < 0.01 level**						

Table – 11: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
SENSORY PERCEPTION	Bed Sore	10	3.80	.42	1.296	0.225 #
	No Bed Sore	41	3.98	.16		
# No Statistical Significance at P>0.05 level						

Table – 12: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
MOISTURE	Bed Sore	10	2.40	.52	3.382	0.001 **
	No Bed Sore	41	3.00	.50		
**** Highly Significant at P < 0.01 level**						

Table – 13: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
MOBILITY	Bed Sore	10	1.90	.32	6.847	0.0005 **
	No Bed Sore	41	2.83	.59		
** Highly Significant at P < 0.01 level						

Table – 14: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
ACTIVITY	Bed Sore	10	2.00	.00	11.136	0.0005**
	No Bed Sore	41	2.76	.43		
** Highly Significant at P < 0.01 level						

Table – 15: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
NUTRITION	Bed Sore	10	1.80	.63	5.969	0.0005**
	No Bed Sore	41	3.02	.57		
** Highly Significant at P < 0.01 level						

Table – 16: Comparison of Bed Sore by Unpaired T-Test.

BED Sore		N	Mean	S.D	t-value	P-value
FRICTION/SHEAR	Bed Sore	10	1.40	.52	7.203	0.0005 **
	No Bed Sore	41	2.76	.54		
** Highly Significant at P < 0.01 level						

Table – 17: Age with Bed Sore.

			BED Sore		Total	$\chi 2$ - value	P-value
			Bed Sore	No Bed Sore			
AGE	< = 50 yrs	Count	0	26	26	19.898	0.0005 **
		%	0.0%	63.4%	51.0%		
	51 - 60 yrs	Count	3	11	14		
		%	30.0%	26.8%	27.5%		
	61 - 70 yrs	Count	7	4	11		
		%	70.0%	9.8%	21.6%		
Total		Count	10	41	51		
		%	100.0%	100.0%	100.0%		
** Highly Significant at P < 0.01 level							

The sensitivity of the scale was 90% and specificity of the scale was 93.70% with the cut off value at 16 (**Table – 7, 8, 9**). Comparison of total Braden scale score revealed S.D of 1.57 and p-value of 0.0005 for those who developed pressure sore which was highly significant (**Table – 10, 11**). The subscale moisture influencing on patient who developed bed sore came with the mean value of 2.40, S.D of 0.52 and p-value of 0.001 which was significant (**Table – 12**). The subscale mobility influencing on patient who developed bed sore came with the mean value of 1.90, S.D of 0.32 and p-value of 0.0005 which was highly significant (**Table – 13**). The subscale activity influencing on patient who developed bed sore came with the mean value of 2.00, and p-value of 0.0005% which was highly significant (**Table – 14**). The subscale

nutrition influencing on patient who developed bed sore came with the mean value of 1.80, S.D of 0.63 and p-value of 0.0005 which was highly significant (**Table – 15**). The subscale friction and shear influencing on patient who developed bed sore came with the mean value of 1.40, S.D of 0.52 and p-value of 0.0005 which was highly significant (**Table – 16**). Around 70% of the patients in the age group 61-70 years developed bed sore and 30% of the patients in the age group 51-60 years developed bed sore. No patient below 50 years developed pressure sore (**Table – 17**).

Conclusion

Comparison of total Braden scale score revealed S.D of 1.57 and p-value of 0.0005 for those who developed pressure sore which was highly significant. The sensitivity of the scale was 90% and specificity of the scale was 93.70% with the cut off value at 16. Thus, the Braden scale was highly significant and has high predictive value in predicting pressure sore in intensive care units.

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