A descriptive study to measure the reliability of Braden scale score calculated by clinical nurses and evaluate its predictive value for pressure ulcer risk among ICU patients.

ABSTRACT

The research study was done to measure the Reliability of Braden Scale Score Calculated by Clinical Nurses and evaluate its Predictive Value for PU Risk among ICU Patients. A descriptive research study design was adopted. The study was conducted at the ICUs of DY Patil Hospital, Navi Mumbai. Non probability purposive sampling technique was used. In this study samples were ICU patients (N=75) and clinical staff (N=36). The data was collected using observation and interview techniques. The data was tabulated and analyzed in terms of the study objectives. The data collection was done from ICU Patients and clinical staff. The study result shows the overall Interrater reliability conveyed by intra class correlation coefficient was 0.865 with 95% confidence interval (0.787, 0.915).

Interrater reliability expressed by intra class correlation coefficient for individual item ranged from 0.013 that is 13.00% with 95% confidence interval (-0.090, 0.140) to 0.643 with 95% confidence interval (0.176, 0.821) with the lowest value being measure from 'sensory perception' and 'moisture.'

Although the calculated Interrater reliability coefficients for total Braden score were moderate or high in some cases several clinical differences occurred between the two groups. Due to Interrater, reliability being very low in some cases like "sensory perception" and "moisture" it is doubtful that their assessments contribute to any valid results. The calculation of intra class correlation coefficients is the most appropriate Interrater reliability estimates.

KEYWORDS: - Interrater reliability, Braden scale, Pressure ulcer risk assessment.

INTRODUCTION

Intensive care units (ICUs) receive patients with single or multiple organ failure, who often require life support measures like mechanical ventilation, continuous sedation and vasoactive drugs, in addition to multiple types of devices, such as catheters, drains, probes and immobilizers. These measures significantly impair one of the most important mechanisms for the maintenance of skin integrity, that is bed mobility, making patients highly vulnerable to the development of pressure ulcers (PU).[1]

High-risk patients are elderly people, stroke patients, people with diabetes, individuals with dementia, persons who use wheel-chairs or are bed-bound and any patient with reduced mobility.[2] The use of appropriate preventive measures gets hampered when high-risk patients cannot be accurately, reliably, and timely detected with the Braden Scale (the most used risk

scale, with the best predictive values).[3] Treatment options to avoid progression of PU are well established, but the method to detect and avoid them before onset has not evolved in two decades.[4]

Since ICU patients have peculiar characteristics and in view of the scarcity of Indian studies evaluating the performance of the Braden scale in general; the aim of the present study was to analyze the predictive validity of the Braden scale in critical care patients[1]. Further it is also important to know whether the nurses are rightly rating the Braden scale. The overall aims of this study were to examine the Inter-rater reliability (IRR) of the item and total scores of the Braden scale in a real-life clinical setting and to determine the predictive value of Braden scale in an acute care setting.

METHODS

This study was conducted in November 2020 in D.Y. Patil hospital in Navi Mumbai. This study used descriptive research design and quantitative approach. Observation and interview techniques were used. Braden scale is used to assess the risk of PU among the respondents. An observation checklist is used to collect data regarding respondent's demographic data (from the clinical record sheet), Braden Scale Score and Risk factors of Pressure ulcer.

The required permission was obtained from the hospital authorities and the researcher ensured that all rules and regulations were followed with regards to safety and confidentiality of the respondents. The researcher visited the three selected Non-Covid ICUs of the study setting. The researcher recruited all the patients present in the ICU as per the inclusion and exclusion criteria. The researcher recorded from the patients clinical file (the 1st set of respondents) the biographic variables such as age, gender, caste, religion, ICU invasive procedures and invasive lines, diagnosis, co-morbidities, ICU stay, and any surgical intervention. During the given shift the researcher assessed the respondent's risk for pressure ulcer using the Braden scale after the clinical nurse (2nd set of respondents) had assessed and recorded it. It was ensured that the time duration between the clinical nurse's assessment and that of the researcher was less than 15 minutes. Before the 1st set of respondents were transferred out of the ICU, the researcher recorded the presence or absence of pressure ulcer.

The researcher ensured that biographic data of the given clinical nurses (2nd set of respondents) was obtained using the interviewing techniques on the last day of interaction with them. In this study the biographic variables of the set of respondents were analyzed by using descriptive statistics namely frequency and percentage in the forms of graphs, tables. Interrater Reliability scores of Braden scale scores were calculated using intra class correlation coefficient between clinical staff (2nd respondents) and researcher. The analysis was done using SPSS. The intraclass correlation coefficient was calculated for each subclass and overall score to know the interrater reliability. Braden scale scores was analyzed for predictive validity of Braden Scale using Cronbach's alpha.

In this study, there are 2 sets of respondents. 1st set of respondents were 75 patients, all patients who were admitted in the selected ICUs till the attainment of the sample size. 2nd set of respondents were all clinical nurses (n=36), working in these selected ICUs.

MAJOR FINDINGS OF THE STUDY

SECTION 1: Biographic of the respondents (1st set of respondents)

1. **Age** – The age group for study was <45 to >65 years. According to the study findings (N=75) majority (48%) of the respondents were from the age group 46-65 years (n=36), 36% were from age group <45 years (n=27) and minimum that is (n=12) 16% were from age group >65 years. (SD± 17.13)

2. **Gender**- The majority samples comprised 56% of male respondents (n=42) and 44% of female respondents (n=33).

3. **Caste/ religion** – In this study majority of 91% of the respondents were Hindu by religion (n=68), 8% were Muslim (n=6) and 1% were Christian religion (n=1).

4. **Marital status** – Researcher found both married and unmarried respondents. Majority (87%) of the respondents were married (n=65) and unmarried respondents were 13% (n=10).

5. **ICU days** - 49% of the respondents spent 3-5 days (n=37) of stay in the ICU; 36% (n=27) of them stayed for 6-8 days, 12% (n=9) of them stayed for 9-12 days and 3% (n=2) of them stayed for 18-20 days in the ICU. The average days of stay in the ICU was 15.4 and median day was 5.

6. **ICU invasive procedures** – 68% (n=51) of the respondents had a Foley's catheter in situ; 35% (n=26) had central lines; 21% (n=16) had surgical drains; 19% (n=14) had an ET/TT; 43% (n=32) had surgical interventions; 48% (n=36) had NGT and interventional diagnostics were carried out on 28% (n=21) of the respondents.

7. **Motor Assessment** - Motor assessment showed that the majority 56%, (n=42) of the respondents had paresis, 21% were having plegia on one side of the body (n=16) and 23% (n=17) had no motor deficits.

8. **Sensory Assessment** - 81% (n=61) of the respondents had intact sensory assessment and 19% were impaired (n=14).

9. **Glasgow Coma Scale**- Glasgow coma scale assessment revealed that 69% of the respondents had mild grading 13-15 (n=56), 19% had not assessed (Patient on ventilator and sedated) (n=14) and 12% (n=5) of the respondents had moderate grading.

10. **Pain Score**- Assessment of the respondents kept on ventilator 19% showed 0-3 painless (n=14). Behavioral pain scale is used to assess the Pain Score.

11. **Sedation Score**- Assessment of the respondents kept on Ventilator 19% showed sedation score 6 (n=14). Ramsay Sedation Score is used to assess the Sedation Score.

12. **Mean arterial pressure** - 40% (n=30) had mean arterial pressure in the range of 70-80, 27% between 81-90, 12% (n=9) had <70, 12% (n=9) had between 91 to 100 and 9% (n=7) of them had mean arterial pressure above 100.

13. **Incontinence to Stool and Urine**
    As the patients were on Ventilator (n=14), no patient was incontinent to Stool and Urine. Sedated patients were maintained in diapers and had a Foley's catheter in situ.

SECTION-2 Biographic data of the clinical Nurse (2nd set of respondents)

1. **Age**- 92 % of the clinical nurses were from the age group 20-30 years (n=73) and 8% of the age group from 30-40 years (n=2).
2. **Gender**- 61% of clinical nurses were females (n=22) and 39% were males (n=14).
3. **Professional education**- 66% of the respondents was having BSc degree (n=24), 28% were having GNM degree (n=10), and 3 % each had ANM and M.Sc. degree (n=1). 3% of the respondents had a certificate/ diploma courses (infection control nurse) (n=1) 19% were attended conference workshop /In-service education on pressure ulcer (n=7).
4. **Total Clinical experience**- Percentage wise distribution of the respondents according to their clinical experience showed that highest percentage 45% were having <1 year (n=16), 36% were having 2-3 years (n=13), 8% were having 4-5 years and 6-10 years (n=3) and 3% were above 10 years (n=1).
5. **Clinical experience in ICU**- Percentage wise distribution of the respondents according to their clinical experience revealed that highest percentage 69% were having <1 years (n=25), 14% were having 4-5 years (n=5) and 11% were having 2-3 years (n=4), 3% were having 6-10 years and above 10 years (n=1).

SECTION- 3 Reliability scores of Braden scale

1. **Inter-rater reliability**- The inter-rater reliability is high 0.871 that is 87.1% with confidence interval (0.918, 0.796) for the Braden score calculated by the researcher and nurses.
2. **Sensory**- The mean score is 1.56 for nurses and 2.89 for the researcher with standard deviation 0.66 and 1.02 respectively. The interrater reliability is poor that is 0.202 that is 20.2% with confidence interval (-0.153, 0.476) for the Braden subscale for sensory training; there is poor inter-rater reliability in case of sensory.
3. **Moisture**- The mean score is 1.69 for nurses and 3.39 for the researcher with standard deviation 0.77 and 0.59 respectively. Inter rater reliability is very poor 0.013 that is 13.00% with confidence interval (-0.090, 0.140) for the Braden subscale for moisture.
4. **Activity**- The mean score is 2.32 for nurses and 1.45 for the researcher with standard deviation 0.808 and 0.81 respectively. The Interrater reliability is moderate 0.54 that is 54.00% with confidence interval (-0.162, 0.794) for the Braden subscale for activity training.
5. **Mobility**- The mean score of mobility is 2.77 for nurses and 1.96 for the researcher with standard deviation 0.89 and 0.74 respectively. The Interrater reliability is moderate 0.55 that is 55.00% with confidence interval (-0.108, 0.793) for the Braden subscale for activity training.
6. **Nutrition**- The sub scale nutrition has the mean score 2.67 for nurses and 2.16 for the researcher with standard deviation 1.0 and 0.63 respectively. The inter-rater reliability is moderate 0.578 that is 57.8% with confidence interval (0.192, 0.764) for the Braden subscale for activity training.
7. **Friction shear**- In case of friction shear, the mean score is 2.24 for nurses and 1.77 for researcher with standard deviation 0.73 and 0.58 respectively. The Interrater reliability is moderate 0.643 that is 64.3% with confidence interval (0.176, 0.821) for the Braden subscale for activity training.
8. **Total Score (All Variables) -** The overall score, the mean score is 13.25 for nurses and 13.57 for researcher with standard deviation 3.1455 and 3.1458 respectively. The Interrater reliability is good 0.865 that is 86.5% with confidence interval (0.787, 0.915) for the entire Braden scale.

SECTION- 4 Validity Scores of Braden scale

1. The incidence of patients who developed pressure ulcers during the study period was 5.33% (n=4). All the respondents developed grade I pressure ulcers, highlighting the sacrum as the most frequently affected location. Further validity analysis was not done due to limited sample size developing pressure ulcer.
2. **Interpretation-** According to the below table Respondents (n=75), 4 respondents (1st respondents) developed pressure ulcer, 12-14 were under moderate risk.

Table no-1 Classification of pressure ulcer (PU) risk on the data collection day and development of PUs.

(n=75)

Braden scale Range	Frequency	Percentage	Appearance of Pressure ulcers	
			No	Yes
15-18 Mild risk for >75	61	81.33	0	0
15-16 Mild risk	10	13.33	0	0
12-14 Moderate risk	4	5.33	0	4
< 12 High risk	00	0	00	0
Total	75	100	0	4

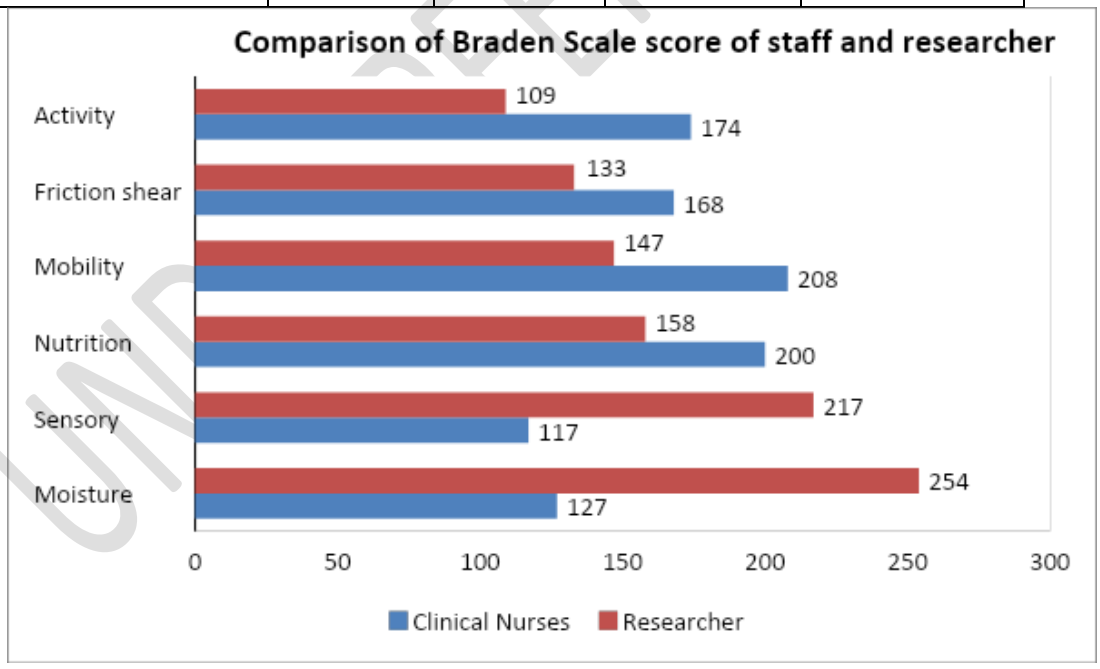

Figure 1: Bar diagram showing percentage wise distribution to their Braden Scale Score calculated between clinical staff and researcher.

DISCUSSION

The study sample consisted of 75 patients. The mean patient age was 15.4 years (SD± 17.13), The median ICU stay was 5 days.
Similarly, In the current study the Interrater reliability expressed by intra class correlation coefficient for individual items ranged from 0.013 that is 13.00% with 95% confidence interval (-0.090, 0.140) to 0.643 with 95% confidence interval (0.176, 0.821) with the lowest value being measure from 'sensory perception' and 'moisture.'

In the study done by Jan Kottner (2008)[5] the interrater reliability by the intraclass correlation coefficient was expressed as ranging from 0.70 to 0.95. Chester H, Ho (2016)[6] in their study reported that the interrater reliability of total score was high which is 0.807. These studies correlated to the current study. According to the current study the inter-rater reliability is 0.871 which is evidently high, that is 87.1% with confidence interval (0.918, 0.796) for the Braden score calculated by researcher and clinical staff.

In the study done by Jan Kottner (2008)[5], the intraclass correlation coefficients for individual items ranged from 0.06 (95% CI -0.31 to 0.48) to 0.97 (95% CI 0.93-0.99) with the lowest values being measured for the items "sensory perception" and "nutrition".

In the study done by Neomi Arias Brunet Rogenski (2012)[7], lower agreement was observed between moisture and nutrition.

In the study by Chester H, Ho (2016)[6], it was reported that the interrater reliability of subscale was of lowest reliability (ICC-0.266) in friction and shear. Nicole Ricciioni (2018)[8] found in their study that Intra-class Correlation Coefficient for the Braden scale was 0.894, 95% confidence interval (CI) (0.823, 0.938), which is an excellent agreement.

The above studies report different intraclass correlation coefficients ranging from good, excellent and strong. The inter-rater intraclass correlation coefficient range for the lower agreement between the sensory perception, nutrition, moisture friction and shear.

The present study was done to measure the reliability of Braden Scale score calculated by Clinical nurses and evaluate its predictive value for pressure ulcer risk among ICU patients. In the current study, H1 stated that the Braden scale score calculated by clinical nurses and the researcher found low interrater reliability in sensory perception, and moisture amongst ICU patients. H1 is accepted because the inter-rater reliability between the clinical nurses and the researcher is low in "sensory perception and Moisture." H2 hypothesis is not analyzed, as only 5.33% of respondents developed grade 1 pressure ulcer; this sample being too low for any statistical analysis.

CONCLUSION

The present study was done to measure the reliability of Braden scale score calculated by clinical nurses and evaluate its predictive value for PU risk among ICU patients of selected hospitals of Navi Mumbai. On the basis of Braden scale score this study was conducted to verify and validate the reliability of Braden scales score calculated by clinical nurses in predicting PU. The study was conducted on a total of 75 respondents and 36 clinical nurses. In this study the interrater reliability scores of Braden scale score were calculated using intra class correlation coefficient between clinical nurse and researcher's assessment. The analysis is done using SPSS. The inter-rater reliability is high 0.871 that is 87.1% with confidence interval (0.918, 0.796) for the Braden score

calculated by researcher and clinical nurse. In sensory the interrater reliability is poor that is 0.202 that is 20.2% with confidence interval (-0.153, 0.476) for the Braden subscale for sensory training. In moisture- The inter- rater reliability is very poor 0.013 that is 13.00% with confidence interval (-0.090, 0.140) for the Braden subscale for moisture.

In these two subscales the clinical nurses and researcher scores were poor. And recordings by the clinical nurses lacked accuracy.

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