

Risk Assessment and Prevention Program Impact on the Incidence of Pressure Ulcers in Intensive Care Unit

¹Azar Abedi, ²Ahmadreza Yazdanic and ³Reza Daryabeigy
¹Student Research Center, School of Nursing and Midwifery,
²Department of Critical Care Nursing,
³Department of Nursing, Faculty of Nursing and Midwifery,
Isfahan University of Medical Sciences, Isfahan, Iran

Abstract: Pressure ulcers are a common problem in intensive care units and potentially avoidable. The first step in the prevention of pressure ulcers is to identify patients at risk using standard tools. The aim of this study was to evaluate the impact of preventive programs on the incidence of pressure ulcers based on the Braden tool. This study was a randomized clinical trial with two groups of 65 adult patients admitted to the intensive care unit of a teaching hospital were randomly assigned to experimental and control groups. In the experimental group using the Braden risk assessment tool, patients at risk for pressure ulcer were identified and then implemented a prevention program for two weeks. Control group received routine care. Data were analysed using SPSS. Fisher's exact test, show a significant difference between the two groups in the incidence of pressure ulcers ($p = 0/01$). And the occurrence of pressure ulcers in the intervention group was lower than the control group. Identification of patients at risk for pressure ulcers using Braden tool and appropriate preventive measures can reduce the incidence of pressure ulcers in patients admitted to intensive care units in the intervention group.

Key words: Pressure ulcer, risk assessment, intensive care unit, nursing, braden tool, pressure ulcers

INTRODUCTION

Pressure ulcer which is created as a result of uncompensated pressure, is one of common problems that is potentially avoidable (Gunningberg and Stotts, 2008) and is one of the five pain and inconvenience creating factors for patients (Elliott *et al.*, 2008). Patients hospitalized in ICU are more prone to pressure ulcer due to existence of factors such as severity of disease, long period of hospitalization, receiving sedative drugs, mechanical ventilation and intensive lack of movement (Elliott *et al.*, 2008). The prevalence rate of pressure ulcer was estimated 13.5% in 2008 and 12.3% by Van Gilder *et al.* (2009). The prevalence rate in ICUs was 7-38% (Sayar *et al.*, 2009). Pressure ulcer is, after cancer and known cardiovascular diseases, the third most costing disease (Nayak *et al.*, 2008). Death rate of pressure ulcer is also high, so that, annually, 400 patients lose their lives (Reddy *et al.*, 2006). Pressure ulcers threaten both physical and psychological-social health of people and patients have to experience pain, illness, limitation of activity, paradigm corruption (Lynn *et al.*, 2007), increase in costs (Gunningberg *et al.*, 2011), period

of hospitalization (Strand and Lindgren, 2010), pathogenicity (Brem *et al.*, 2010), decrease in life quality, increase in sepsis risk and in case not cured, they experience death (Moore and Cowman, 2008).

Based on what was said, the necessity of pressure ulcer prevention is important and according to the studies, it decreases the illness up to 50% (50). First step to prevention is identification of patients prone to pressure ulcer, therefore, it is recommended that a systematic analysis by a credible tool be performed at the time of admission (Pancorbo-Hidalgo *et al.*, 2006). According to different studies, one can infer that using a risk analysis tool has a positive effect on preventive programs with regard to pressure ulcer (Chaves *et al.*, 2010; Catania *et al.*, 2007; Rogenski and Kurcgant, 2012; AhmadiNejad and Rafiei, 2011).

Next step in preventing pressure ulcer is deploying a standard care guide to perform preventive interventions. With regard to pressure ulcer, too, several care guides and preventive programs are authored and provided, the use of which is recommended for guiding the nursing in health care institutions (AhmadiNejad and Rafiei, 2011).

Corresponding Author: Azar Abedi, Student Research Center, School of Nursing and Midwifery,
Isfahan University of Medical Sciences, Isfahan, Iran

Although, pressure ulcers exist internationally in care environments, however, care providers are not able to eliminate the problem and adequate measures are not taken. When nurses use complete and codified information with regard to danger assessment, it causes care instructions to be precise and specific. On the other hand, there are no information regarding effectiveness of other methods, therefore, there should be a suitable preventive program which deploys a standard tool in ICU to analyse the danger of pressure ulcer and performs preventive intervention programs, to fill the gap. Today, there are 40 criteria to analyse the danger of pressure ulcer, from which Braden has been widely used in many studies and is known as a strong predictor for pressure ulcer (Moore and Cowman, 2008; Pancorbo-Hidalgo *et al.*, 2006; Chaves *et al.*, 2010). Therefore, the study had as its goals the effectiveness of pressure ulcer danger based on Braden tool and performing preventive program on the pressure ulcers conducted in ICU.

MATERIALS AND METHODS

The study is a two-group clinical trial conducted on 65 patients (33 people as experimental group and 32 people as control group) in ICU of a teaching hospital in Esfahan city. The number of subjects was determined as 32 people in each group, utilizing the equation:

$$n = (z+z)^2 \left[\frac{p_1(1-p_1)+p_2(1-p_2)}{p-p} \right] / (p-p)^2$$

Sampling was done as sequential convenience. Samples were chosen from qualified hospitalized in ICU. Replacing the subjects in two groups was done randomly using minimization method by minim py software. Since, factors like age, sex and background disease plays a role in creation and development of pressure ulcer, synchronization and randomization was done by the software. Qualifications to enter the study were: Being 18 years old or older, minimum of 2 weeks hospitalization (pressure ulcers in ICUs occur the 1 week of hospitalization), existence of no sign of pressure ulcer when entering the study and having a GCS of 6 or more (people who didn't feel well wouldn't enter) Chaves *et al.*, 2010; Catania *et al.*, 2007). People whose Braden score was more than 18 at the end of the study would quit. People who developed pressure ulcer in the two groups were marked as positively having pressure ulcer. The sampling process took 2 months.

Information gathering tool was an inspection list and was the Braden tool. The first part of inspection list contained demographic information such as age and sex, the second part contained clinical information regarding the patient like primary diagnosis, background diseases, period of hospitalization and BMI (Body Mass Index). In the third part, score obtained from Braden criterion.

Table 1: Comparison of the sex., MBI, Alb and Braden scale score between two groups

Variable	Intervention group	Control group	Statistics
Sex			
Male	15 (46.9)	16 (48.5)	p = 0.897
Female	17 (53.1)	17 (51.5)	X ² = 0.017
Mean (SD)			
Age	54.9 (22.4)	52.3 (23.1)	p = 0.63
BMI	23.5 (3.1)	23.18 (3.26)	p = 0.66
Alb (g/L)	3.17 (0.632)	3.17 (0.638)	p = 0.98
Braden score	14.78 (2.18)	13.18 (2.18)	p = 0.08
			t = 1.77

Assessment criterion for the risk of pressure ulcer accession was Braden tool whose validity and sensitivity was reported 99 and 100%, respectively. Braden consists of six subsets which are sensory reception, moisture, movement, activity, nutrition and abrasion and is scored 6-23. Score 18 or lower scores indicate a risk of pressure ulcer, scores higher than 18 mean the absence of pressure ulcer risk. Score 9 or lower scores indicate high risk of pressure ulcer, scores between 10 and 12 indicate high risk, scores between 13 and 14 indicate average risk and scores between 15 and 18 are indicative of low risk (Moore and Cowman, 2008).

In the experimental group, assessment of pressure ulcer risk using Braden tool was done when entering the study and repeated every 24 h to determine patients at risk and based on each of Braden subsets, preventive measures were taken. This was done for 14 days. Based on NPUAP rating system, grade 2 ulcer was considered positive with regard to ulcer accession.

Based on score obtained by the patient in each subset, preventive measures were taken according to Table 1. In control group, risk assessment was done only once and at the admission on atudy and preventive measures were done by nurses non-systematically based on their clinical judgments.

Ethical considerations such as providing an introduction letter from the research council, receiving permission from hospital manager to do the intervention, receiving writer permission from participants or their family (in case not conscious), research units being free to take part or don't take part in the study, making sure of information security and anonymity of participants. The data gathered was then given to SPSS and tested by t-test, Chi-square, Fisher's exact test and variance analysis. They were analysed by repeated observations.

RESULTS AND DISCUSSION

The 65 patient's entered the study, 32 were put in experimental group and 33 were put in control group. During the study, no one left. Findings for the two groups are shown in Table 1. The two groups were not significantly different in sex (p = 0.897), age (p = 0.47),

BMI ($p = 0.66$), Albumin level ($p = 0.98$) and Braden score ($p = 0.08$). Average Braden score based on variance analysis test was not significantly different from repeated observations in experimental group during the study ($p = 0.107$) while Freedman indicated significant difference for the pressure ulcer risk between Braden criterion subsets during the study ($p < 0.001$). At the beginning of the study, from experimental group, 6 people (18.8%), 9 people (28.1%) and 17 people (53.1%) were respectively at high, average and low risk for pressure ulcer. At the end of the study and after deploying preventive measures, these proportions were enhanced and as a result 4 people (12.5%), 3 people (9.4%) and 25 people (78.1%) were respectively at high, average and low risk for acquisition and development of pressure ulcer. In the experimental group, no case of pressure ulcer was observed while in the control group 6 people (18.2%) were identified with grade 2 ulcer which was significantly higher than experimental group ($p = 0.01$). The most common position for pressure ulcer was sacrum area (50%).

The study was conducted having as the goal the assessment of performing a preventive program based on Braden criterion on development of pressure ulcer for patients hospitalized at ICU. The results showed that performing a preventive program and utilizing Braden criterion to identify patients at pressure ulcer risk, significantly decreased development of pressure ulcer in patients at ICU which matches similar studies (Chaves *et al.*, 2010; Catania *et al.*, 2007).

In experimental group, no case of pressure ulcer was observed, however, in control group, pressure ulcer was 18.2%. While in a similar study conducted in Kerman, the pressure ulcer was reported 5.34 (23) which is very little compared to the study at hand. Perhaps one of the reasons the development rate of pressure ulcer is low in the mentioned study is that it was conducted in all departments of the hospital while in the study at hand, only patients at ICU were assessed. Based on conducted studies, development of the ulcer in ICU is more common compared to other hospitalization departments (Chaves *et al.*, 2010).

In a study in Brazil (2012), deploying Braden criterion, development of pressure ulcer decreased from 41.2-23% (Chaves *et al.*, 2010). The preventive program chosen is similar to the study at hand in many respects, the difference being that screening patients deploying Braden criterion was done at the reception time and every Monday and Wednesday and was repeated till the patient was released from ICU while in the study at hand, researcher measured Braden score every 24 h for 14 days. Also, in another study, another preventive program was conducted which decreased pressure ulcer from 12.65-2%

(Catania *et al.*, 2007). In yet another study in Lebanon, performing risk assessment deploying Braden criterion and then conducting preventive measures decreased pressure ulcer from 6.63-2.09 (Elliott *et al.*, 2008).

In the study at hand, the most common position for development of pressure ulcer was sacrum area (50%) which matches the study of AhmadiNejad and Rafiei (2011), Jamand *et al.* (2012).

CONCLUSION

The results of the study showed that we can, by deploying Braden tool to assess pressure ulcer and conducting preventive program, decrease development of pressure ulcer. With regard to the importance of pressure ulcer in these departments and problems that arise for patients and care systems because of these ulcers, precise planning to prevent such ulcers and deployment of assessment tools and preventive measures are greatly important (Kremani and Haghiri, 2007; Niederhauser *et al.*, 2012).

LIMITATIONS

With regard to long duration of subjects' presence in the study and being under surveillance the whole day, one can state that the low number of subject is considered a limitation. And also diversity of patient's clinical conditions which can affect the development of pressure ulcer is yet, another limitation.

ACKNOWLEDGEMENTS

We would like to thank Research council of Esfahan Medical University, Faculty of nursing and midwifery, nursing and management staff of Alzahra University of Esfahan Medical University.

REFERENCES

- AhmadiNejad, M. and H. Rafiei, 2011. Pressure ulcer incidence in intensive care unit patients in Bahonar Hospital, Kerman. J. Iran. Soc. Anaesthesiol Intensive Care, 57: 10-16.
- Brem, H., J. Maggi, D., Nieman, L. Rohnitzky and D. Bell *et al.*, 2010. High cost of stage IV pressure ulcers. Am. J. Surg., 200: 473-477.
- Catania, K., C. Huang, P. James, M. Madison, M. Moran and M. Ohr, 2007. PUPPI: The pressure ulcer prevention protocol interventions. AJN. Am. J. Nurs., 107: 44-52.
- Chaves, L.M., M.H. Grypdonck and T. Defloor, 2010. Protocols for pressure ulcer prevention: Are they evidence-based?. J. Adv. Nurs., 66: 562-572.

- Elliott, R., S. McKinley and V. Fox, 2008. Quality improvement program to reduce the prevalence of pressure ulcers in an intensive care unit. *Am. J. Crit. Care*, 17: 328-334.
- Gunningberg, L. and N.A. Stotts, 2008. Tracking quality over time: What do pressure ulcer data show?. *Intl. J. Qual. Health Care*, 20: 246-253.
- Gunningberg, L., N.A. Stotts and E. Idvall, 2011. Hospital-acquired pressure ulcers in two Swedish County Councils: Cross-sectional data as the foundation for future quality improvement. *Intl. Wound J.*, 8: 465-473.
- Jamand, T., S. Akaberian, R. Khoramroodi, S. Pooladi and A. Hajivandi *et al.*, 2012. Assessment of risk factors associated with bedsores in patients admitted to Fatemeh Zahra and Salman Farsi Hospitals in Boushehr by using the braden indices (2007-2008). *Iran. S. Med. J.*, 15: 233-240.
- Kremani, H. and A. Haghiri, 2007. Assessment of risk factors associated with pressure ulcer in patients with head and spinal cord injury in intensive care unit. *J. Arak Med. Sci.*, 10: 39-46.
- Lynn, J., J. West, S. Hausmann, D. Gifford and R. Nelson *et al.*, 2007. Collaborative clinical quality improvement for pressure ulcers in nursing homes: (See editorial comments by Dr. George Taler on pp 1674-1675). *J. Am. Geriatrics Soc.*, 55: 1663-1669.
- Moore, Z.E. and S. Cowman, 2008. Risk assessment tools for the prevention of pressure ulcers. *Cochrane Database Syst. Rev.*, Vol. 3, 10.1002/14651858.CD006471.pub3
- Nayak, D., K. Srinivasan, S. Jagdish, R. Rattan and V.S. Chatram, 2008. Bedsores: Top to bottom and bottom to top. *Indian J. Surg.*, 70: 161-168.
- Niederhauser, A., C.V. Lukas, V. Parker, E.A. Ayello and K. Zulkowski *et al.*, 2012. Comprehensive programs for preventing pressure ulcers: A review of the literature. *Adv. Skin Wound Care*, 25: 167-188.
- Pancorbo-Hidalgo, P.L., F.P. Garcia-Fernandez, I.M. Lopez-Medina and C. Alvarez-Nieto, 2006. Risk assessment scales for pressure ulcer prevention: A systematic review. *J. Adv. Nurs.*, 54: 94-110.
- Reddy, M., S.S. Gill and P.A. Rochon, 2006. Preventing pressure ulcers: A systematic review. *J. Am. Med. Assoc.*, 296: 974-984.
- Rogenski, N.M.B. and P. Kurcgant, 2012. The incidence of pressure ulcers after the implementation of a prevention protocol. *Lat. Am. J. Nurs.*, 20: 333-339.
- Sayar, S., S. Turgut, H. Dogan, A. Ekici and S. Yurtsever *et al.*, 2009. Incidence of pressure ulcers in intensive care unit patients at risk according to the Waterlow scale and factors influencing the development of pressure ulcers. *J. Clin. Nurs.*, 18: 765-774.
- Strand, T. and M. Lindgren, 2010. Knowledge, attitudes and barriers towards prevention of pressure ulcers in intensive care units: A descriptive cross-sectional study. *Intensive Crit. Care Nurs.*, 26: 335-342.
- Van Gilder, C., S. Amlung, P. Harrison and S. Meyer, 2009. Results of the 2008-2009 international pressure ulcer prevalence survey and a 3-year, acute care, unit-specific analysis. *Ostomy Wound Manage.*, 55: 39-45.