



Effectiveness of nursing intervention on prevention of facial pressure ulcer among patients on non-invasive ventilation: A quasi experimental study

¹ Jayasri J, ²Malarvizhi S and Dr. Jaeny Kemp

¹ M.Sc. (N) Student, GKNM Institute of Nursing, Coimbatore, Tamil Nadu, India

² Professor, GKNM Institute of Nursing, Coimbatore, Tamil Nadu, India

³ Former Principal, GKNM Institute of Nursing, Coimbatore, Tamil Nadu, India

DOI: <https://doi.org/10.33545/nursing.2023.v6.i2.A.339>

Abstract

Background: Noninvasive ventilation (NIV) is the provision of ventilatory support to the patient's spontaneous breathing by using interfaces such as mouthpiece, nasal mask, face mask and helmet mask. It has many advantages like low incidence of upper airway injury, laryngeal stenosis, nosocomial pulmonary infection, decreased need for sedative, paralytic drugs and hospital stay. However the facial pressure ulcer resulting from the usage of NIV mask is the most unpleasant and painful complication faced by patients.

Aim: The aim of the study was to assess the effectiveness of Nursing Intervention on Prevention of Facial Pressure Ulcer among patients on Non-Invasive Ventilation

Methods: The study was conducted, in the Intensive care units of a super specialty tertiary care center in Coimbatore, India. Quantitative research approach was used to assess the effectiveness of nursing interventions on prevention of facial pressure ulcer among patients on Non-invasive ventilation. The research design adopted for this study was Quasi-experimental Time series with multiple institution of treatment design. Non Probability Purposive sampling was adopted for selecting the samples (N=44). The samples were assigned to two groups, experimental (N=22) and control (N=2) based on inclusive and exclusive criteria. Baseline assessment of facial pressure ulcer was done using Braden Scale for all samples. The tailored Nursing Interventions were given to the experimental group whereas the control group received routine care. Posttest was done to both the groups using the same scale.

Result: The facial pressure ulcer risk score in experimental group and control group showed a significant difference from 12th hour onwards to 42nd hour. Statistically, there was no significant difference in the mean facial pressure risk score before and after intervention in the control group ($F=1.84, p<0.05$).

Conclusion: The tailored Nursing intervention was effective in reducing facial pressure ulcer among patients on NIV. It is a cost effective method and can be incorporated as the evidence based practice in hospital settings.

Keywords: Non-invasive ventilation (NIV), Facial pressure ulcer

Introduction

Acute respiratory failure is a serious illness. Acute respiratory failure results from difficulty in getting oxygen to the lungs and removing carbon dioxide from the lungs, or both. Depending on the severity of the condition, acute and chronic respiratory failure are treated with oxygen therapy by Invasive Ventilation (IV) or Non Invasive Ventilation (NIV) by Continuous Positive Airway Pressure (CPAP) or Bilevel Positive Airway Pressure (BIPAP), (Judith *et al.*, 2018) ^[1].

NIV is widely used in critical area and it is the first line intervention in various types of respiratory failure using external interface which enhances improved gas exchange and enables the patient to swallow, cough and speak (Cesare *et al.*, 2015) ^[2].

Non Invasive Ventilation (NIV) is the provision of ventilatory support to the patient's spontaneous breathing by using interfaces such as mouthpiece, nasal mask, face mask and helmet mask. It has many advantages comparatively

including, low incidence of upper airway injury, laryngeal stenosis, nosocomial pulmonary infection, decreased need for sedative, paralytic drugs and hospital stay (Otero *et al.*, 2017) ^[3].

During NIV therapy various types of interfaces are used for the patients. Assessing the correct size and well fit interfaces are important for successful ventilation. However NIV efficacy is more important than patient comfort. It is the prime duty of the nurse to select the appropriately fitting mask to increase patient tolerance and improve NIV outcome (BaHammam *et al.*, 2018) ^[4].

The disadvantages of NIV are air leaks, eye irritation, and noise due to air leak and mask pressure. The face mask causes facial pressure ulcer which is the most unpleasant and painful complication. The facial pressure ulcer is caused by lack of understanding of how to fit the device, how often to remove the device and inspect the skin (Brill, 2017) ^[5].

The risk factors for the development of device related pressure injury are continuous mask and strap pressure,

friction and shear injury from the mask, movement and fragile skin due to chronic steroid use. (Cascioli *et al.*, 2019) [6].

There is no universally ideal and one size fits all NIV interface. Therefore choosing an interface requires a thorough evaluation of features, ventilator modes for respiratory failure by the nurses for effective care outcomes when using NIV interfaces (BaHammam *et al.*, 2018) [4].

Aim: The aim of the study was to assess the effectiveness of Nursing intervention on prevention of facial pressure ulcer among patients on non-invasive ventilation.

Methods

The study was conducted, in the Intensive care units of a super specialty tertiary care center in Coimbatore, India. Quantitative research approach was used to assess the effectiveness of structured Nursing interventions on prevention of facial pressure ulcer among patients on Non-invasive ventilation. The investigator developed an Evidence Based structured Nursing Intervention procedure to be implemented from the initiation of NIV. The conceptual framework for the study was done based on AACN Synergy model. The formal permission to conduct research was obtained from the Hospital authorities. Ethical clearance was obtained from the Institutional Ethical Committee. The validity of the tool and the structured Nursing intervention was confirmed by submission to Subject experts. The reliability of the risk assessment tool was determined by interrater method. The research design adopted for this study was Quasi-experimental Time series with multiple institution of treatment design. Non Probability Purposive sampling was adopted for selecting the samples (N=44). The study was conducted, in the Intensive care units of a super specialty tertiary care center in Coimbatore, India. Quantitative research approach was used to assess the effectiveness of nursing interventions on prevention of facial pressure ulcer among patients on Non-invasive ventilation. The research design adopted for this study was Quasi-experimental Time series with multiple institution of treatment design. Non Probability Purposive sampling was adopted for selecting the samples (N=44). The samples were assigned to two groups, experimental (n₁=22) and control (n₂=22). Baseline assessment of facial pressure ulcer was done using Braden Scale for all samples. The tailored Nursing Interventions were given to the experimental group whereas the control group received routine care. All the samples were assessed for facial skin integrity by observation before initiation of NIV. The control group patients received routine care and were assessed for risk of facial pressure ulcer using Braden scale every 6th hourly for 42 hours. The experimental group of samples were provided a series of Nursing interventions including appropriate size selection and fixing of Non-invasive ventilation mask, assessment of patient every 6 hours, skin care every 6 hours including cleaning and drying with gauze, skin massage with coconut oil every 6 hours, application of customized pressure reduction gauze pad and

were also assessed for risk of facial pressure ulcer using Braden scale every 6th hourly for 42 hours. Posttest was done to both the groups using the same scale.

Data analysis: The data collected from the subjects were compiled and analyzed using descriptive and inferential statistics such as frequency, mean, percentage and standard deviation. Frequency and percentage distribution were used to assess the demographic and clinical variables. Comparison of vital parameters between control group and experimental group was performed by repeated measures ANOVA-F test. Comparison of level of risk for facial pressure ulcer score between experimental and control group was performed by paired t-test, unpaired t-test, F-test, and chi-square test.

Table 1: Frequency and percentage distribution of demographic variables in experimental group and control group, N= 44

Demographic variables	Experimental Group (N1=22)		Control Group (N2=22)	
	Frequency	%	Frequency	%
Age in Years				
a) < 30	0	0.00	0	0.00
b) 30-40	2	9.09	0	0.00
c) 40-50	3	13.64	3	13.64
d) > 50	17	77.27	19	86.36
Gender				
a) Male	8	36.36	8	36.36
b) Female	14	63.64	14	63.64
Education				
a) Illiterate	1	4.55	2	9.09
b) School level	19	86.36	17	77.27
c) Under graduate	2	9.09	3	13.64
d) Post graduate	0	0.00	0	0.00
Occupation				
a) Unemployed	13	59.09	14	63.63
b) Self employed	8	36.36	6	27.27
c) Private employee	1	4.55	1	4.55
d) Government employee	0	0.00	1	4.55
Religion				
a) Hindu	15	68.18	18	81.82
b) Christian	3	13.64	2	9.09
c) Muslim	4	18.18	2	9.09
d) Others	0	0.00	0	0.00
Marital status				
a) Unmarried	2	9.09	0	0.00
b) Married	20	90.91	21	95.45
c) Widow	0	0.00	1	4.55
d) Divorcee	0	0.00	0	0.00
Type of family				
a) Nuclear	13	59.09	14	63.64
b) Joint family	9	40.91	8	36.36
Monthly Income (in Rs)				
a) < Rs20,000	15	68.18	17	77.27
b) Rs. 20,000-30,000	2	9.09	3	13.64
c) Rs. 30,000-40,000	2	9.09	1	4.55
d) > Rs40000	3	13.64	1	4.55

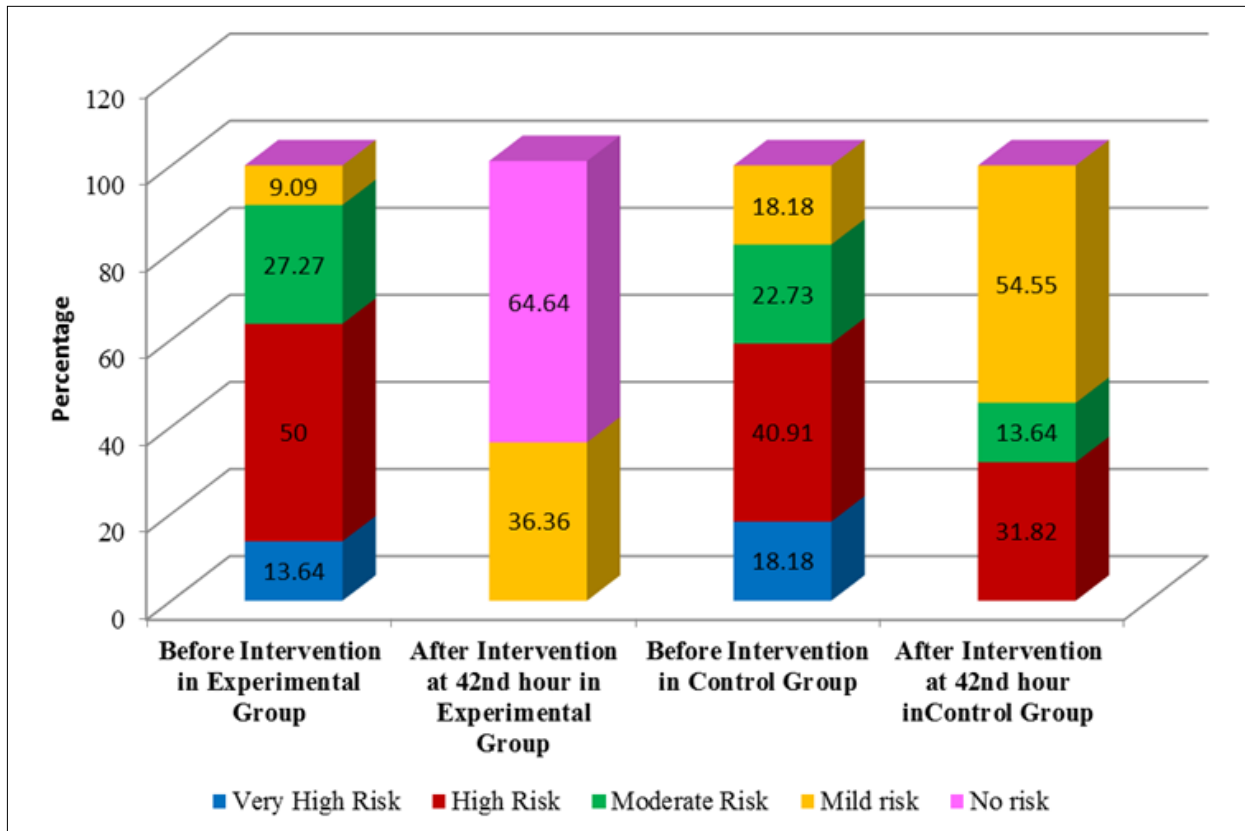


Fig 1: Percentage distribution of level of risk for facial pressure ulcer in experimental group and control group before and after intervention at 42nd hour.

Table 2: Comparison of mean facial pressure ulcer score with the observations before and after intervention (6th hour, 12th hour, 18th hour, 24th hour, 30th hour, 36th hour, 42nd hour) in experimental group and control group, N=44

Observation	Experimental Group (N1=22)		Repeated Measure ANOVA	Sig Value	Control Group (N2=22)		Repeated Measure ANOVA	Sig value	
	Mean	SD			Mean	SD			
Before Intervention	12.00	1.88	F=26.02	0.00	12.50	0.00	F=1.84	0.09	
After Intervention	6 th hour	12.91			1.90	12.55			2.15
	12 th hour	14.55			2.30	13.18			1.62
	18 th hour	16.27			1.75	13.68			1.86
	24 th hour	17.41			1.40	13.86			1.64
	30 th hour	18.00			1.07	14.00			1.77
	36 th hour	18.73			1.03	14.18			2.50
	42 nd hour	8.82			1.01	14.23			2.52

In experimental group the mean score increased from 12.00 before intervention, to 18.82 after intervention at 42nd hour which concluded that the risk was reduced markedly. Statistically, there was a significant difference in the mean facial pressure risk score before and after intervention in the experimental group ($F=26.02, p<0.05$). Whereas in the control group, the mean facial pressure ulcer risk score increased slightly from 12.50 in the initial assessment score to 14.23 at 42nd hour which concluded that the risk was reduced but less compared to experimental group. Statistically, there was no significant difference in the mean facial pressure risk score in the control group. ($F=1.84, p<0.05$).

In the Experimental group there was a significant difference in the parameters including mean pulse score, mean respiration score, mean diastolic BP score, mean SPO₂ score and mean FiO₂ score before and after intervention whereas no significant changes observed in body temperature and

systolic BP. In the control group there were no significant difference in the mean temperature score, mean pulse score, mean respiration score, mean systolic and diastolic BP score, mean SPO₂ score before and after intervention. Statistically, there was no significant association between the level of risk for facial pressure ulcer and selected demographic variables such as gender, occupation, previous hospitalization, co-morbidity, indication and body built before intervention.

Conclusion

The tailored Nursing intervention was effective in reducing facial pressure ulcer among patients on NIV. It is a cost effective method and can be incorporated as the evidence based practice in hospital settings.

Conflict of Interest: None

Financial Support: Not availed

References

1. Marcin Judith. Chronic Respiratory Failure. www.healthline.com. Casey *et al.* (Aug 2019). Protocolized Post-Extubation Respiratory Support to prevent re-intubation: Protocol and statistical analysis plan for a clinical trial. 2018 Mar;9:8. Retrieved from DOI: 10.1136/bmjopen-2019-030476.
2. Gregoretti Cesare, *et al.* Non-invasive Ventilation in Critically Ill Patients. 2015 Jul;31(3):435-457. DOI: 10.1016/j.ccc.2015.03.002.
3. Otero Pena, *et al.* Preventing facial pressure ulcers in patients under non – invasive mechanical ventilation: A randomised control trial. 2017 Mar;26(3):128-136. DOI: 10.12968/jowc.2017.26.3.128.
4. BaHammam S, Ahmed, *et al.* Choosing the proper interface for positive airway pressure therapy in subjects with acute respiratory failure. 2018 Feb;63(2):227-237. Created on Mon, 06/15/2015 - 18:44. DOI: 10.4187/respcare.05787.
5. Brill, *et al.* Randomized crossover trial of a pressure sensing visual feedback system to improve mask fitting in noninvasive ventilation. 2017 Oct;22(7):1343-1349. Retrieved from: DOI: 10.1111/resp.13074.
6. Cascioli, *et al.* Nursing excellence: Successful steps to reduce pressure injuries related to noninvasive ventilation, *Journal of nursing excellence*; c2019 Sep. <https://www.myamericannurse.com/successful-steps-reduce-pressure-injuries>.

How to Cite This Article

Jayasri J, Malarvizhi S, Kemp J. Effectiveness of nursing intervention on prevention of facial pressure ulcer among patients on non-invasive ventilation: A quasi experimental study. *International Journal of Advance Research in Nursing*. 2023;6(2):42-45

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.