

A Descriptive Study To Assess The Nasal Injury And Role Of Nurses On Selected Non-Invasive Oxygen Administration Methods Among Neonates In A Selected Hospital At Chennai

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ABSTRACT

Purpose: The nurse plays an important role in caring for neonates with CPAP therapy. The study aims to determine the severity of nasal injury with Nasal CPAP in NICU and different barrier methods used to reduce the incidence of Nasal CPAP and HFNC induced nasal injury among neonates. To evaluate the frequency and severity of nasal injury secondary to Nasal continuous positive airway pressure and High flow nasal cannula among neonates and to nursing care guidelines.

Methods: This is a descriptive study carried out in the Neonatal Intensive Care Unit, Institute of Child Health and Children's Hospital, Chennai, Tamilnadu. The study includes newborns those who are underwent Nasal CPAP and HFNC with nasal prongs on during non-invasive therapy and after weaning from NCPAP and HFNC. Duration of study periods was from November 2021 to December 2021. Nose of the neonates were monitored from first day of NCPAP and HFNC treatment till it was weaning. Nasal injury was reported into three grades: Mild (erythema / pressure indent, Moderate (superficial erosion), Severe (septal necrosis).

Results: Total 60 newborns were included in study, 34 males and 26 females. All enrolled newborns were received NCPAP 50 (83.3%), were received HFNC 5 (8.3%) and were received both NCPAP and HFNC 5 (8.3%). The mean gestational age, longer duration of NICU stay, and duration on NCPAP and HFNC in newborns were 33 (26 weeks- 40 weeks), 14 (0-7) days, and 11 (0-21) days respectively. Incidence of nasal injury was Mild injury 24(40%), Moderate injury 23 (38.33%) Severe injury 13 (21.67%) and Nursing care guidelines on neonates with NCPAP and HFNC moderate level of care had 21(35%), adequate had 39(65%). The r value was 0.54 and p=0.001 which was highly significant.

Conclusion: Nasal injury is a frequent complication of NCPAP and HFNC, especially in preterm babies and neonates requiring longer duration. Such nasal injury can be prevented by Nursing care and barrier.

Keywords: Nasal injury, Nasal CPAP, HFNC, Neonates, Non-invasive, and NICU

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INTRODUCTION

Respiratory failure, particularly in neonates, is a serious issue in the neonatal intensive care unit (NICU). Oxygen administration strategies that are secure, convenient,

efficient, and economical are preferred in underdeveloped countries. CPAP can be administered using a simple device that delivers blended oxygen through the neonate's airway, with the end of the tubing

submerged to the desired depth in sterile water solution to generate pressure (Bubble CPAP). Maintaining nasopharyngeal or nasal CPAP in robust, vigorous neonates might be challenging.

The nurse plays an important role in the care of neonates who are having CPAP therapy. Check their heart rate, respiratory rate, Spo2 range, and CPAP parameters (water level, temperature, pressure, and the size of their nasal prongs/masks). Preventing nasal injuries requires careful selection of the right size prongs, frequent nursing awareness, and attention to proper posture. Injury avoidance is aided with a checklist that examines skin integrity, blanching, prong size, symmetry of nostrils, the position of septum, colour consistency, and frequency of secretions, followed by a nasal massage and suction.

The neonates receive a bedside subjective evaluation of nasal injury six hours after administering nasal CPAP, which includes: • nares dilatation • columella indentation or excoriation • notching on the bridge of the nose • changes in nose shape • any part of the nose is red, indented, bleeding, or excoriated. Seven practice components were included in clinical nursing practice standards to avoid nasal skin injury: 1. Deciding on the size of the nasal prongs 2. Nasal prong insertion and fixation 3. Taking precautions while using nasal prongs 4. Problems monitoring 5. Removal of nasal secretions 6. Proper humidity and temperature adjustments 7. Attention to bodily comfort.

METHODS AND MATERIALS

The Quantitative approach was used; this approach was used to assess the nasal injury on non-invasive oxygen administration methods among neonates. a descriptive correlational research design was selected for this study. Correlational design is to describe variables and examines the relationship among these variables in a single group. Variables The two categories of variables are discussed in the present study. Research variable: Nasal injury and Role of Nurses on Non-invasive oxygen administration methods. Influencing variables: Gestational age, birth weight, Sex, Duration of NICU stay, Antenatal steroids, and Duration of nasal CPAP and HFNC support. Biophysical parameters such as Apgar score at 1 minute, Apgar score at 5 minutes, Temperature, SPO2, Respiration, and Heart rate.

The study was conducted in the Neonatal Intensive Care Unit of the Institute of Child Health and Hospital for Children, Chennai. Target population comprised Neonates who were all admitted to the Neonatal Intensive Care Unit with Nasal CPAP and HFNC. The accessible population of the study comprised neonates who were admitted to the Neonatal Intensive Care Unit with Nasal CPAP and HFNC and who were available

during data collection. The data collection period was more than four weeks. The samples were selected by the purposive sampling technique. Oral consent was obtained from the parents of study participants. The parents of participants were assured of the confidentiality of the data collected and told that it will be used only for research purposes. Assessed the Nasal injury and Role of Nurses on nasal CPAP and HFNC among neonates who were on nasal prongs and nasal masks. It took approximately 15 minutes to complete the tool. Neonates on Nasal CPAP and HFNC were assessed for a minimum of 24 hours to a maximum of 216 hours. The role of Nurses who were working morning and evening shifts were assessed accordingly. Plan for data analysis the data collected from the subjects were compiled and analyzed using the samples for this study were Neonates on Nasal CPAP and HFNC who fulfilled the inclusion criteria. The sample size of the study was 60, non-probability purposive sampling technique was adopted for the study. The tool was submitted for content validity to experts in the field of Child Health Nursing in Chennai. • 1Neonatologist • 3 Nursing experts in the field of Child Health Nursing • 1 Statistician

The sample size was estimated based on previous study results and by Power Analysis. The study finding was 79%. It is expected to improve 10% and 80% of the power of the study. The formula used for calculating the sample size was $S = (Z \text{ Score})^2 * P (1-P) / \text{Margin of error}$ $S = (1.28)^2 * 0.9 / 0.0025$ $S = 0.1474 / 0.0025$ $S = 58.9$ So, sample size is approximated to 60. Here the confidence level is 80%, the Margin of error is 0.05, Prevalence range is 0.1. The reliability of the tool was determined using the Inter-Rater technique which showed $r = 0.78$ for nasal injury assessment score and $r = 0.71$ for structures observation checklist. Hence, the tool was found highly reliable. For Nasal injury - Inter-Rater Method $r=0.78$ (Highly Reliable) For observation checklist (Role of Nurses) - Inter-Rater Method $r=0.71$ (Highly Reliable).

The data were pooled and subjected to statistical analysis using the SPSS-16 package. The data collected from the subjects were compiled and analysed using Descriptive statistics: Frequency, Standard deviation, Mean, and Mean percentage were used to describe neonate's demographic variables. Inferential statistics: 1. Karl Pearson Correlation 'r' test was used to correlate the nasal injury. 2. Chi-square to find out the association between nasal injury with nasal CPAP and HFNC with their selected background variables.

Ethical clearance was obtained from the Institutional ethical committee of ACS Medical College and Hospital (No.304/2021/IEC/ACSMCH Dt.10.08.2021). Informed consent was obtained from the parents of study

participants. The necessary approval from the authorities was secured. The anonymity and confidentiality were maintained.

RESULTS

Total 60 neonates, shows a maximum of 37 neonates (61.67%) who were in the gestational age group of >36 weeks, 22(36.67%) were birth weight 2251 3000grams, 34 (56.67%) were male, 27 (45%) were duration of NICU stay 0-7 days, 49 (81.67%) did not receive antenatal steroids, 39 (65.00%) were 0-3 days nasal CPAP and HFNC support, and none of the neonates were in 15-21 days duration of Nasal CPAP and HFNC support.

Neonates with the maximum Apgar score at 1 minute was found to be 26 (43.33%) in 4-6 below normal, Apgar score at 5 minutes was 45 (75%) in 7-9 considered normal. Temperature at 36.1-37 C was found to be highest at 53 (88.33%). There were no neonates at 33C-35C temperature. The maximum SpO₂ was seen at 91 95% with a frequency of 39 (65.00%), and no neonates were found in 80-85% of SpO₂. Respiratory rate at 51-60 breath per minute was 31(51.67%), and no neonates were found in Respiratory rate at 71-80 breath per minute. Finally, the maximum Heart rate at 121 140 beats per minute was 28 (46.67%).

The majority of neonates had an injury on tip of the nose at 42 (70.00%), none of the neonates had tissue loss at tip of the nose, the next 39 (65%) neonates had nasal septum injury, none of neonates had tissue loss at nasal septum, then 39 (65.00%) neonates had an injury at the nostrils, none of neonates had red / bleeding and tissue loss at nostrils. Another 37 (61.67%) neonates had to change nose shape, none of neonates had pushed up and shortened nose shape. None of the neonates had injury at bridge of the nose, and finally 47 (78.33%) neonates had upper lip injury with none of the neonates having Red / indent/ skin breakdown and tissue loss at upper lip.

Tip of the nose: None of the neonates had a normal tip of the nose, 42(70.00%) neonates had redness, 10(16.67%) had red + indent, 8(13.33%) had red /indent/skin breakdown, none of the neonates had tissue loss.

Nasal septum: None of the neonates had normal nasal septum, 39(65.00%) had redness, 15(25.00%) had redness + indent, and 6(10.00%) had red / indent/skin breakdown and none of the neonates had tissue loss.

Nostrils: Out of 60 neonates, 9(15.00%) had normal nostrils, 39(65%) had enlarged nostrils, 12(20.00%) had enlarged and prong-shaped nostrils, and none of the neonates had red, bleeding and tissue loss.

Nose shape: Out of 60 neonates, 23(38.33%) had normal nose shape, 37(61.67%) had pushed up / back but normal, and none of the neonates had pushed up and shortened nose shape. Bridge of the nose: 60(100%)

neonates had the normal bridge of the nose. None of them had red, red +indent, red / indent/skin breakdown, and tissue loss.

Upper lip: Out of 60 neonates, 8(13.33%) had a normal upper lip, 47(78.33%) had redness, 5(8.33%) had redness + indent, and none of them had red / intent/skin breakdown, and tissue loss.

The percentage level of nasal injury assessment scores among neonates. In general, none of them had no injury, 24(40.00%) of them had a mild injury, 23(38.33%) of them had a moderate injury, and 13(21.67%) of them had a severe injury.

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The mean value of the Structured observational checklist to assess nasal care given to neonates with nasal CPAP and HFNC shows that 0.01 is not significant with the routine nasal massage whereas a highly significant value of 1.00 concerning the Appropriate size of cap and position, Correct sizes of prongs or mask, Blow by breaks where the interface is removed from the nostrils at least twice every nursing shift.

The percentage level of nursing practice, on observation, it was found that the nursing care given to neonates with Nasal CPAP and HFNC. In general, 21(35%) of them had rendered a moderate level of nasal care, 39(65.00%) of them had rendered an adequate level of nasal care, and none of them had rendered an inadequate level of nasal care.

DISCUSSION

The guidance from the field of Neonatology, Child Health Nursing, and statistician enabled the researcher to design the methodology and validate the tool. It also added new ideas to the conceptual framework. A Middle-Range Theory of caregivers based on Myra Levine's Conservation model was adopted to conceptualize and explain the various aspects of the study. The researcher acquired a quantitative research approach and correlational descriptive, non-experimental design for this study.

The Nasal integrity and Pressure Injury Chart was used to assess the nasal injury and a structured observational checklist of Nurse guidelines on nasal CPAP 10 questions was used to assess the role of nurses on nasal CPAP and HFNC among neonates. Reliability and validity of the tool were approved by the Inter-Rater method and the Kappa value for Nasal injury was 0.78 (Highly reliable), and the Observation checklist (Role of Nurses) was 0.71 (Highly reliable). The pilot study was

conducted at Kanchi Kamakoti Child Trust Hospital [KKCTH], Nungambakkam, Chennai. The main study was carried out at the Institute of Child Health and Hospital for Children (ICH), Egmore, Chennai.

Major findings of the study: The percentage of nasal injury assessment scores among neonates. In general, about 24 (40.00%) of neonates had a mild injury, about 23 (38.33%) of neonates had a moderate injury and 13 (21.67%) of neonates had a severe injury. The study found the percentage level of checklist scores on the role of nurses. In general, none of them had an inadequate score, 35.00% of them had a moderate score, and 65.00% of them had been adequate score.

The study disclosed that the Nasal injury mean was 7.43 with a standard deviation of 0.75 and the Role of nurse mean was 5.50 with a standard deviation of 2.33. The calculated 'r- value is = 0.54, which is indicated a positive moderate correlation, statistically significant with the nasal injury and role of nurses on nasal CPAP and HFNC among neonates a $p < 0.001$. The chi-square value indicated that Duration of NICU stays, Duration of nasal CPAP and HFNC support, Apgar score at 5 minutes had shown statistically significant association with nasal injury at p

CONCLUSION

Nasal continuous positive airway pressure and High flow nasal cannula are efficient in improving the clinical condition of mild to moderate respiratory distress. Nasal prongs are the most commonly used interface for the delivery of nasal CPAP to neonates. Nursing guidelines are to determine the incidence and risk factors for nasal injury in neonates and to provide clinicians with strategies to effectively prevent and treat it.

The researcher aimed to determine the severity of nasal injury with nasal CPAP in NICU and different barrier methods used to reduce the incidence of nasal CPAP and HFNC induced nasal injury among neonates. Hence the study was intended to assess the nasal injury and role of nurses on nasal CPAP and HFNC among neonates, through the assessment the researcher discovered the Gestational age of neonates and the Duration of nasal

CPAP and HFNC support are subjected to nasal injury. Therefore, the findings revealed that the nasal injury and nurses' role show a moderate positive correlation which was statistically significant among neonates on nasal CPAP and HFNC.

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RESULT TABLE AND FIGURE

Section-I

Part A: Deals with the distribution of background variables of neonates.

Table:1 Frequency and percentage distribution of neonates based on demographic variables
N =60

Demographic variables		Frequency	Percentage
Gestational age in weeks	26-30 weeks	5	8.33%
	30.1- 34 weeks	8	13.33%
	34.1- 36 weeks	10	16.67%
	>36 weeks	37	61.67%
Birth weight	750grams -1500grams	19	31.67%
	1501grams -2250grams	6	10.00%

	2251grams – 3000 grams	22	36.67%
	3001grams – 3750grams	13	21.67%
Sex	Male	34	56.67%
	Female	26	43.33%
Duration of NICU stay	0-7days	27	45.00%
	8-15 days	8	13.33%
	16-21 days	5	8.33%
Antenatal steroids	>22days	20	33.34%
	Given	11	18.33%
	not Given	49	81.67%
Duration of Nasal CPAP and HFNC support	0-3 days	39	65.00%
	4-7 days	19	31.67%
	8-14 days	2	3.33%
	15-21 days	0	0.00%

Part B: Deals with the distribution of biophysical parameters

Table: 2 Frequency and percentage distribution of neonates based on biophysical parameters N=60

Biophysical parameters		Frequency	Percentage
Apgar score at 1 minute	0-3 are critically low	14	23.33%
	4-6 are below normal	26	43.33%
	7-9 are considered normal	20	33.34%
Apgar score at 5 minutes	0-3 are critically low	6	10.00%
	4-6 are below normal	9	15.00%
	7-9 are considered normal	45	75.00%
Temperature	33-34 C	0	0.00%
	34.1-35 C	0	0.00%
	35.1-36 C	7	11.67%
	36.1-37 C	53	88.33%
Spo2	80-85%	0	0.00%
	86-90%	11	18.33%
	91-95%	39	65.00%
	95-100%	10	16.67%
Respiratory rate	30-50 bpm	6	10.00%
	51-60 bpm	31	51.67%
	61-70 bpm	23	38.33%
	71-80 bpm	0	0.00%
Heart rate	100-120 bpm	10	16.67%

121-140 bpm	28	46.67%
141-160 bpm	14	23.33%
161- 180 bpm	8	13.33%

Section-2

Figure 1: Percentage distribution of the Nasal injury assessment score

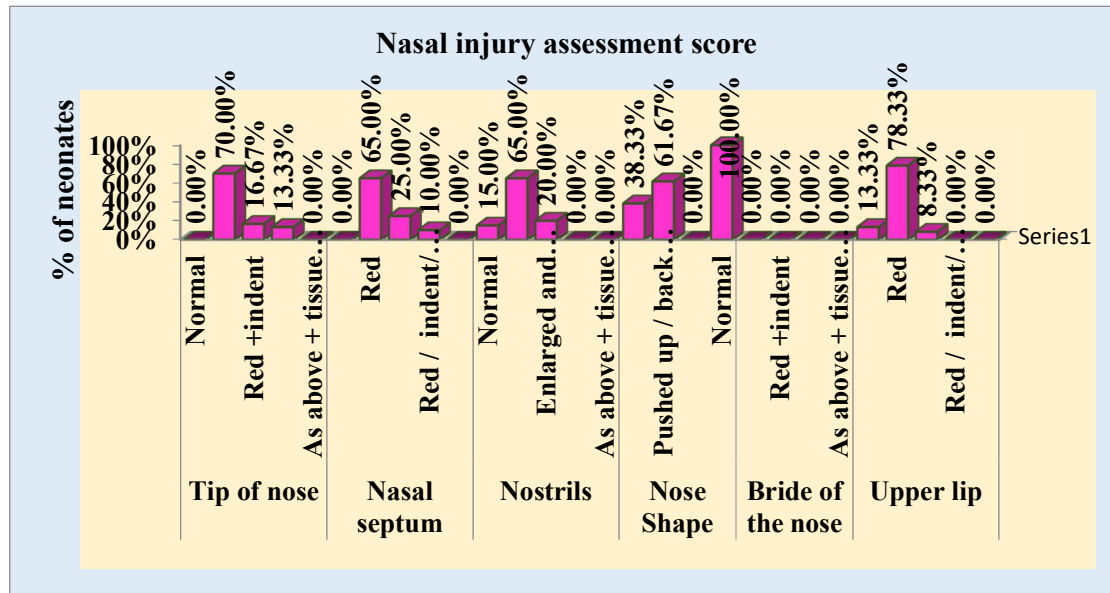


Figure 2: 3-D line diagram reflecting the percentage distribution of Nasal injury assessment score

Section-3 Structured observation checklist to assess nursing care given to neonates with nasal CPAP and HFNC

Table:3 Descriptive analysis of observation checklist
N = 60

Sl.no	Observation questionnaire	Mean
1	Appropriate position of neonate's head supported with neck roll and nest to prevent excessive movement of interface.	0.99
2	An appropriate size of cap and position	1
3	Correct sizes of prongs or mask	1
4	Gentle nasal suction	0.96
5	Prevention of pressure on the nose	0.75

6	Routine nasal massage	0.01*
7	Does she control neonatal agitation?	0.96
8	Fixation technique with hydrocolloid barrier	0.04
9	Proper fixation of tubing from nose to machine	0.69
10	Blow by breaks where the interface is removed from the nostrils at least twice every nursing shift.	1

