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Effectiveness of Protocol on Endotracheal Tube Suctioning among ICU Staff Nurses

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ABSTRACT

Background: It is understood that ET suctioning has several complications. Despite this, the method of suctioning the ET persists without adequate justification for the specific methods used. Suctioning is a high-risk procedure that can lead to hypoxemia, vomiting, cardiovascular dysfunction, inflammation, atelectasis, increased intracranial pressure, and can also cause tracheal mucosal lesions. Those can be complications can be prevented by implementing the protocols regarding Endo-tracheal tube suction.

Objective: The aim of this research is to assess staff Nurses' current experience of Endo-Tracheal suctioning before introducing the protocol as well as to determine whether or not the protocol is successful.

Methods: One Group Pre Test –Post Test Design, the study was conducted in ICU's of selected hospitals among staff nurses.

Results: It has been found that the Endo-tracheal suctioning protocol has been observed effective in improving knowledge and practice of Staff Nurses working in ICU.

Key Words: Effectiveness, Endo-tracheal tube suctioning, ICU staff Nurse, Preoxygenation, Protocol, Suction device, Standard practice

INTRODUCTION

Endo-tracheal tube suctioning is a procedure that is done for the purpose to remove the pulmonary secretions mechanically by using a suction device. It helps to keep the airway patent. All the clients who are having Endotracheal tubes need to remove secretions through the Endotracheal tube by the suction procedure.¹ Why the patients develop complications such as tachycardia or bradycardia, increase or decrease blood pressure, pain, discharge, and decrease arterial oxygen saturation? Is it avoidable by following certain guidelines/standard protocol? This was the question in mind while thinking about researching this topic.

Endotracheal suctioning (ETS) is one of the most common supporting prevention in intensive care units (ICU) to suction overage respiratory secretions and improve respiratory function.¹² The research study was carried out to assess the skills and experience of pre-training and post-training 48 cardiovascular intensive care unit nurses to develop best practice recommendations for different suction methods in

patients with Endo-tracheal tube. It was concluded that the staff nurses had complied with standard practice training.² A scientific study examined the efficacy of tracheal suction by direct observation, and the technical information was evaluated using a self-administered questionnaire. The research finding evaluated that the staff nurses working in ICU have more theoretical knowledge than suction practical skills.³

The research investigated nurses' experience and expertise in conducting tracheal suction. Twenty-eight nurses were observed using reports from non-participants and standardized observation schedules. The study showed that most subjects (n=14) were not to do the Endo-tracheal tube suction procedure properly, this was stated by the participant. The average knowledge percentage and practical experience were 11.1 and 10.3(maximum score20). The research findings stated the low level of awareness regarding the suction procedure. This research finding recommends the support, education, and training of the staff nurses on the Endotracheal suction procedure.⁴ For data collection, a standardized questionnaire

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was used to gather information and an observational checklist to determine the score of the practice. The research was performed using concise and inferential statistics

Unfortunately, when it comes to suction failure, the vast number of ICU errors goes unnoticed, which raises morbidity, mortality and thus increases patient stay in the hospital. Scheduling of education and regular training session is suggested to improve the quality of treatment to eliminate incidents or complications with these sentinels.⁸ In India, few experiments were carried out to determine the outcome of the nurse and the patient as a whole in terms of the suction technique. This work aimed at developing and applying suction techniques by giving training to the staff nurses in small groups and then studying the outcomes of nurses and patients.⁵ Adverse effects such as hypoxemia, pneumothorax, reduced blood flow, pain, and discomfort were also associated with ETT suction.⁶ Endotracheal Suctioning used to remove secretions from the central airways and stimulate the cough reflex.¹³ Although the evidence-based review of literature in the medical field does not always state to agree on best practices to balance advantage over risk. The following guidelines are made by respiratory therapists and researcher:

Suction should be done only when it is indicated to avoid the risk of an adverse event.⁷

Pre-oxygenation with 100% oxygen is mandatory to avoid hypoxia.⁷

Using low-pressure volume unless otherwise needed. The preferable suction pressure is between 80 to 120mmofHg, Except where the secretion does not react.⁸

Selection of correct sized suction catheter is mandatory.⁹ According to the respiratory therapist; a suction catheter with an external diameter of less than 50 % of the inner diameter is recommended. This will allow for efficient aspiration.⁷

Examine the advantages and disadvantages of open and closed suctioning methods.

The literature recommends the closed suction system for convenience and speed.

Researchers recommend continuous suction, otherwise, there is a risk of alveolar collapse.⁷

Perform the suction gradually with a low suction pressure as it can cause mucosal damage, bleeding and even vagal stimulation and Bradycardia. ⁹

MATERIALS AND METHODS

Research approach: One Group Pre Test –Post Test Design

Study settings: ICU of selected hospitals

Population: ICU staff-nurses

Sample: Registered ICU Staff Nurses of selected hospitals.

Sample Size: 30.

Method Of Sampling: Convenient sampling method.

Criteria for Inclusion: Staff nurses working in ICU for more than one 1year, who gave consent for participation in the study and working rotation wise in 3 shifts

Exclusion Criteria: Staff Nurses working in ICUwho cannot communicate in Marathi and English, staff nurses who have participated in similar research.

Data collection method: Structured interview & observation checklist.

Ethical Approval: Ethical approval were obtained from the institutional ethical committee of Datta Meghe Institute of medical sciences deemed to be university, Sawangi Meghe, Wardha (Ref. No-DMIMS(DU)/IEC/2018-19/7806).

Statistics: The use of a paired t-test was done to evaluate the effectiveness of the Endo-tracheal tube suction protocol.

And the Chi-Square test was used for assessing the association of selected demographic variables with knowledge and practice regarding Endotracheal tube suction value.

RESULTS

Table 1: Distribution according to the demographic component of staff nurses employed in ICU (n=30)

Socio-Demographic Variables	No. of ICU Staff Nurses	Percentage (%)
Age in years		
21- 30 years	25	83.3
31 -40years	3	10.0
41-50 years	2	6.7
Sexuality/Gender		
Male	9	30.0
Female	21	70.0
Education		
GNM	18	60.0
BSc(N)	12	40.0
Professional Experience		
1-5years	25	83.3
6-10 years	1	3.3
>10 years	4	13.3
ICU experience in years		
1-5 years	25	83.3
6-10 years	3	10.0
>10 years	2	6.7

Table 2: Knowledge level score assessment (n=30)

Level of knowledge score	Score Range	Knowledge percentage	
		Pre Test	Post Test
Below Average	0-50%	8(26.67%)	0(0%)
Average	51-75%	20(66.67%)	3(10%)
Above Average	76-100%	2(6.67%)	27(90%)
Minimum score		6	11
Maximum score		13	15
Mean knowledge score		8.80±1.74	13.20±1.21
Mean % Knowledge Score		58.66±11.66	88±8.09

Table No. 2 shows that 26.67 The proportion of pre-test nurses had less than the average score of information, 66.67 % of the pre-test staff nurses and 10% of post-test staff nurses had an average knowledge score and 6.67 % of them had above-average knowledge score in pre-test and 90 % in post-test.

The minimum score of knowledge in the pretest was 6 and in the post-test, it was 11, the maximum knowledge score in the pretest was 13 and in the post-test, it was 15.

The mean knowledge score in the pretest was 8.80±1.74 and in post-test it was 13.20±1.21 and the mean percentage of knowledge score in the pre-test was 58.66±11.66 and in post-test it was 88±8.09.

Table 3: Assessment with the level of the practice score (n=30)

Practice Score	Score range	Percentage of Practice Score	
		Pre Test	Post Test
Below Average	0-50%	15(50%)	0(0%)
Average	51-75%	14(46.67%)	3(10%)
Above Average	76-100%	1(3.33%)	27(90%)
Minimum score		7	11
Maximum score		21	15
Mean practice score		10.60±2.85	13.20±1.21
Mean % Practice Score		53±14.29	88±8.09

Table 3 shows that 50% of pre-test staff nurses had below-average practice scores, 46.67% of pre-test staff nurses, and 10% of post-test staff nurses had average practice scores, and 3.33% had above average practice score in the pre-test and 90% in post-test. The minimum practice score in the pretest was 7 and in the post-test, it was 11, the maximum practice score in the pretest was 21 and in the post-test, it was 15.

The mean practise score in the pretest was 10.60±2.85 and in post-test it was 13.20±1.21 and the mean percentage of practice pre-test score was 53±14.29 and the post-test score was 88±8.09.

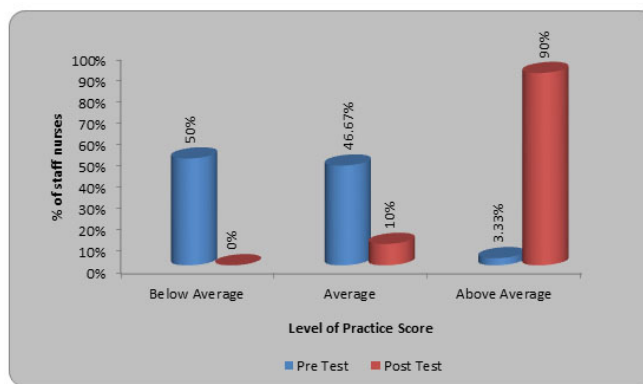


Figure 1: Assessment of practice score.

Table 4: Difference between knowledge score in pre-test and posttest of Staff Nurses working in ICU (n=30)

Overall	Mean	SD	Mean	t-Value	p-value
Pre test	8.80	1.74	4.40±1.61	14.96	0.0001
Post-test	13.20	1.21			S,p<0.05

Table 4 depicts the pretest and post-test awareness ratings of staff nurses employed in ICU concerning suction of the Endo-tracheal tube. Mean, standard deviation, and values of mean difference are compared & the student’s paired test is applied at a 5% level of significance. The tabulated value for n=30-1 was 2.05 i.e. 29 degrees of freedom. For the overall awareness score of staff nurses, which is the statistically appropriate standard of importance, the measured ‘t’ value i.e. 14.96 is much higher than the tabulated value at a meaning standard of 5%. It is therefore interpreted statistically that the protocol on Endotracheal tube suctioning among ICU staff nurses was found effective in improving the knowledge of the ICU staff nurses. So the H1 was accepted.

Table 5: Significance of difference between practice score in pre and post-test of staff nurses working in ICU (n=30)

Overall	Mean	SD	Mean Difference	t-value	p-value
Pre test	10.60	2.85			0.0001
Post-test	18.03	1.62	7.43±3.38	12.04	S,p<0.05

Table 5 shows the comparison between the pre-test and post-test practice score of ICU staff nurses on Endotracheal tube suction.

Meanwhile, standard deviation and mean differential values are compared and the student’s paired non-test is applied at a 5% meaning level. The tabulated value for n=30-1 i.e. 12.04 is much higher than the tabulated value at a 5% level of significance for the overall practice score of staff nurses which

is a statistically acceptable level of significance. Hence it is statistically interpreted that the new protocol on overall practice regarding Endotracheal tube suctioning among staff nurses working in ICU found effective. Because of that H_1 was accepted.



Figure 2: Significance of difference between practice score in pretest and posttest of Staff Nurses working in ICU

DISCUSSION

Endo-tracheal suction is a technique aimed at preserving the patency of airways by mechanically removing the secretions retained in the lungs, particularly in clients with implanted manual airways. Patients admitted to ICU also need to be tested for suction requirements. When on a mechanical ventilator these patients may be susceptible to various problems. Because of the complexity of Endotracheal suctioning, patients should be screened for suction needs because this is an invasive, complicated procedure that needs to be done with a fair prescription. After all, it can damage the patient. The reviews have shown that ventilator-associated pneumonia is the commonest complication of Endotracheal suction among the intubated patients on a ventilator and it is up to 47% of all types of infections reported in intensive care units. It is important for this procedure that the nurse is aware of the different methods of Endotracheal Suction and is focused on appropriate scientific evidence. The present research adopted an experimental approach involving thirty nursing staff employed in ICU with one group Pre Test Post Test Design. The results of this research indicate that, in all areas of the information questionnaire and observational checklist, the mean post-implementation information score and practice score was statistically more than the pre-test awareness score and practice score as obvious from the t -test (<0.05). These results were partly consistent with the findings of an evaluation study carried out to assess the effectiveness of the proposed teaching program (PTP) on the awareness and experience of Endotracheal suction among 50 staff nurses selected in various intensive care units in selected Mangalore hospitals. The mean overall post-test knowledge score (27.5) was slightly

higher than the mean overall pre-test knowledge score (17.0) and the average pre-test practice score (13.2) after 12 days of teaching and mean post-test practice score (28.7), respectively. The analysis concluded that this is where is a substantial increase in the degree of competence and experience among staff nurses following the PTP.⁷ While PTP was successful in obtaining practical information and scores. The findings were also consistent with the research conducted by Ozden et al 2012 to assess nurses' awareness and experience before and after training and to establish a protocol for open and closed system suction methods in patients with ETTs, which showed significant changes in knowledge and practices.¹⁰

The finding of this study state that nursing staff had less than average knowledge and bad practices regarding Endotracheal suctioning during the pre-implementation period. Such results were consistent with research from Dayalan et al. 2008 to evaluate the knowledge and expertise of the nurse regarding Endotracheal suction in acute and highly dependent ward areas. The knowledge and experience relationship was tested with demographic variables, the awareness and experience of staff nurses concerning Endotracheal tube suction was not correlated with demographic variables.¹¹

CONCLUSION

This is concluded that the Endotracheal Suction procedure has been successful in enhancing awareness and training of nursing staff employed in intensive care units. Staff nurses' knowledge and practice of Endotracheal Suction tubes are not associated with demographic variables. Complications caused by emergency procedures, such as the Endotracheal Suctioning technique, should not be ignored in manually ventilated ICU patients. Nursing workers will learn about recent developments in critical care nursing i.e. Endotracheal suction to alleviate breathing problems. Staff nurses working in ICU must be trained about the Endo-tracheal tube suction skill. The nursing staff's clinical procedures about Endo-Tracheal Suctioning should be tracked and feedback is given. The nurse supervisor will enforce the procedure for suctioning the Endo-tracheal tube in intensive care units. There will be identical research replicated in other intensive care units. A similar study can be conducted on a large number of samples. Similar research may be performed with different aims to determine the performance of patient care and patient recovery.

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