

## ORIGINAL ARTICLE

## KNOWLEDGE ON ENDOTRACHEAL TUBE CARE AMONG NURSES IN A HOSPITAL

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## ABSTRACT

**Introduction:** Endotracheal Tube (ETT) care management, play a significant role in the course of recovery of critically ill patients with ET tube. Oral and endotracheal suctioning of secretions, monitoring ETT cuff pressure, and the provision of oral care are all part of daily care. This study was carried out with the aim of assessing knowledge on endotracheal tube care among nurses in Manmohan Memorial Medical College and Teaching Hospital, Swoyambhu, Kathmandu

**Method:** A descriptive cross-sectional study was conducted among 110 nurses of MMTH using stratified proportionate sampling technique. Self-administered questionnaire technique was used to collect data by using Self-developed structured questionnaire. Data analysis was done using descriptive and inferential statistics in SPSS version 23

**Results:** The result showed that inadequate knowledge was present in frequency of endotracheal suctioning (20.0%), appropriate depth of suction catheter insertion (29.1%), suction pressure method (24.5%), appropriate duration for endotracheal suctioning (23.6%), complication of over-inflation (26.4%) and oral cavity assessment (13.6%). The findings of the study showed that half (50.0%) of the nurses had adequate level of knowledge on ETT care. The study shows the significant association of the level of knowledge on ETT care with ethnicity ( $p=0.022$ ) and working unit ( $p=0.021$ ).

**Conclusion:** There is still gap in knowledge on ETT care. To improve the nurse's knowledge on ETT care, education and communication activities should be increased through in-service education and training focusing on endotracheal tube suctioning, cuff pressure monitoring and oral care of intubated patients

**Key words:** ETT care; ETS; knowledge; nurses

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## INTRODUCTION

Endotracheal Tube (ETT) care management, play a significant role in the course of recovery of critically ill patients with ET tube. Oral and endotracheal suctioning of secretions, monitoring ETT cuff pressure, and the provision of oral care are all part of daily care. To deliver high-quality care, nurses must be knowledgeable about the advantages and disadvantages of endotracheal care for patients on mechanical ventilation, as well as appropriate management. A nurse's quick diagnosis and intervention can alleviate acute respiratory distress, dyspnea, and increased breathing effort while also averting unfavorable outcomes <sup>1</sup>.

Risky ETT care practices continue to be a global issue in the current environment. Despite the existence of scientific guidelines for ETT care, nurses' clinical practices have not implemented many of these recommendations, possibly as a result of inadequate knowledge. Even with established ETT care evidence-based recommendations, nurses would prefer to carry out procedures in a traditional or routine manner <sup>2</sup>.

A study conducted in Tanzania showed 80.6% of nurses demonstrated undesirable overall knowledge of ETS evidence-based recommendations, 19.4% demonstrated moderate level and 0% demonstrated the desired level. Although the majority (69.9%) of ICU nurses had knowledge on indications of ETS and 77.7% had knowledge on action to be taken in case of abrupt changes in Electrocardiogram (ECG) monitor, most of them (86.4%) did not have knowledge on choosing appropriate catheter size for the child and 88.3% had no knowledge on the correct way of suctioning the child. In addition to that, nurses who had received ICU training demonstrated higher knowledge than compared to those who had not received ICU training <sup>3</sup>.

A study conducted in China showed over half of the nurses were unaware of the difference between open and closed suction and the pros and cons of using hyperinflation. Nurses with endotracheal suctioning training demonstrated significantly higher awareness of

endotracheal suctioning recommendations and higher adherence levels than untrained nurses <sup>4</sup>.

A study conducted in Sri Lanka showed only half of the nurses had good knowledge of ETT care. It showed knowledge was poor for statements on "oral secretions may pool above the cuff leading to ventilator-associated pneumonia" (VAP) (12%) and selecting a suitable suction catheter (44%). A significant difference was observed in knowledge and professional qualification ( $P=0.043$ ). Married nurses were less knowledgeable than unmarried nurses <sup>5</sup>.

Only 4.3% of the total respondents had good knowledge of endotracheal suctioning (ETS), 52.2% had fair knowledge, and 43.5% had poor knowledge, according to a descriptive cross-sectional study on nurses' knowledge of the procedure conducted in the Gandaki Medical College Teaching Hospital and Research Center of Kaski, Nepal. There was a statistically significant relation between the association of the level of knowledge of respondents and their ethnicity ( $P=0.049$ ). Only 23.9% had knowledge on discontinuing ETS immediately when the heart rate rises or falls <sup>6</sup>.

A wide range of lack in knowledge on the proper care of ETT is noted, ETT care is an essential part of nursing care. It has been concluded that negligence in the proper care of ETT can result in a variety of complications that would ultimately prolong the duration of hospital stay of patients. Hence, the problem needs to be addressed promptly.

## How to Cite

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## METHODS

A descriptive cross-sectional research design was used to assess the level of knowledge on ETT care among nurses of Manmohan Memorial Medical College and Teaching Hospital, Swoyambhu, Kathmandu. Total 110 nurses were selected using stratified proportionate sampling technique from medical, general, dialysis, cabin, delux cabin, ICU, post operative, OT and emergency where total nurses working were 134. A Self-developed Structured and Semi-structured Questionnaire was distributed to each nurse and collected right after completion. The set of questionnaires consisted of 2 parts.

Part I: It consisted of questions related to sociodemographic (age, ethnicity, and marital status) and work-related variables (work experience, designation, training, graduated institute, professional qualification, working unit, availability of equipment).

Part II: It consisted of questions related to knowledge on ETT, ETS, cuff pressure management, and oral care. There were altogether 35 questions consisting of 2 multiple response questions where all the responses were correct and 33 multiple choice questions where one answer was correct and others were incorrect

### Ethical Considerations

To maintain the ethical soundness of the study, an approval letter was obtained from the Institutional Review Board of MMIHS. The purpose of the study was explained and voluntary consent was taken from the respondents before data collection. Confidentiality and anonymity was maintained throughout the study.

### Data Collection and Analysis

Data was collected by the researcher using a self-administered structured questionnaire to gather information on ETT Care from 2080/09/15 to 2080/09/29.

Data was interpreted by using descriptive statistics (mean, standard deviation, frequency, and percentage), and inferential statistics (chi-square test) was used to measure the association between level of knowledge and selected demographic variables.

## RESULTS

The socio-demographic characteristics of the respondents revealed that the mean age of the nurses was 20. Almost all (90.9%) the nurses belonged to age group of > 20 years whereas more than half (52.7%) of the nurses were from Brahmin/Chhetri ethnic group. Similarly, majority (67.3%) of the nurses were never married.

The work-related findings of this study revealed that out of 110 nurses, more than half (56.4%) of the nurses worked in critical care unit (CCU). Most of the nurses (86.4%) worked under the designation as staff nurse. Similarly, most (84.5%) of the nurses had their recent graduation from private institute. Majority of the nurses (63.7%) had the work experience of more than 1 year. Although more than half of the nurses worked in CCU, only 10 % of the nurses had received training on ETT care

**Table 1: Level of Knowledge on ETT Care among the Respondents**

Level of knowledge	Number	Percent
Inadequate knowledge (< 21)	55	50.0
Adequate knowledge (≥ 21)	55	50.0
Mean ± Standard Deviation = 4±21		
Total	110	100.0

Table no. 1 shows the nurses knowledge on ETT. The participant's level of knowledge was categorized on the basis of mean score (21). Among 110 nurses, half (50.0%) of the nurses had adequate knowledge on ETT while half (50.0%) of the nurses had inadequate knowledge on ETT.

Table no. 2 illustrates the association between the level of knowledge on ETT care and ethnicity ( $P=0.022$ ) however, no association is found with other socio-demographic variables

**Table 2: Association between Level of Knowledge on Learning Disability and Socio-demographic Characteristics**

Variables	Level of Knowledge		Chi-Square Value	p-value
	Inadequate knowledge No. (%)	Adequate knowledge No. (%)		
Age (in completed years)				
≤ 20 years	4 (40.0)	6 (60.0)	0.440	0.507
> 20 years (Adhikari and Subba, 2020)	51 (51.0)	49(49.0)		
Ethnicity				
Brahmin/Chhetri	35(60.3)	23(39.7)	5.252	0.022*
Others (Dalit, Janajati, Madhesi)	20(38.5)	32(61.5)		
Marital status				
Never married	34(45.9)	40(54.1)	1.486	0.223
Married/living together	21(58.3)	15(41.7)		

**Table 3: Association between level of Knowledge with Work-related Variables of the Respondents**

Variables	Level of Knowledge		Chi-Square Value	p-value
	Inadequate knowledge No. (%)	Adequate knowledge No. (%)		
Professional qualification				
Diploma	33 (57.9)	24 (42.1)	2.949	0.086
Bachelors and above	22(41.5)	31(58.5)		
Working unit				
General unit	30(62.5)	18(37.5)	5.323	0.021*
Critical care unit	25(40.3)	37(59.7)		
Designation				
Senior nurse	5(35.7)	9(64.3)	1.310	0.252
Staff nurse	50(52.1)	46(47.9)		
Work experience				
≤ 1 year	20(50.0)	20(50.0)	0.000	1.000
>1 year	35(50.0)	35(50.0)		
Recent graduated institute				
Government	10(58.8)	7(41.2)	0.626	0.429
Private	45(48.4)	48(51.6)		
Training on ETT care				
Yes	6(54.5)	5(45.5)	0.101	0.751
No	49(49.5)	50(50.5)		

**\*Significant at  $p$ -value<0.05**

Table no. 3 represents that there is association between the level of knowledge on ETT care and working unit ( $P=0.021$ ). However, no association is found with other work-related variables.

## DISCUSSION

### Knowledge on Endotracheal tube Suctioning (ETS)

In regards to normal suction pressure application for ETS, more than half (56.4%) of the nurses knew normal suction pressure of ETS is 80-120 mm Hg. The finding of the study is similar to the study conducted in Changsha, China among 310 nurses where more than half (54.1%) of the participants had knowledge on normal suction

pressure for ETS<sup>4</sup>. In this study, only 20% of the participants had answered correctly on frequency of ETS which is in contrast to the study conducted in Changsha, China among 310 nurses where majority (68.0%) of the nurses had answered correctly<sup>4</sup>. In regards to appropriate depth of suction catheter insertion, only 30.9% of the nurses gave correct answer as 0.5 cm past the end of ETT which is in contrast to the findings of an international survey where majority (71%) of nurses suctioned no further than 0.5 cm past the ETT<sup>7</sup>. In this study, 41.8% of the nurses had knowledge on nerve that is stimulated during ETS. This finding is contradictory to the study conducted in Kaski district of Nepal among 92 nurses where more than quarter of the nurses (29.3%) knew the nerve that is stimulated during ETS<sup>6</sup>. In regard to duration of 100% oxygen administration before/after ETS, only 39.1% of the nurses knew it was 30-60 seconds.

#### **Knowledge on ETT Cuff Pressure Management:**

In this study, only 35.5% of the nurses had knowledge on recommended cuff pressure for ETT. The finding of the study is similar to the study conducted in the Nelson Mandela Metropole, Eastern Cape, South Africa among 101 nurses where only 22% of the nurses maintained the range for cuff pressure measurements<sup>8</sup>. Routine cuff deflation and re-inflation is no longer recommended. However, in this study, majority (62.7%) of the nurses still agreed on the necessity to deflate and re-inflate after suctioning the intubated patient. The best technique for monitoring ETT Cuff Pressure is recommended as Minimal Leak Technique (MLT). However, the finding of this study shows only 20.9% of the nurses had knowledge on best technique for monitoring ETT Cuff Pressure.

#### **Knowledge on Oral care of Intubated Patient**

AACN (American Association of Critical-Care Nurses) guidelines recommend brushing the teeth twice a day and swabbing the mouth every 2 to 4 hours. In this study, half of the nurses (50.9%) had knowledge on correct frequency brushing teeth and half of the nurses (50.9%) had knowledge on correct frequency of mouth swab of the intubated patients which is consistent to AACN guidelines. The finding of the study is contradictory to web-based survey conducted among 347 randomly selected members of the AACN where almost all (92%) of the nurses reported providing oral care every 2-4 hourly while only 30% of the nurses reported brushing with a toothbrush and toothpaste twice a day<sup>9</sup>. In this study, majority (71.8%) of the nurses had knowledge on most appropriate mouthwash and mouth swab solution for providing oral care to intubated patients which is chlorhexidine gluconate. The finding of the study is contradictory to the study conducted in the East Coast of Peninsular Malaysia among 93 ICU nurses where almost all (93.5%) of them used chlorhexidine gluconate for mouth swab and almost all (97.8%) of the nurses used chlorhexidine gluconate for mouthwash<sup>10</sup>.

#### **Level of Knowledge on ETT care**

In this study, level of knowledge was classified into two categories on the basis of mean score where half of the nurses (50.0%) had adequate level of knowledge and half of the nurses (50.0%) had inadequate knowledge on ETT care. The findings of the study were nearly similar to study conducted in Srilanka among 185 nurses where half (50.8%) of the participants had adequate knowledge on ETT care<sup>5</sup>.

#### **CONCLUSION**

Based on the findings of the study, only half of the nurses have adequate level of knowledge on ETT care. However, inadequate knowledge is found on the frequency of ETS, nerve that is stimulated during ETS, recommended suction method, appropriate depth of suction catheter insertion, suction pressure method, appropriate duration for ETS, size for a suction catheter, duration of 100% oxygen administration, frequency of monitoring cuff pressure, best technique for monitoring ETT cuff pressure, complication of over-inflation of the ETT cuff, necessity to deflate and re-inflate after suctioning and oral cavity assessment.

#### **RECOMMENDATIONS**

A study can be conducted in more than one setting using more

samples so that the findings of the study can be generalized in other settings. An educational intervention study can be conducted which can provide nurses a detailed knowledge and latest information about ETT care. Since, significant difference is identified among the nurses working in different units, training and rotation among the nursing personnel is recommended.

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#### **AUTHORS CONTRIBUTIONS**

Reena Mandal took the overall responsibility for the study, including conceptualization, methodology development, analysis, and finalization of the manuscript. Mamta Rai contributed to methodology design and tool preparation, while Ranju Mahato led the preparation of the theoretical framework, methodology, data collection and analysis, and report preparation.

#### **COMPETING INTERESTS**

All the authors declare no competing interest