



**KNOWLEDGE AND PRACTICE REGARDING ENDOTRACHEAL CARE AMONG THE
HEALTH PROFESSIONALS OF SHAHID GANGALAL NATIONAL HEART CENTER,
BANSBARI, KATHMANDU, NEPAL**

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ABSTRACT

Endotracheal care is a collective care within intensive care units (ICUs) which includes hand washing, maintaining sterile technique before and after suctioning of endotracheal tube, suctioning of oral and nasal airway, adequate humidification, hyperventilation, alertness about complication, inflating and deflating of cuff at appropriate time.^[1] Adequate knowledge along with the correct procedure performance is required to follow the aseptic technique which in turn prevents acquired endotracheal infection. Nurses are the forefront care giver at such settings.

Objective: To assess the Knowledge and Practice regarding endotracheal care among the Health Professional.

Method and Material: A simple descriptive cross sectional study design was used for the studies which was conducted in critical care units of Shahid Gangalal National Heart Center with a sample of 61 health professional especially nurses and were selected by Non – probability purposive sampling technique. A semi-structured questionnaire was prepared to obtain socio-demographic information regarding their knowledge and practice on endotracheal care. Collected data was then checked and rechecked for completeness and accuracy, then entered in SPSS Software Version 20. Descriptive statistics such as numbers and percentage were used to describe demographic data and for the analysis of the level of the participants' knowledge and practice. To determine association of knowledge with socio-demographic factors "Chi-square Test" was used, and subsequently, the relationship between knowledge and practice was assessed by using Pearson's Correlation Technique. **Result:** The study found out that majority (62.3%) were age > 26 years. Majority of (41%) completed Bachelor of Nursing. Majority (30%) had work experience of 1 to 5 years. Highest number (37.7%) worked in ASICU. Most of the (54.1%) are married. All the participants had not taken any training regarding endotracheal tube care. Level of knowledge was good among 60% and fair among 39.3%. Level of Practice was good among 86.9% and fair among 13.1%. There was significant association of working unit with Knowledge (Chi – square 'p' value = 0.009). It was found out that there is no significant association of education, working unit and marital status with practice as Chi-square 'p' value= > 0.05. Correlation of knowledge and practice showed significant relationship between them, it indicate that when knowledge score is changes, practice score is also changes by 29.2 %. **Conclusion:** This is concluded that level of Practice is higher than level of knowledge despite of highest education level, it may be due to longer working experience in same critical care unit and may be due to handing over the culture of care to junior. Therefore, further training, in-service education is required to the nurses in order to increase knowledge and practice both practically and theoretically.

KEYWORDS: Knowledge, Practice, Endotracheal Care, Endotracheal Suctioning, Health Professional.

INTRODUCTION

Collective care such as hand washing, maintaining sterile technique before and after suctioning of endotracheal, suctioning of oral and nasal airway, adequate humidification, hyper oxygenating, alertness about complication, inflating and deflating of cuff at appropriate time.^[1] Endotracheal suctioning (ETS) is one of the most common procedures performed in patients with artificial airways. It is a component of bronchial

hygiene therapy and mechanical ventilation that involve mechanical aspiration of pulmonary secretion from a patient artificial airway to prevent its obstruction and keep the airway patent too. Therefore providing care until and unless patient is wean off from mechanical ventilation is endotracheal care.^[2] However, failure to meet the standards in the implementation of this procedure can have numerous detrimental effects. Possible complication of endotracheal tube suctioning

includes hypoxia, bronchospasm, atelectasis, tracheal ventilator-associate pneumonia, increase in intracranial pressure, and cardiac dysrhythmia. All intensive care nurses should be aware when performing this intervention of the potential hazards a patient is exposed to, and should endeavor to prevent or minimize these; updating endotracheal tube suctioning practices is considered to reduce the incidence of these complications.^[3]

Endotracheal Suctioning is a sterile procedure that nurses must perform efficiently and effectively in order to avoid infections and other complication. Nurses lack of adherence to aseptic technique is a factor in transmitting infection or cross infection which in turn increases patients length of stay and prone the patients to more risk of infection. Adequate knowledge along with the correct procedure performance is required to follow the aseptic technique which in turn prevents infection. So it's imperative to assess their knowledge for endotracheal suction. The scientific knowledge on which nurses base their clinical practice is often lacking.^[4]

Over the 3 year studied ninety –seven U.S intensive care unit participating impact from 2005 to 2007, total ICU occupancy ranged from 57.4% to 82.1% and the number of beds fill with mechanically ventilated patient ranged from 20.7 % to 38.9%.^[5]

Similarly of 64, 69,674 hospitalizations in the six states of USA, 2.8% received invasive mechanical ventilation and they all need endotracheal care. Projecting to national estimates there were 7, 90,257 hospitalization involving mechanical ventilation in 2005, representing 2.7 episodes of mechanical ventilation per 1000 population.^[6]

When an infection can be prevented by ordinary and reasonable care, nurses must use such care. Adequate knowledge is required to follow the aseptic technique. This study will also help to put ground and identify knowledge gaps pertaining Endotracheal suctioning in order to close those gaps for better patient outcome. VAP is estimated to occur in 9-27 % of all mechanically ventilated patients, with the highest risk being early in the course of hospitalization. It is the second most common nosocomial infection in the intensive care unit (ICU) and the most common in mechanically ventilated patients. VAP rates range from 1.2 to 8.5 per 1,000 ventilator days and are reliant on the definition used for diagnosis.^[7]

In Nepal, Nowadays the use of mechanical ventilator has been becoming an integral part for the management of the patient in the critical care and mechanical ventilator is available in almost all ICU in Nepal. Most renewed hospitals do have ventilator support and its use is in increasing trend as per the need. At Bir Hospital during 2069, 239 were admitted in intensive care unit of which 69 of them need ventilator support. Likewise, in the

context of Gangalal Hospital in the year of 2015 surgical department had conducted 1412 of surgeries(Annual report 2015), and all those patient need endotracheal care during Intensive care unit stay for certain days and according to annual report of 2016, total no. of operated cases were 1509 and all need ventilator support.

One study done by Bülbül Maras on 2016, in teaching hospital turkey on knowledge and practice levels regarding open system Endotracheal Suctioning and to investigate if there is a relationship between nurses' demographic characteristics and their knowledge and practice, the study suggests that the knowledge level of most of the nurses was good and their practice level was fair. Intensive care nurses must perform suctioning procedures safely and effectively to ensure delivery of quality of care and eliminate complications.^[8]

There are only few published studies were found in knowledge and practice regarding endotracheal care among nurses in the context of Nepal. Therefore, this topic has been chosen by researcher for the study.

METHODOLOGY

A cross-sectional descriptive design was adopted in Critical Care Units that are: Medical Intensive Care Unit (MICU), Coronary Care unit (CCU), Adult Surgical Intensive Care Unit (ASIU), Pediatric Surgical Intensive Care Unit (PSICU) of Shahid Gangalal National Heart Center (SGNHC), Kathmandu from Jan 7th 2017 to Feb 21st 2017 among 61 nurses who were selected by Non – probability purposive sampling technique. Semi-structured questionnaire was used as the data collection tool by face-face interview. Validity and reliability was maintained by the extensive review of related literature, consulting supervisor and by taking expert's opinion and pre-testing the instrument in 10% of sample size in different setting with similar characteristics. The collected data was checked for completeness and accuracy and the data was entered and analyzed in SPSS Software version 20. Descriptive and inferential statistics were to analysis the data. Data was interpreted in tabular and narrative form as per necessary. To find out the Knowledge level and Practice related question were complied with considering the score of correct answer as 1 and wrong answer as 0. The levels of Knowledge and Practice level were grouped as: **Knowledge level:** Good knowledge= More than 75%, Fair knowledge = (50 – 75 %) Poor knowledge = less than (50%). **Practice level;** Good practice= more than 75 %, Fair practice = (50 – 75%), Poor practice= less than (50%).

Formal approval letter was taken from concerned authority of research committee of Norvic Institute of Nursing Education and then study was conducted after taking ethical approval from Internal Review Committee (IRC) of SGNHC. After that, written informed consent was taken from each participant. The information obtained from each participant was kept confidential. Confidentiality and dignity of the participant was highly

considered throughout the study by respecting their thought and securing their question.

FINDINGS

Demographic Patterns

Table 1 shows the distribution of participants according to age, education level, working experience, working unit, marital status and training. With regards to age, majority of participants (62.3%) were aged more than 26 years. In terms of education level, the majority of participants (41%) had the degree of Bachelor of Nursing. Regarding work experience, the majority of (49.2%) had 1 to 5 years work experience. Likewise, majority of participants (37.7%) were from ASICU unit. It was also observed that the majority of participants (54.1%) were married.

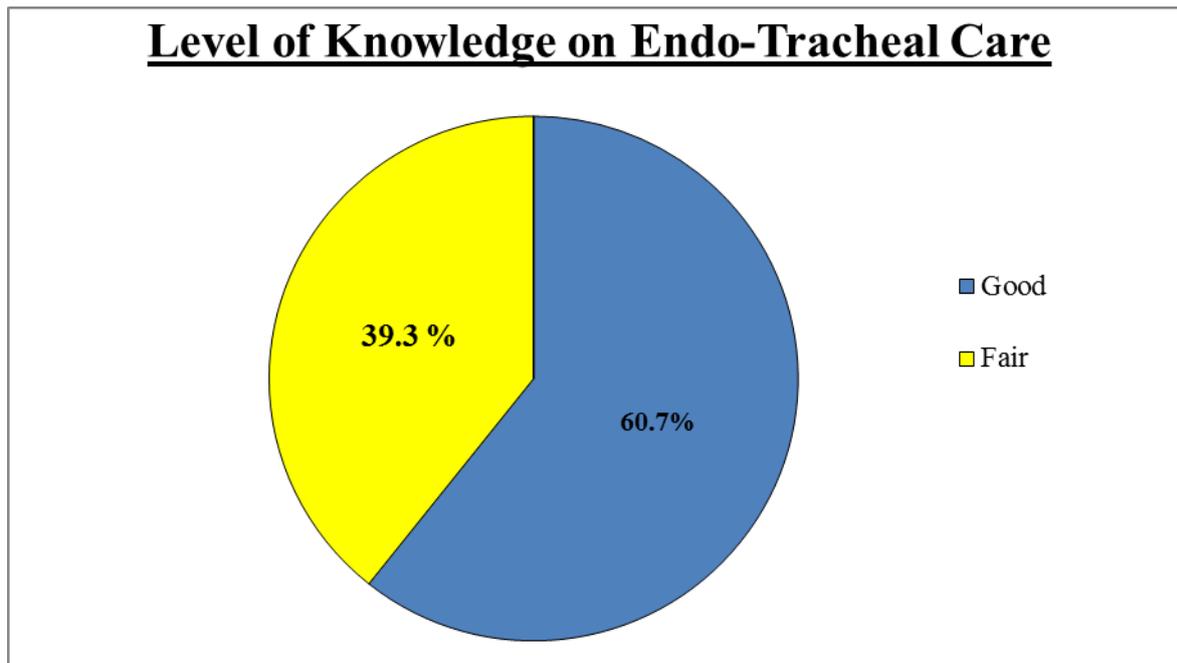
Table 1: Socio –demographic information's of Participants.

Variables	n= 61	
	Frequency	Percent
Age		
Is equal to or below 25	23	37.7
More than 26	38	62.3
Level of education		
PCL Nursing	20	32.8
Bachelor of Nursing	25	41.0
B. SC Nursing	16	26.2
Working experience		
Less than 1 year	10	16.4
1 to 5 years	30	49.2
5 to 10 years	19	31.2
10 to 15 years	2	3.2
Working Unit		
MICU	7	11.5
CCU	14	23.0
ASICU	23	37.7
PSICU	17	27.9
Marital status		
Married	33	54.1
Single	28	45.9
Training		
No	61	100

Table 2: Participant's Knowledge related to Endotracheal Care.

Components	n= 61			
	Frequency		Percent	
	Correct	Incorrect	Correct	Incorrect
Meaning of Endotracheal care	54	7	88.5	11.5
Meaning of Endotracheal suctioning	61	-	100	-
Size of Endotracheal suctioning (ETS) catheter	39	22	63.9	36.1
Size of suction catheter in adult patient	58	3	95.1	4.9
Indications for Endotracheal Suctioning	56	5	91.8	8.2
Prevention from hypoxia during suctioning	60	1	98.4	1.6
Recommendation time during suctioning	60	1	98.4	1.6
Endotracheal suctioning wall pressure	30	31	49.2	50.8
Humidification of endotracheal tube	35	26	57.4	42.6
Interval of changing suction catheter	54	7	88.5	11.5
Not recommended while suctioning	53	8	86.9	13.1
ETS frequency	27	34	44.3	55.7
Effect of increased ETS frequency	22	39	36.1	63.9
Reason behind discontinuation of suctioning	53	8	86.9	13.1
Exception for complication of ETS	55	6	90.2	9.8

Above table 2 shows that majority (88.5%) know about endotracheal care. Similarly, all know ETS. Majority (95.1 %) know size of adult ET catheter and 91.8 % answered correctly about ETS indications. About 98.4 % knows Prevention from hypoxia during suctioning and correct time for suctioning and so on.



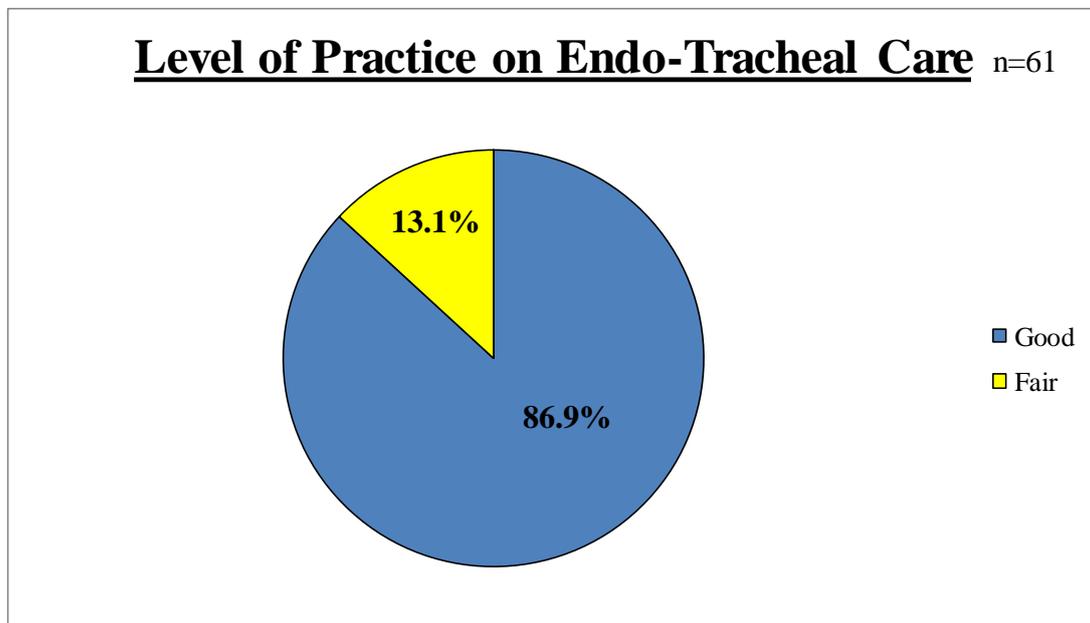
The figure reveals that 60.7 % participant's had good knowledge about Endo-Tracheal Care, whereas only 39.3% had fair knowledge. Nobody had poor knowledge.

Table 3: Participant's Practice on Endotracheal Care.

n = 61		
Components	Frequency	Percent
Ensuring the suctioning is required		
Yes	60	98.4
No	1	1.6
Bringing all the article in bedside including hand washing and putting sterile gloves		
Yes	55	90.2
No	6	9.8
Ventilated the patient with 100% oxygen		
Yes	60	98.4
No	1	1.6
Not applying pressure while inserting catheter		
Yes	61	100
No	-	-
Pulling back the catheter 1-2 cm if resistance is met		
Yes	56	91.8
No	5	8.2
Withdraw the catheter gently rotating it back		
Yes	60	98.4
No	1	1.6
Limit the suction time 10 to 15 second and not performing more than 4 suctioning.		
Yes	57	93.4
No	4	6.6
Instilled normal saline while suctioning		
Yes	36	59
No	25	41
Immediately resume ventilation (100%) on removal of the catheter from Endotracheal tube.		
Yes	55	90.2
No	6	9.8

Performing oral and nasal suctioning after Endotracheal suction		
Yes	59	96.7
No	2	3.3
Discard the suction tube after each suctioning		
Yes	53	86.9
No	8	13.1
Performed hand hygiene and document any changes during procedure		
Yes	61	100

Above table 3 shows that majority(98. 4%) ensures whether suction is required, 90.2% bring the article in bedside including hand hygiene, mask and sterile glove. Majority (98.4%) pre-oxygenated the patient with 100% oxygen and withdraw back with gently rotating the ET catheter during suctioning. Similarly, they (90.2%) resumes 100% oxygenation after suctioning of ET tube. Then 96.7% performs oral and nasal suction too. Lastly, all washes their hands after ETS care.



The figure reveals that 86.9% participants had good practice, and 13.1% had fair practice, and nobody had poor practice.

Table 4: Association of knowledge with selected Socio- demographic variables.

Variables	Fair	Good	*p value
Education status			
Certificate level	7	13	0.628
Bachelor level	17	24	
Working unit			
Medical ICU	13	8	0.009
Surgical ICU	11	29	
Marital status			
Married	11	22	0.297
Single	13	15	

* Chi- square test 'p' significant at <0.05 level

Table 4 shows that association of knowledge with selected socio –demographic factors. It is found out that working unit have significant association with

knowledge with (p value= 0.009) by using Chi square test.

Table no. 5: Association of Practice with selected Socio- demographic variables.

n=61			
Variables	Fair	Good	*p value
Education status			
Certificate level	2	18	0.921
Bachelor level	6	35	
Working unit			
Medical ICU	4	17	0.552
Surgical ICU	4	36	
Marital status			
Married	4	29	0.297
Single	4	24	

* Chi- square test ‘p’ significant at <0.05 level

Table 5 show that association of practice with selected socio demographic factors. It was found out that education, working units and marital status had no significant with practice as p value is more than 0.05 by using Chi square test.

Table 6: Correlation between Knowledge and Practice.

		n=61	
Variables		Practice score	Knowledge score
Practice score	Pearson Correlation	1	.292*
	p value		0.022
Knowledge score	Pearson Correlation	.292*	1
	p value	0.022	

Above table 6 shows, there is significant relationship between Knowledge and Practice (p value- 0.022).It

indicate that when knowledge score is change, practice score is also changes by 29.2 %.

Table 7: Correlation of knowledge and practice with age and working experience.

		n=61	
		Knowledge	Practice
Practice	Pearson Correlation	.292*	1
	p value	.022	
Age of the participant	Pearson Correlation	.312*	.433**
	p value	.014	.000
Working experience	Pearson Correlation	.305*	.384**
	p value	.017	.002

There is 29.2% interrelationship between Knowledge and practice which is statistically significant at 5% significance level (p-value=0.022). Similarly, knowledge is related with age and working experience by 31.2 and 30.5. Practice is related with age and working experience by 43.3 and 38.4. Therefore, age and working experience were related to knowledge and practice.

DISCUSSION

Demographic pattern of 61 participant at Shahid Ganalal National heart Center were age, level of education, working experience, working unit and marital status, training. In relation to this, majority of participants were age group more than 26 years (62.3%),

majority of participant were completed bachelor of nursing 25 (41.0%), majority of participants work in surgical ICU by ASICU 23(37.7%) and PSICU 17(27.9%) majority of participant have working experience of 1 to 5 year and no one have taken training which is similar to study conducted by Majeed HM at Bagdad teaching hospital, Iraq in 2017, where majority of nurses age were (20 to 29 years) old that were accounted for (60%), the level of education represented that most of them (54%) were from nursing college(34%)for less than one year were employee in intensive care unit. Majority of them (58) were employee (1 to 5) years were employee in nursing, (58%) of them have training session in intensive care unit.^[14]

Regarding nurse's knowledge on assessment for Endotracheal Suctioning, this study revealed that 100% of nurses said that it used to remove secretion from artificial airway by applying negative suction which indicate that all the available nurses have good knowledge about Endotracheal Suctioning. Similarly, study done on 2015 in Khartoum teaching hospital, Sudan by Elbokhary R, half of nurses 47.6% said its used to remove secretion from artificial airway while 38.1% of nurses said it used to remove secretion from trachea itself with reflect nurses misunderstanding regarding the term (Endotracheal), this lead to faulty procedure. The study also shows that 91.8% nurses think that metabolic acidosis is not an indication for Endotracheal suction, that means indication for suctioning is visible or audible secretion in Endotrachea, heightened peak airway pressure in mechanical ventilation and decreased saturation. This revealed that more than half of nurses are aware of the indication for suction. Similarly study done in 2015 in Khartoum hospital, Sudan by Raghda Elbokhary, 64.3% look for visible or audible secretion in their assessment and only 47.5% said that wheeze are not an indication for suctioning after auscultation. 42.9 % of nurses use ABG to monitor oxygenation. Difficulty to assess secretion presence makes secretion stagnate leading it to become thick and very difficult to suction.^[9]

In this study, nurse's knowledge regarding diameter of suction catheter 63.9% revealed that less than half the internal diameter of the tracheal tube. Therefore, more than half of nurses have knowledge about diameter of suction catheter which helps to prevent patient from tracheal trauma and hypoxia. Similarly, study did in on 2015 in Sudan, over half the nurses 64.3% use a size that is less than the internal diameter of the tracheal tube, correct tube size decrease patient distress and tracheal mucosa damage. Likewise, knowledge regarding size of suction catheter in adult patient, the study revealed that 95.1 % of nurses use 12 to 18 franz suction catheter which is the correct size for adult patient.^[9]

The study also assessed knowledge regarding pre oxygenation, suctioning duration, pressure of wall suction and the study showed that 98.2% of nurses know that pre oxygenation help to prevent from hypoxia, 98.4 % of nurses revealed that duration of suctioning is 10 to 15 second and 49.2% of nurses apply pressure of 80 to 120 mm of hg in adult patient while suctioning, 44.3% suction only when clinically indicated therefore study revealed that Shahid Gangalal hospital ICU nurses have adequate knowledge about pre oxygenation and duration of suctioning whereas poor knowledge in maintaining frequency and pressure of wall suctioning. Similarly, study done in Sudan, on 2015, 64.3% of nurses know that pre oxygenation minimize hypoxia, 45.2% do suction for 10 to 15 sec, 45.2% apply pressure of 80 to 120 mm of hg, 61.9 % suction only when clinically indicated correct suction interval and pressure reduce hypoxia and atelectasis.^[9]

Regarding complication and effect of endotracheal suction the study revealed that 90.2% nurses think that decreased blood volume is not and complication, 36.1% of nurses said that it causes atelectasis. This result that majority of nurses of Shahid Gangalal hospital are aware about complication such as traumatic injury, bronchospasm, ventilator associated pneumonia and minority of nurses are unaware about the effect of frequent suctioning. Similarly, study done in 2015 in Khartoum hospital of Sudan, the study revealed that 45.2 % of nurses think that decreased blood volume is not an complication, nurses lack of knowledge regarding complication complicate the patient status even more and 16.7% of nurses said that it causes atelectasis. This reflects that nurses lack of knowledge pertaining suctioning frequency. Suctioning the patient too much would damage the lung mucosa.^[9]

Nurses knowledge regarding discontinuation of the procedure was assessed in this study. It showed that 86.9% think that change in heart rate and cardiac ectopy. Likewise, 86.9 % revealed that instillation of sodium bicarbonate while suctioning is not recommended whereas, 57.4% of nurses revealed that humidification of endotracheal tube can be done by humidifying the ventilator but not by instillation of normal saline. About 88.5% of nurses revealed that suction catheter should be changed after each suctioning. Similarly, study done in 2017, Baghdad teaching Hospital, Iraq by Majeel HM in 2017 showed 74% most of them sate instillation of sodium bicarbonate through ET tube is not recommended due to lungs tissue damage, 46% of nurses said normal saline instillation is not recommended through performing ET suctioning and 32% of nurses said should be discontinue suctioning when the heart rate is above or below normal level, 96.66% reveled suction catheter should be changed after each suctioning. Normal saline instillation that may be cause of tachycardia, hypoxia and dyspnea.^[14] Similarly study done by Frota OP, on 2013, participant asked about routine instillation of Normal saline or other fluid before the ETA and result proved deficient and it was poor as only 44.5% correctly stated that it should not be applied routinely.^[11]

This study also assessed the practical level of ICU nurses, result showed that 90.2% bring the article in bedside including hand hygiene, mask and sterile glove, it shows that majority of nurses have good practice level which help to prevent from infection by providing proper management and sterile technique. Similarly study done in Khartoum teaching hospital, Sudan on 2015, all nurses 100% check functioning of suctioning apparatus.^[9] In contract of this study, over half of nurses 80% dont wear face mask and all of them (100%) don't use sterile gloves reflecting their negligence for infection control issue.^[9] Similarly, study done by Frota OP, in the participant were ask the action of hand hygiene before and after the procedure and 100% give correct answer.^[11] In this study, 91.8% of nurses pull back if resistance is met, 98.4% withdraw catheter gently pulling it back,

93.4% limit the suction time 10 to 15 second and don't perform more than 4 suction per suctioning. Similarly, study done by Bulbul Maras *et al.*, hospital in western Turkey revealed that 81.9% correct the aspiration time (10-15s) and in contrast only 5.6% was found to performed the aspiration a maximum of 3 times consecutively.^[8]

Likewise, in this study, result shows 41% don't pour normal saline while suctioning. While in similar study done in hospital of western turkey by Bulbul Maras *et al* showed only 2.8% don't humidified by passing normal through catheter.^[8] In contrast, study done in Baghdad teaching hospital, Iraq by Majeed HM in 2017 showed that majority of (82 %) of nurses used normal saline or distil water to rinse suctioning tube until clear and the study assessed the practical level of ICU nurse which shows incorrect practice and it lead to hypoxia and chance of VAP.^[14] Again, in this study results shows that 90.2% resume ventilation (100%) on removal of suction catheter. Majority (96.7%) of participants performed oral and nasal suctioning after ET suctioning, it shows that nurses are more conscious about prevention from ventilator associated pneumonia. This study also shows that 86.9 % of nurses discard the suction catheter after each suctioning. Which is supported by the study done in Bagdad teaching, Iraq by Majeed HM in 2017 which showed that 80% of nurses discard the equipment after each suctioning.^[14] Therefore participants are more aware about prevention from ventilator associated pneumonia. This study shows that 100% participant said they performs hand hygiene and documents the any changes. It is supported by study done in Khartoum teaching hospital by Elborkhary R, 100% of nurses perform hand hygiene but 100% don't document the changes in vital sign.^[9] which is contrast for this study.

In this study, participants had good knowledge by (60%) and 39.3% have fair knowledge likewise, 86.9% participant have good practice, 13.1% had fair practice. It is supported by study done in Bagdad teaching Hospital, Iraq in 2017 showed that nurses have best practice level than knowledge level.^[14] and similar study conducted in Khartoum Teaching Hospital Sudan in 2015, 85.7% have poor knowledge level, 76.7% have fair practice level.^[9]

In this study, the association of knowledge with selected socio –demographic factors, it is found out that working unit have significant association with knowledge with (p value = 0.009). Similarly, study done by Gul Bulbul Maras in teaching hospital, Western Turkey, the relationship between the type of unit and the nurses knowledge score is statically significant.(p=0.013).^[8] In contrast, the study done by Akram Ansari, *et al.*(2012),in Shahid Beheshti Hospital, Iran, the type of unit and nurses working experience were not significantly related to their knowledge and practice.^[19]

In this study, the association of practice with selected socio demographic factors, it was found that education, working units and marital status had no significant with

practice. Similarly study done in 2015 at Khartoum hospital, Sudan, there is no significant between working experience and level of knowledge and practice.^[9] Similarly study done in 2017 at Bagdad Teaching Hospital, there is no significant relationship of socio demographic variable with knowledge and practice.^[14]

CONCLUSION

The study finding revealed, Knowledge level was good among (60.7 %) whereas fair among (39.3%). Likewise, Practice level was good among (86.9%) and fair among (13.1%). Only working unit has significantly associated with knowledge (chi- square 'p' value = 0.009). This study shows that when knowledge score is changes, practice score is also changes by 29.9%. There is 29.2% interrelationship between Knowledge and practice which is statistically significant at 5% significance level (p' value=0.022). Similarly, knowledge is related with age and working experience by 31.2 and 30.5. Practice is related with age and working experience by 43.3 and 38.4. Therefore, age and working experience were related to knowledge and practice.

Conflict of Interest: None

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