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Awareness of the Principles of Endotracheal Tube Suctioning Among Critical Care Nurses Working in Rural Tertiary Care Hospital

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Research Article

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Abstract

Introduction: Ventilator-associated pneumonia is often a common complication encountered in critically ill -patients on ventilatory support in intensive care units. Intubated patients have increased susceptibility for mucous production and decreased airway clearance, paving risks for pneumonia and atelectasis. Maintenance of bronchial hygiene hence becomes a quintessential strategy in such patients; endotracheal suctioning being a salient component. Our study aims at assessing the level of awareness of principles of endotracheal suctioning in adults amongst critical care nurses of our rural tertiary care hospital.

Aim: To study the awareness of nurses about principles of endotracheal tube suctioning practices in adult critical care units rural tertiary care unit.

Materials and methods: After obtaining clearance from the Institutional Ethical Committee the study was conducted. A questionnaire was prepared taking into account the demographic details, knowledge ,attitude and practice skills of the nursing staff, and the same distributed amongst 68 critical care nursing staffs who were willing to be the part of study.

Results: The obtained data were expressed in percentage. Most common age group was between 20–29 years (79.41%). All 68 nurses (100%) believe endotracheal tube (ETT) suctioning is helpful for the patient and 42 nurses (61.7%) does the suctioning based on clinician order. 48 (66%) of nurses believe that auscultation before the ETT suctioning is a good practice. All 68 (100%) nurses keep an eye on oxygen saturation, respiratory rate of the patient pre, during and post suctioning. Only 50 (73%) nurses felt the monitoring of all the parameters like heart rate, oxygen saturation, breath sounds, respiratory rate, End tidal carbon dioxide (EtCO2) is important. Out of 68 nurses 46 nurses felt the negative pressure required for ETT suctioning is 80-150 mm Hg. 49 (72%) out of 68 nurses claimed that the knowledge related to ETT suctioning is updated in continued nursing education.

Conclusion: The ETT suctioning is an important part in the ventilated patients. The thorough knowledge of the suctioning is mandatory for the critical care nurses. Frequent survey, training and updating the knowledge of the critical care nurses should be considered.

Keywords: Endotracheal Suctioning; Bronchial Hygiene; Ventilator Associated Pneumonia

Abbreviations: ETT: Endotracheal Tube; ICU: Intensive Care Units; RR: Respiratory Rate.

Introduction

Ventilator-associated pneumonia is often a common complication encountered in critically ill -patients on ventilatory support in intensive care units. Intubated patients have increased susceptibility for mucous production and decreased airway clearance, paving risks for pneumonia and atelectasis [1,2]. Maintenance of bronchial hygiene hence becomes a quintessential strategy in such patients, endotracheal suctioning being a salient component. Ensuring that endotracheal suctioning is done with professional competence by nursing staff becomes a cardinal factor in providing quality care to patients [3]. Negligence or incorrect methods of suctioning can lead serious complications such as bleeding, trauma to airway structures, bronchoconstriction, hypoxemia, alteration in mean arterial pressure, heart rhythm disturbances and eventually ventilator associated pneumonia [4]. Our study aims at assessing the level of awareness of principles of endotracheal suctioning in adults amongst nursing staff working in critical care units of rural tertiary care.

Materials and Methods

After obtaining clearance from the Institutional Ethical Committee, an observational, prospective, cross sectional study was conducted in the month of February 2020. A questionnaire was prepared taking into account the demographic details, knowledge ,attitude and practice skills of the nursing staff, and the same distributed amongst 68 nursing staff working at intensive care units (ICU) at our hospital who were willing to participate in the study. 68 nurses in medical, surgical and cardiac intensive care unit, willing to participate in the questionnaire were considered in inclusion criteria. The questions as described in the Table no 1 was given to all participants. An adequate time was given to complete the questioner. Non- critical nursing staffs, nurses who have only 1 month of experience of ICU were excluded from the study. Parameters studied were knowledge, awareness and skills of suctioning practices of endotracheal tube.

Socio-Demographic Details		
S.R NO	Questions	**Options**
1	What is your gender	○ Male ○ Female
2	How old are you?	○ <20 years ○ 20-29 year ○ 30 – 39 years ○ 40-49 years ○ 49 – 59 years
3	What is the highest degree of nursing education you attained?	○ Bachelors ○ Masters ○ Diploma
4	What is your schedule of shift at work?	○ Morning ○ Afternoon ○ Night ○ On rotation basis
5	Currently you are working in which ICU?	○ Medical ○ Surgical ○ Respiratory ○ Cardiac
6	How many years of work experience do you have as nursing staff?	○ <6 months ○ 6 months to 1 year ○ 1 to 3 years ○ 3 to 5 years ○ > 5 years
Knowledge		

1	Do you believe that ETT suctioning is beneficial to the patient?	○ Yes ○ No
2	How often you do suctioning of the ETT?	○ Every hourly only ○ Every 2 hourly only ○ Every four hourly only ○ As per clinician advice and as and when required
3	Do you auscultate the patient before and after suctioning? Or insist the resident on-call to do so?	○ Yes ○ No
4	What are the clinical parameters you assess in before, during or after suctioning?	○ SpO2 ○ Heart rate ○ Respiration rate ○ Breath sounds ○ EtCo2 ○ All of the above
5	What is the negative pressure used for the suctioning of ETT?	○ 30-40 mmHg ○ 50-70 mmHg ○ 80-150 mmHg ○ >200mmHg
6	What is the type of suctioning used in your workplace?	○ Open ○ Close ○ Both
7	How do you update your knowledge regarding effective ETT suctioning practices?	○ Training under clinician ○ Reading books/journal ○ Continued Nursing education ○ None of the above

Table 1: Socio-Demographic Details.

Results

The obtained data were compiled and expressed in percentage. Out of 68 nurses, 28, 25 and 15 were from medical, surgical and cardiac ICU. Highest number of nurses was from the age group of 20 – 29 years (79.41%) and among all the male nurses were on highest count i.e. 47 (69.11%). The maximum number of 48 (70.5%) nurses serving in rural critical care was having diploma qualification. 29 (42.64 %) out of 68 nurses had an experience of 1 to 3 years. Nearly 17 (25 %) nurses had an experience of more than 5 years. Only 10 (14.7%) nurses had an experience of less than 6 months. All 68 nurses (100%) believe endotracheal tube (ETT) suctioning is helpful for the patient and maximum number of nurses (42 nurses 61.7%) does the suctioning based on clinician order. 45 (66%) nurses believe that auscultation before the ETT suctioning is a good practice. All 68 (100%) nurses keep an eye on oxygen saturation, respiratory rate of the patient pre, during and post suctioning. 34 (50%) nurses agreed that they do auscultation or ask resident doctor to auscultate before the suctioning. While only 30 (44%) nurses felt monitoring the heart rate is necessary while doing ETT suctioning. Out of 68 nurses 58 (85%) nurses felt monitoring breath sounds and 42 (61.7%) nurses felt monitoring end tidal carbon dioxide ($EtCO_2$) is important for suctioning procedure. Only 50 (73.5%) nurses felt the monitoring of all the parameters like heart rate, oxygen saturation, breath sounds, respiratory rate, $EtCO_2$ is important.

Out of 68 nurses 46 (67.6%) nurses felt the negative pressure required for ETT suctioning is 80-150 mmHg. Out of 68 nurses 48 nurses (71%) felt that the type of suctioning is used is closed type.

The 30 (44.1%) nurses, most of the time preferred to do the ETT suctioning only with the advice of clinicians. 49 (72%) out of 68 nurses claimed that the knowledge related to ETT suctioning is updated in continued nursing education.

Discussion

The rationale for airway hygiene is to prevent pneumonia and respiratory failure [5]. In our study all the 68 nurses felt that it is an important job to ensure the suction of the ventilated patient is must. Endotracheal suctioning is an invasive procedure with more potent risk

of developing complications [6]. Usually there are no fixed guidelines how frequently the suctioning has to be done. But in our institutional practice we either follow 2nd hourly ETT suctioning or more frequently based on the clinical status. The final decision maker will be the clinician attending the patient. In our study nearly 42 (61.7%) nurses still follow the guidelines of the institution and there is a need of educating the remaining nurses.

Suctioning is an invasive technique and may lead to hypoxia, sudden bradycardia, tachycardia, hypercapnia, trauma to the respiratory tract and iatrogenic infection etc. Studies have revealed changes in the respiratory rate (RR) and SPO_2 due to the stimulation of the vagus nerve while suctioning. Hence, one should assess and keep close monitoring the patient before, during and after the suctioning. Smith, et al mentioned in his article that many nurses are unaware of the importance of assessing the need for suctioning practices;[7] they fail to perform comprehensive assessment of patient's respiratory status, which is mainly inclusive of chest auscultation [8,9]. In our study the only 45 (66%) of nurses felt the auscultation for breath sounds is important. Suctioning out the oxygenated air along with the secretions is a major cause for the development of hypoxia in patients on mechanical ventilatory support [9-11]. Hence, pre-oxygenation or hyper-oxygenation is a recommended practice [12]. It is interesting to know that all 68(100%) nurses practice in monitoring of oxygen saturation, respiratory rate of the patient pre, during and post suctioning. All the nurses practice 100% pre-oxygenation using the ventilator settings.

Only 30 (44.1%) nurses felt monitoring the heart rate is necessary while doing ETT suctioning. Out of 68 only 50 (73.5%) nurses felt the monitoring of all the parameters like heart rate, oxygen saturation, breath sounds, respiratory rate, $EtCO_2$ is important while doing suctioning procedure.

The size of the catheter needs to be determined prior to endotracheal suctioning to reduce the risk of trauma. The widely accepted formula for calculation size of suction catheter is, Catheter size in French = (ET-tube size [mm] − 2) × 2 [13,14]. All 68 (100%) nurses accepted that they know which size catheter to be used for the adult patient we could not assess whether they know the formula of calculating the size of the catheter. Hence it is difficult to comment on the knowledge of the size selection of the suction catheter. Studies have shown the necessity for usage of the lowest possible suction pressures sufficient enough to clear the tracheal secretions to reduce the risk of atelectasis, hypoxia, and damage to the tracheal mucosa. It is recommended to use a negative pressure of 80–120 mm Hg for endotracheal suctioning [12]. In our study 46 (67.6%) nurses felt the negative pressure required for ETT suctioning is 80-150 mmHg. Definitely there is a need of educating rest other nursing staff as under pressure may not be beneficial to the patient and over pressure may cause the harm to patient.

It is always important to maintain the sterility of the suction catheter to be used by following a "non-touch" practice. Studies have also revealed a noticeable gap between the current knowledge of the nursing staff and the existing suctioning practices followed up [15,16]. There are two types of suctioning i.e. open and closed suctioning. Out of 68 nurses 48 (71%) nurses felt that the type of suctioning is used in institution is closed type which is incorrect. Being in rural area it is very challenging to meet the quality of patient care with available resources. Since most of the patients who are getting admitted are economically backward, the open suction technique is used in this setup as per institutional guidelines. Unfortunately major number of nurses who participated is not at all aware of type of suctioning we use. Definitely we need to educate the nurses regarding the types of suction. The reason of unawareness could be lack of exposure to closed suction technique. Overall as the nurses get more experience their understanding of the suctioning technique of endotracheal tube improves a lot.

Limitations of the Study

Lesser number of the samples taken in this study as it is a rural tertiary care hospital. We did not study the work pattern of nurses, like whether they are overburdened with writing work or medications etc. We also did not consider the ratio of patient to nurses which actually affects the quality of patient care.

Conclusion

The knowledge, attitude and practice of critical care nurses is above the average. Necessary steps are initiated to improve the knowledge and simulation based training was arranged to train all the nurses. It is important that regularly the tertiary care centre should do such survey and teach the nurses if required.

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