Knowledge And Practices Regarding Open-System Endotracheal Suctioning Among Intensive Care Unit Nurses At The National Hospital Of Sri Lanka

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Abstracts: Open-system endotracheal suctioning (OS-ETS) is performed on critically ill requiring mechanical ventilation to keep the airway patent. Intensive care unit (ICU) nurses need to perform this procedure ensuring patient safety while taking measures to prevent ventilator associated pneumonia. This study aimed at assessing knowledge and practices of ICU nurses regarding OS-ETS. In phase I, a descriptive cross-sectional survey was carried out to assess knowledge regarding OS-ETS among a convenience sample of 150 ICU nurses from the National Hospital of Sri Lanka using a pre-tested self-administered questionnaire. In phase II, a subsample of 50 ICU nurses who participated in the survey were observed while performing OS-ETS by two trained independent raters using a pre-tested previously validated structured 20 item check list. Data were analyzed using SPSS version 21. Mean overall knowledge score was 57.93 ± 12.81, while the mean overall practice score was 63.70 ± 7.81. Participants had good knowledge on indications, suction catheter selection criteria, infection control practices, hyperoxygenation, suction pressure selection and post suction practices. Poor knowledge was evident regarding contraindications, hazards/ complications, patient positioning and suctioning techniques. Good practices were observed among 26 (56%), while poor practices were observed in areas of patient positioning, verbal reassurance, infection control practices and chest auscultation. The findings revealed that ICU nurses have poor overall knowledge on OS-ETS though their practices were favorable. The study highlights the need for continuous professional education for nurses to address the gaps identified and establishing practice guidelines regarding OS-ETS for improving quality and safety in health care.

Keywords: Intensive care nurses, open system endotracheal suctioning, knowledge and practices

Introduction:

Open-system endotracheal suctioning (OS-ETS) procedure is done to keep the airway patency among critically ill patients requiring mechanical ventilation. It is a component of bronchial hygiene therapy and mechanical ventilation (MV) that involves the mechanical aspiration of pulmonary secretions from a patient's artificial airway to prevent its' obstruction (Guglielminotti, et al., 1998). There are guidelines and best practices recommended to prevent the risk of adverse effects of endotracheal suctioning (ETS). The Main aim of ETS is to keep air pathways permeability; provide sufficient oxygenation; avoid the risk of ventilator-associated pneumonia (VAP), prevent atelectasis and pulmonary consolidation (Seckel, 2008). Intensive care unit (ICU) nurses who care for critically ill patients 24 hours need to follow guidelines to ensure patient safety and prevent VAP. However, previous studies showed that ICU nurses' knowledge and

practices in adhering to current guidelines were insufficient. Purpose of this study was to assess knowledge and practices of ICU nurses' regarding OS-ETS.

Methodology:

The study was designed as a single center survey and observational study and took place at the largest teaching hospital in Sri Lanka. A descriptive cross-sectional survey (phase I) was carried out to assess knowledge among a convenience sample of 150 ICU nurses working at eleven ICUs at the National Hospital of Sri Lanka (NHSL) using a pre-tested self- administered questionnaire adopted from a previously validated tool with expert opinion. An overall score of ≥57.93 was considered as good knowledge and <57.93 as poor according to means. A proportionate convenience sample of 50 nurses from those who participated in the survey were observed (phase II) by two trained independent raters while performing OS-ETS procedure using a structured observational check list adapted from a previously validated structured 20 item check list evaluated on a dichotomous scale; 0=incorrect, 1= correct. An overall score of ≥63.70 was considered as good practice and <63.70 as poor practice according to mean score. Inter-rater reliability was established. Ethical approval was obtained from Ethics Review Committee of University of Sri Jayewardenepura for the study. Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 21.

Results and discussion:

Most of the participants 88.7% (n=133) were female and 48% (n=72) of participants included in age range of 30-39 years. The mean age of the Participants was 31.61±5.37 SD years. Majority 56% (n=84) of the Participants were married and (n=82) 54.7% of ICU nurses categorized under grade III. Majority of the Participants (n=125) 83.3% had highest educational qualification as Diploma in nursing. Most of the participants 82% (n=123) were educated/trained on ETS procedure and only 12% (n=19) had special training in intensive care nursing (Table 1). The mean overall knowledge regarding OS-ETS was 57.93± 12.81, while the mean overall practice level was 63.70 ± 7.81. Among the participants only 44.7% had good knowledge on OS-ETS (Table 2) and 52% had good practice on OS-ETS procedure (Table 3). The findings are of great concern as many nurses failed to demonstrate an acceptable level of knowledge but good practice level that support previous findings of Day, et al., (2001). Poor knowledge regarding ETS among intensive care unit nurses could be dangerous for the patient who have artificial airways (Negro, et al., 2014). Findings of the current study shows a disparity between the participants' knowledge and practice.

Table 1: Socio-demographic characteristics of participants

Variable	Category	Number (n=150)	Percent (%)
Gender	Female	133	88.7
	Male	17	11.3
Age Age	20-29 years	63	42
	30-39 years	72	48
	40-49 years	13	8.7
	More than 50 years	2	1.3
Civil status	Married	84	56
	Unmarried	66	44
Grade	Grade I	11	7.3
	Grade II	57	38
	Grade III	82	54.7
Highest educational qualification	Diploma in nursing	125	83.3
	Graduate	25	16.7

Variable	Category	Number (n=150)	Percent (%)
Total experience as a nurse	Less than 1 year	33	22
	1-2 years	11	7.3
	3-5 years	27	18
	6-10 years	57	38
	More than 10 years	22	14.7
ICU work experience	Less than 1 year	42	28
	1-2 years	15	10
	3-5 years	35	23.3
	6-10 years	38	25.3
	More than 10 years	20	13.3
Any education/training on OS-ETS	Yes	123	82
	No	27	18
Special training on intensive care	Yes	19	12.7
	No	131	87.3

Table 2: Distribution of practice level among ICU nurses (N=50)

Variable	Frequency (n=150)	Percent (%)
Good knowledge	67	44.7
Poor knowledge	83	55.3

Table 3: Distribution of practice level among ICU nurses (N=50)

Variable	Frequency (N)	Percent (%)
Good practice	26	52
Poor practice	24	48

Gender had significant relationship with knowledge regarding open-system endotracheal suctioning (p=0.02). The Participants had good knowledge on indications (93.3%), accurate suction catheter selection criteria (84%), infection control practices (82.7%), hyperoxygenation (75.3%), selection of negative pressure range (51.3%), catheter insertion technique (54.7%), suction application stage (86.7%) and post suction practices (78%). But some deficiencies were identified in some knowledge areas on contraindications, hazards/complications, patient positioning (48%), normal saline instillation (27.3%), suction pressure application technique (36%), suction catheter withdrawal technique (12%), time duration per suction pass (48%), hyperoxygenation period in between suction passes (28.7%). Particular attention should be paid to technical aspects of the procedure, such as suction catheter size, the level of negative pressure, the depth of suction catheter insertion, and the duration of suctioning, which have a huge impact on ES related complications (Maggiore & Volpe, 2010). During the observation good practice (56%) was observed only in areas such as preoxygenation, hyperinflation, normal saline instillation, selection of suction catheter, negative pressure application technique and time duration per suction pass. Almost half of the participants (48%) have not adhered to the practice guidelines in some areas such as patient positioning, verbal reassurance, infection control practices, negative pressure range selection, suction catheter withdrawal technique and auscultation of the chest.

The observational design was used to gain insight into what was happening in actual practice. Observational study involved collection of data that specify practices or events selected for observation and are conducted in participants' natural environments (Kelleher & Andrews, 2008). Direct observation was potentially a more comprehensive method to ascertain how nurses performed in real situations and to identify differences if any in practice (Said,

2012). Nosocomial infection (NI) which also called "hospital-acquired or health care-associated infection" is a serious public health issue affecting hundreds of millions of people every year worldwide (WHO, 2016). Health care associated infections (HCAI) increase morbidity, mortality, length of hospital stays, and costs (Collins, 2008); therefore, more research and changes in practice are needed to ensure hospital safety and prevent HCAIs (WHO, 2011). Infection control practices of OS-ETS prior to suction showed that 80% of the participants did not wash hands before starting the procedure and out of them 28% used alcohol hand rub as an alternative for hand washing prior to suction.

Almost all participants in the observational study used at least a single personal protective equipment, but none used all the PPE necessary. All of them, n=50 (100%) were wearing a mask, 14% (n=7) were wearing a polythene disposable apron, 70% (n=35) were wearing gown and only 4% (n=2) wore goggles/eyewear before practice. This may suggest a perconception among nurses that wearing gloves and using 'non-touch' aseptic technique when inserting the suction catheter that neglects the need for frequent hand washing. Yet, the literature clearly suggests that use of gloves do not replace the need for hand washing (Pratt, et al., 2001).

A majority of participants (66.7%) in the survey revealed that not having formal training on OS-ETS as the most common barrier. Half of the participants (50%) noted that lack of knowledge on OS-ETS as another barrier. Moreover, 44% of them identified no supervisory guidance to monitor the effectiveness of ETS practice and lack of experience/practice on OS-ETS as barriers. Only 38% of the participants reported that unavailability guidelines in the unit/hospital for ETS as a barrier.

Conclusion

ICU nurses have poor overall knowledge on OS-ETS. Their overall practices were favorable but deficiencies that could affect patient safety were evident. The study highlights the need for continuing education for nurses to address the gaps identified and establishing practice guidelines regarding OS-ETS for improving quality and safety in health care. Therefore, on-going education programmers focusing on improving both theory and practice should be implemented by the hospital authorities. In addition, practice guidelines on ETS should be implemented and continuous monitoring through nursing audits should be done for prevention of VAP and thereby to improve the quality of care and safety of patients.

References:

Burke, J., 2003. Infection control-A problem for patient safety. *The New England Journal of Medicine,* 348(7), pp. 651-656.

Collins, A., 2008. *Preventing Health Care-Associated Infections.* [Online] Available at: https://www.ncbi.nlm.nih.gov/books/NBK2683/ [Accessed 01 April 2018].

Guglielminotti, J., Desmonts, J. & Dureuil, B., 1998. Effect of tracheal suctioning on respiratory resistances in mechanically ventilated patients' chest. 113(5), pp. 1335-1338.

Kelleher, S. J. & Andrews, T., 2008. An observational study on the open-system endotracheal suctioning practices of critical care nurses. *Journal of Clinical Nursing,* 17(3), pp. 360-369.

Maggiore, S. & Volpe, C., 2010. *Springer Link.* [Online] Available at: https://link.springer.com/article/10.1007/s13546-010-0211-1 [Accessed 20 October 2017].

Negro, A., Ranzani, R., Villa, M. & Manara, D., 2014. Survey of Italian intensive care unit nurses' knowledge about endotracheal suctioning guidelines. *Intensive and Critical Care Nursing,* 30(6), pp. 339-345.

Pratt, R. J.; Pellowe, C.; Loveday, H. P.; Robinson, N.; Smith, G. W., 2001. The Epic Project: Developing

National Evidence Based Guidelines for Preventing Healthcare Associated Infections. Phase I: Guidelines for Preventing Hospital Acquired Infections. *Journal of Hospital Infection,* 47(Suppl.), pp. S1-S82.

Said, A. T., 2012. *Knowledge and practice of intensive care nurses on prevention of ventilator associated pneumonia at Muhimbili National Hospital, Dar Es Salaam, Tanzania,* s.l.: s.n.

Seckel, M., 2008. Does the use of a closed suction system help to prevent ventilator associated pneumonia?. *Critical Care Nurse,* 28(1), pp. 65-66.

WHO, 2011. *World Health Organization.* [Online] Available at: http://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507_eng.pdf?sequence=1 [Accessed 19 April 2018].

WHO, 2016. *Health care without avoidable infections:The critical role of infection prevention and control.* [Online] Available at: http://www.who/his/sds [Accessed 5 May 2018].