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The gap between knowledge and practice in standard endo-tracheal suctioning of ICU nurses, Shahid Beheshti Hospital

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ABSTRACT

Aims: Endotracheal suctioning is a vital process to keep the airways open. The method of performing endotracheal suctioning has a great effect on its complications and effectiveness. This study was carried out with the aim of assessing gap between the knowledge and performance of nurses' working in intensive care units (ICU) in tracheal suctioning.

Methods: In this cross sectional study, knowledge and performance of 44 nurses working in three ICUs in Shahid Beheshti Hospital, Kashan, Iran, was analyzed in three areas of prior, during and post suctioning, using a 26 item questionnaire and check list in 2010. kruskalwallis test, spearman correlation coefficient and SPSS14 software were used for data analysis.

Results: In the 8 items in question of prior suction the average score for knowledge and performance were 5.4 (±1.12) and 0.81 (±0.71) respectively and in the analysis of ten items during suction an average score of 7.7 (±1.09) and 4.6 (±0.75) were obtained for knowledge and performance respectively. In 8 items of post suction the average score of knowledge was 6.47 (±0.69) and that of performance was 3.86. In general, from 26 possible points, the average score of knowledge and performance were 19.59 and 8.75 respectively. The type of ICU and nurses' working experience were not significantly related to their knowledge and performance.

Conclusion: This study revealed that despite acceptable knowledge, nurses' performance in endotracheal suctioning is poor. This shows that education alone is not sufficient for observance of the standards.

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1. Introduction

Patients hospitalized in ICU suffer from an increase in secretions in airways and difficulty in evicting these secretions due to many causes such as existence of artificial airways, disorder in normal function of Ciliary cells and defect in coughing reflex [1, 2]. So the patients need periodical suctioning [3]. Therefore endotracheal suctioning is one of major operations performed in ICU [4-7]. Some studies reflect that a patient may need endotracheal suctioning 3 to 24 times in each 24 hours [8]. Endotracheal suctioning, if not performed with appropriate technique, will lead to several consequences and perils such as respiratory and cardiac defects, trachea endothelial trauma, bleeding, increase in brain pressure, hypoxemia and cardiac arrhythmia

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and even may cause cardiac arrest and death [4, 9-11].

Endotracheal suctioning must be performed according to right standards and codes in order to reduce its side effects [12]. Wood (1998) demonstrated in a study that performing suctioning by well-educated nurses and after checking patient's need has better effect and fewer side effects than performing it routinely at every two hours [11]. Celik and Elbase (2000) also revealed in a study that performing suctioning by themselves according to the codified protocol will minimize its side effects [10].

Despite the existence of several studies, a manual on the basis of evidences about tracheal suctioning is not available in most units [2]. Therefore performing suctioning with the observance of such experimental evidences by nurses is on question [9]. Day et al in two separate studies in intense and acute care units, realized nurses' lacking knowledge which was reflected in their performance [2, 13]. Golzeles et al (2004) also showed that there is a noticeable gap between nurses' knowledge and performance of endotracheal suctioning. According to this research their knowledge was much better than their performance and this knowledge was not reflected in their performance [9]. Furthermore, Kelher and Andrew (2008) stated that different nurses acted differently in endotracheal suctioning and didn't observe experimental recommendations so the quality of this nursery care was lower than expected [14].

Despite the importance of the issue, few documented studies in Iran were available to researcher. Hadian Shirazi et al (2009) in an investigation in Neonatal Intensive Care Units (NICUs) demonstrated that the nurses' knowledge level was mean and low, but as a consequence of education, their knowledge and performance would improve [15]. Bighamian et al also showed the effect of education in improvement of nurses' performance in endotracheal suctioning in adult's ICU [16].

One of the challenges for nursery services in country is improvement in clinical methods' quality. In the past years special attention was given to education during service. The question to be asked is how much this increase in knowledge will affect their clinical performance?

Assessment of clinical performance is possible by direct observation of nurses' behavior, but analysis by direct surveillance on nurses' performance on the bedside of patients was rarely paid attention. Regarding the importance of performing endotracheal suctioning correctly in ICUs, the researcher was determined to implement a research to investigate nurses' knowledge and performance in the field of endotracheal suctioning in ICUs of Kashan Hospital. There is a hope that this research will help to clarify the status of this care in ICUs and by finding weaknesses, offer solutions to improve the quality of this service.

2. Methods

This cross sectional study was done between August 2010 and March 2011. The method of sampling was capitation and included all the nurses working in ICUs of Shahid Beheshti hospital in the city of Kashan. The criteria for inclusion in the study were to have the BS degree and at least one month working experience in ICU.

Data gathering tools in this research were a questionnaire to assess the knowledge and a check list according to it to analyze the performance, which were planned by the researchers after bibliographical studies and revision of books and previous studies on the issue. To plan the questionnaire and check list, standard recommendations and protocols for endotracheal suctioning was gathered from creditable scientific resources and articles and was set up in the form of questionnaires and check lists. For example, it is mentioned in the books and articles that before suctioning the sounds of lungs must be listened to. This issue was mentioned as "Listening to the lungs before endotracheal suctioning is necessary." with the choices of "true" and "false" in the questionnaire and as "Listening to the lung" in the check list. In order to analyze the content of the

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questionnaire and check list, it was handed to ten members of scientific council of the faculty of nursing and tutors of ICU and was approved after applying their views and suggestions. To determine the perpetuity of knowledge questionnaire, in was filled out by five nurses in two turns with intervals of two weeks and the correlation coefficient of scores of two tests was calculated 89%. To determine the perpetuity of performance check list, performing suctioning on five patients was analyzed simultaneously by two nurses and the check list was filled out. Then correlation coefficient of these test was calculated which turned out 85%.

The questionnaire consisted of two parts: the first part asked about basic and demographical variables such as age, sex, working experience and the way they were employed and the second part was to analyze their knowledge of endotracheal suctioning. This part consisted of 26 questions which asked about different aspects of nurses' knowledge in three areas of prior, during and post endotracheal suctioning. The right answer to each question would get the score of one, and the score of zero would be given to wrong answers. So each nurse could get a score of zero to twenty six and the nurses' raw score was used to analyze their level of knowledge.

The check list for observation of performing standards of endotracheal suctioning by nurses also included 26 questions which was concerned about nurses' performance in suctioning in three areas of prior, during and post endotracheal suctioning. The score of one would be given to each right function and zero to each wrong one. Performance of each nurse was observed three times. The average of three scores for each nurse was considered as their final score. Observation of nurses' performance took seven months totally. The researcher went to ICUs and attended each unit as an observer for three working shifts to reduce the Hawthorne effect and in order for nurses to get along with his/her attendance. Observation of their performance began on the 4^{th} day.

Items which were assessed in the questionnaire and check list included: 8 items in the area of prior to suctioning; listening to and analysis of respiratory sounds, explanation and assuring the patient, hyper-oxygenation, hyperinflation, washing the hands, wearing gloves, wearing gown, using glasses; ten items in the area of during suctioning; using proper size of catheter, changing the catheter, appropriate negative pressure, appropriate depth and timing of entering the catheter, number of times of entering the catheter, not using normal saline, method of entering the catheter, attention to the heart rhythm and the heartbeat, attention to saturation of oxygen (pulse oximetry); and 8 items in the area of post suctioning; rapid connection of the patient to ventilator, hyper-oxygenation of the patient, re-assuring the patient, listening to the lung, investigation of the heart rhythm and the heartbeat, investigation of secretions' characteristics, washing the hands and writing down the processes in the files. The average of the scores for knowledge and performance of nurses was calculated and also the quality of performance was categorized in three levels

Table 1: averages of nurses' score in knowledge and performance.

	Knowledge			Performance		
	X±sd	Minimum score	Maximum score	X±sd	Minimum score	Maximum score
Before suctioning (8 items)	5.4±1.12	3	8	0.81±0.71	0	3
During suctioning (10 items)	7.7±1.09	5	10	4.6±0.75	3	6.33
Post suctioning (8 items)	6.47±0.99	3	8	3.86±0.69	2.33	5.67

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of desirable, moderate and undesirable: obtaining 76-100% of score was considered as desirable, 51-75% of scores as moderate and less than 50% as undesirable. The scores of knowledge test was calculated and categorized likewise.

For conducting this research, permission was got from ethics committee of the university. Then a letter missive from the hospital and consent of nurses was collected. After finishing the observations, the questionnaire was filled out by the nurses in the presence of the researcher. In the analysis of the data, non-parametrical tests of kruskal-wallis and spearman correlation coefficient was used in SPSS14 software besides calculation of descriptive indices. Standard level in all tests was $p<0.05$.

3. Results

Among 44 nurses participating in the study two were men (4.5%) and 42 were women (95.5%). All of them held the BS degree and at the average age of 29±2.8. The average of their working experience was 5±2.5 years.

In general from 26 possible scores, the average score of knowledge and performance respectively were 19.59 and 8.75. In evaluation of performance the maximum and minimum score were 15 and 6 respectively. While in the evaluation of knowledge they were 25 and 15 respectively. The scores of knowledge and performance in three areas are shown in table 1. Significant correlation was seen between the scores of knowledge and performance ($r=0.57$, $p=0.0001$).

Calculation of quality score showed that in the field of performance, 42 (95.4%) gained scores less than 50% which means performance of most nurses was undesirable in endotracheal suctioning and only 2 of them had a moderate performance with a score of 51-75%. None of them had a desirable performance here. While the scores of knowledge of 23 nurses was at a desirable level (52.2%) and 21 of them was moderate (47.8%).

No significant relation was seen between type of ICU, working experience and other basic variables and scores of knowledge and performance. Relation between some basic variables and scores of knowledge and performance is shown in table 2.

Table 2:relation between basic and demographic variables and scores taken by nurses in knowledge and performance in endotracheal suctioning.

Studied variable		Number & percentage of nurses	Average scores of knowledge	Average scores of performance
Age	25-29	22 (50%)	19.45	8.71
	30-34	19 (43.2%)	19.73	8.49
	>35	3 (6.8%)	19.66	8.44
			P=0.89	P=0.93
Working experience	≤4 years	16 (36.3%)	19.46	8.60
	5-7 years	23 (52.2%)	19.46	8.89
	>7 years	5 (11.3%)	18.8	8.53
			p=0.71	p=0.93
Type of ICU	Internal medicine	15 (34.1%)	19.66	9.26
	Surgery	15 (34.1%)	19.33	8.64
	Neurology	14 (31.8%)	20.35	8.31
			p=0.79	p=0.12
Employment	Formal	4 (9.1%)	19.75	8.00
	Contractual	10 (22.7%)	18.9	8.40
	Subcontractual	21 (47.7%)	19.85	9.20
	On project	9 (20.5%)	19.66	8.40
			p=0.67	p=0.70

4. Discussion

In the present study, the average of nurses' score in knowledge and performance was calculated 19.59 and 8.75 respectively. This

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finding shows there is a large gap between knowledge and performance in such a common and vital process in ICUs and most nurses, despite awareness of recommended standards, does not observe them practically. In a study carried out by Gonzales et al (2004), a result was similar to this study and it was revealed that the level of knowledge was higher than performance. In their study, from 19 possible scores, the average score of knowledge and performance were 12.9 and 14.24 respectively [9]. However in this study the gap between knowledge and performance of nurses was much deeper.

Analysis of performance showed that performance of most nurses was undesirable. Andrew and Kelleher (2008) studied the nurses' performance in ICUs prior, during and post endotracheal suctioning. Results showed that they acted differently in the process, didn't adhere to experimental recommendations and the quality of this service was lower than expected [14].

The low average scores obtained in this study is similar to the study collected by Bighamian et al. These researchers studied nurses' performance in endotracheal suctioning. In that study the average score was 19.9 before education which increased to 32.3 after education and their performance showed a 62% improvement.

In the present study performance of most nurses was undesirable. While knowledge of half of them was desirable. Other studies in this field reveal low level of knowledge and performance of nurses which improved after education [2, 13, 15]. A study carried out in neonatal unit of two academic hospitals in Shiraz demonstrated that the level of knowledge and performance of nurses was low in endotracheal suctioning in neonatal unit [15]. Day et al (2001) in a study conducted in ICUs revealed that in primary analysis before education the knowledge level of most nurses was low as 81% got less than 50% score and their performance was weak, regardless of experimental recommendations [2].

Day et al (2002) in another study analyzed nurses' knowledge and performance in units where patients were transferred with tracheotomy after release from ICU and reported a low level of knowledge which was reflected in nurses performance. In this study the average score of knowledge was reported 11.2 and average score of performance was 10.3 out of 20. Besides, in some cases there was no relation between knowledge and performance and nurses, in spite of knowing about experimental recommendations, acted against them [13]. In our study no relation was seen between working experience and level of knowledge and performance which was in accordance with other studies [9, 13].

Regarding that the average of working experience shows that not much time is passed since nurses' graduation and that their scores show their awareness of common recommendations about endotracheal suctioning, adhering to practical education and other prevocational and managerial factors seems obligatory. Other researchers also have emphasized on the necessity for practical education of this process [9, 13].

Studies show that correct performance of nurses in endotracheal suctioning can minimize undesirable side effects of it on the patients [10, 11]. Nurses can, by utilizing scientific recommendations in their performance, improve the quality of this care and decrease the period of hospitalization and patients' expenses. So a quality nurse care can be effective on prevention of unnecessary deaths as well as medical interventions.

Although questionnaires of knowledge were filled out in the presence of the researcher, due to the researcher's reference to the units in different shifts, there was a possibility of information transfer between nurses. On the other hand, regarding the special and critical condition of ICUs during answering the questionnaire, patients' sudden getting bad may have affected nurses' situation and readiness to answer the questions in some cases. Also in the analysis of performance, it was not possible to completely eliminate the Hawthorne effect and the presence of the researcher could somehow affect nurses' performance. However low scores of

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performance show that this effect was not noticeable.

5. Conclusion

This study showed that, despite acceptable knowledge, nurses' performance was weak in endotracheal suctioning. With regard to the fact that the role of education during service has become more important in recent years and nurses are obligated to take part in such educational courses, it seems that education alone, especially theoretical education, has little effect on nurses' performance and along with theoretic education, special attention must be paid to practical education and other prevocational and managerial factors. And the nurses also must be provided with appropriate devices for performing endotracheal suctioning correctly.

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