EFFECT OF EDUCATIONAL PROGRAM ON NURSES' PERFORMANCE REGARDING SUBGLOTTIC SUCTIONING AND PATIENTS' OUTCOMES

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ABSTRACT

Aim of the study: This study aimed to evaluate the effect of the educational program on nurses' performance regarding subglottic suction and patients outcomes. **Setting of the study** was applied in general (ICU) at Beni–Suef University hospital. **The study sample consisted** of two subjects (patient and nurse). A convenient sample of 35 nurses and her 80 ventilator patients who met inclusion and exclusion criteria. **Tools for Data collection**. **Tool (I)** Nurses' self-administered questionnaire: **Tool (II)** Subglottic suction observational checklists. **Tool (III):** Nurses' attitudes scale. **Tool (IV)** Patients' interview questionnaire. **Tool (V**) Modified clinical pulmonary infection score (**MCPIS**). **Results:** The main results were a mean ± SD for age of 25.14 ± 3.28, a significant difference in nurses' knowledge among the three phases of the study (0.000**) (0, 42.9, 34.3), and nurses' It showed that there was an improvement in knowledge. Overall level of knowledge and practice in immediate post-program follow-up and post-program implementation compared to pre-program. On the other hand, we found that her 98.8% of patients were not diagnosed with ventilator-associated pneumonia (VAP) after 48-96 hours of intubation. **Conclusion:** Improvements in student-nurse performance on subglottic suction are statistically different across the three study phases. The results also showed no significant difference in terms of VAP scores, indicating a small number of cases with VAP. Finally, application of educational programs had a positive effect on trained nurses' performance and patient outcomes, supporting our research hypothesis.

INDEXTERMS: Nurses performance, educational program, subglottic suction.

INTRODUCTION:

Patients who are in urgent need of organ failure care are given care in the intensive care unit (ICU), a highly technologically equipped life support facility. The majority of patients monitored in these facilities get invasive treatments such central venous catheterization

and mechanical ventilation (MV) support. However, these treatments increase the risk of infections in the patients. [1]

Inability of the patient to protect the lower respiratory tract, resulting in aspiration of contaminated oropharyngeal secretions and, in some circumstances, gastric contents. These dangerous germs can overpower the lung's already frail cellular and humoral immune defense mechanisms after invading and populating the lower respiratory tract, finally leading to severe VAP. [2]

Potential microorganisms can be found in secretions that gather around the endotracheal tube's (ETT) liner. Subglottic suction was created in an effort to lessen silent aspiration of secretions above and below the ETT cuff. Aspiration of subglottic secretions has been found to lower the incidence of nosocomial pneumonias because ETT contain a dorsal channel above the ET cuff that permits continuous or intermittent suction of tracheal secretions that accumulate above the patient's subglottic area (VAP). [3]

A subtype of hospital-acquired pneumonia known as ventilator-associated pneumonia (VAP) affects patients who are receiving intubation and mechanical ventilation that was not necessary at the time of hospital admission or that develops 48 hours after intubation and mechanical ventilation using an endotracheal tube or tracheotomy tube. [4]

In addition to keeping the patient in a semi-fowler position during subglottic suction and measuring the ETT's maintenance cuff pressure between 20 and 30 cm H2O, the role of the nurse also includes performing intermittent subglottic suction manually with a 10 ml syringe at an intended frequency of once every two hours from the time of intubation. [5]

The process of influencing nurses' behavior through the production of changes in their knowledge, attitudes, and skills, on the other hand, is known as an educational program for nurses. This program helps nurses maintain and improve their competencies for the delivery of high-quality care to the patients. Improved subglottic suction performance by nurses helps to avoid VAP infections in intensive care units, which are thought to be the cause of extended hospital stays, higher fatality rates, and significantly higher treatment expenses. [6]

Research Hypothesis:

The current study hypothesizes that:

1. Educational program will improve nurses' performance regarding subglottic suction.

2. The implementation of the educational program about subglottic suction will have a positive effect on patients' outcomes.

Significance of the study:

In order to examine the efficacy of this procedure to lower incidence of VAP, more than 20 randomized controlled trials (RCTs) and multiple meta-analyses have evaluated subglottic secretion drainage (SSD) as a strategy for VAP prevention. Nevertheless, even if various recommendations suggest using it.[7]

Materials and Methods:

The aim of this study was accomplished using a quasi-experimental design. The actual work on this study took place from early March 2021 to late December 2021, or around nine months. The environment was brought up by the researchers.

The General Intensive Care Unit (ICU) at Beni Suef University Hospital served as the study's site. The ICU, which has 19 beds spread over four rooms, is on the third floor of the hospital. The number of patients admitted to the ICU each month ranges from 20 to 30 patients with a variety of conditions, such as respiratory failure, heart disease, neurological disease, and infectious diseases. The ICU features nurse's quarters, classrooms, and medicine storage rooms.

A convenient sample (35 nurses) and an intentional sample of 80 male and female ventilated patients who met the inclusion and exclusion criteria.

Inclusion Criteria:

☐ Male and female adult patients aged 18 years and older.

☐ Oral intubation with subglottic suction ETT.

☐ Intubated patients requiring mechanical ventilation (MV) for 48 to 96 hours.

Exclusion criteria:

☐ Extubation of the patient 48 hours prior to her ventilation.

☐ Patients with respiratory infections. ☐ History of aspiration on admission or prior to intubation.

☐ Patients transferred from another hospital or already on a ventilator prior to admission.

☐ White blood cell count less than her 1000 cells/mm3.

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N.

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Tools for data Collection:

Tools of data collection:

Five tools were used for data collection

I. Nurses' Self-administered Questionnaire: (Appendix I)

It was used to assess nurses' level of knowledge regarding subglottic suction. It was include two parts:

☐ First part:

Focused on the demographics of surveyed nurses, including age, gender, education level, experience, VAP prevention, and subglottic aspiration courses.

☐ Second part:

Second part:

Hassan et al. Adapted and adapted for research purposes by researchers. Written in Arabic, it consists of her 40 multiple choice and true/false questions. It is divided into five sections as follows. [9]

The total level of nurses' knowledge score was categorized as follows:

- >90% was considered satisfactory (≥ 36 grades).
- <90% was considered unsatisfactory (< 36 grades).

II. Nurses' practice observational Checklist (Appendix II): this tool was modified by researchers and modified by Tomaszek et al. It was created in English to rate nurses' proficiency with subglottic suction. The checklist has five steps, each of which includes preparations, procedures, and post procedure.[10]

- **First procedure:** Handle subglottic endotracheal tube (ETT) fitting in 30 steps **Second procedure** steps deflation and inflation of the endotracheal tube cuff, requiring 20 procedures.

- **Third procedure** deals with the endotracheal tube cuff measurement, which consists of 26 steps.

- **Fourth procedure** deals with continuous subglottic suction drainage consisting of 42 steps.

☐ **Fifth procedure** is concerned with intermittent subglottic suction which consists of 30 steps.

Scoring system for nurses practice observational checklist (Appendix II).

The scoring system for each procedure as follows: One grade for each done correctly step, zero for not done or done incorrectly step.

- The total grade for first procedure 30 grade which grade ≥ 27 grades considered satisfactory (≥ 90%).

- The total grade for second procedure 20 grade which grade ≥ 18 grades considered satisfactory (≥ 90%).

- The total grade for third procedure 26 grade which grade ≥23.4 grades considered satisfactory (≥ 90%). And first step divide to four sub items of procedure every sub items take ¼ score, second step divided to three sub items degree ¼, ½, ¼.

- The total grade for fourth procedure 42 grade which grade ≥ 37.8 grades considered satisfactory (≥ 90%).

- The total grade for fifth procedure 30 grade which grade ≥ 27 grades considered satisfactory (≥ 90%).

III. Nurses' attitudes assessment scale (Appendix III).

Abd El-Gawad et al., adapted this tool. tailored and modified by researchers in accordance with research aims. Its purpose was to gauge nurses' views toward subglottic suction and was written in Arabic. There are 14 statements in total. On a 3-point Likert scale, participants were asked to provide their answers.[11]

The nurse'response to statement was as follows:

(3, for Agree; 2, for Neutral; 1, for Disagree). The total nurses'attitude score (42 grades).

Scoring system:

- Positive attitudes ≥ 70 % at = ≥ 29.4 grades.

- Negative attitudes < 70% at = < 29.4 grades.

IV. Patients' interview questionnaire (Appendix IV).

- It was concerned with demographic characteristics of patients under study such as patient's age, gender.

V. Modified Clinical Pulmonary Infection Score (MCPIS) (Appendix V).

It was adopted from **(Elpasiony et al, .** It was concerned with the assessment of patient for VAP. [12]

- **Scoring system.**

Using online calculator software from mdcalc.com, it was calculated. (43) Evaluates the next five factors as well.

According to the findings, the patient's temperature, white blood cell count, tracheal secretion, oxygenation, and chest X-ray were all analyzed. The total score is between 0 and 10. Patients with MCPIS values above 5 were classified as having VAP, whilst those with CPIS values below 5 were classified as having VAP.

II. Operational design:

The operational design includes preparatory phase, validity and reliability, pilot study, ethical consideration and field of work.

Preparatory phase:

To develop data gathering methods, examine recent and current important national and worldwide literature reviews, and assess theoretical understanding of many key features using books, papers, journals, magazines, and the Internet.

Validity and Reliability

Utilizing face and content effectiveness, the dveloped tool's effectiveness was evaluated. His panel of 7 experts from the Departments of Intensive Care at Ain Shams University and Department of Intensive Care Medicine at Beni suef University (5 professors of critical care and 2 critical care specialists) tested the validity. Minor changes were made after experts examined the tool's simplicity, completeness, and clarity.

When learning tools were statistically examined for reliability using the Cronbach's alpha coefficient test, knowledge, practice, and attitude scores revealed that the tools were dependable.

Pilot study

To verify the research's applicability, the clarity of the planned questionnaire, and the necessary time for implementation, a pilot study tool was conducted on a group of 8 patients (10%) and a group of 4 nurses (10%). I learnt how to estimate time. In order to create the final form, several statements were removed or reworded and some adjustments were made to the tool based on pilot research. The two main study groups did not contain any of the subjects from the pilot study.

Ethical research considerations in this study include:

　　□ before the study started, it was approved by the Scientific Research Ethics Committee of the Nursing Faculty of Ain Shams University.

The researchers proceeded over the study's objectives and aim with the nurses and patients who were involved.

Researchers made sure that subject data was anonymous and confidential.

Nurses and patients were made aware of their right to decide whether or not to participate in the study and that they could do so at any moment and without providing a justification.

Respect was shown for morality, morals, culture, and beliefs.

Fieldwork:

The purpose of the study was explained to nurses who consented to participate in the study prior to data collection.

The current investigation was conducted in her three phases. Pre-implementation of the educational program (initial evaluation), implementation and evaluation phase of the educational program.

Phase I):

Prior implementation of educational programs (initial evaluation).

• For nurses:

To evaluate nurses' performance (knowledge, practice, and attitudes) on subglottic suction ETT, the three previously described tools—the Nurse Self-Complete Questionnaire, the Observational Checklist, and the Nurse Attitude Assessment Sheet—were utilized in the first phase. About two months consumed at this stage.

To ensure the most accurate observation of nursing practice and reduce the possibility of bias, a nursing practice observation checklist was utilized before the self-administered questionnaire and nurse attitude assessment scale. Researchers used the nurse observation checklist to watch a nurse treat a patient with subglottic aspiration ETT and

evaluate the nurse's performance during her five procedures, which took each nurse between 30 and 45 minutes to complete.

The nurses completed a self-administered questionnaire and the Nurse Attitude Rating Scale after the investigators had observed all nurse practises, and each nurse was questioned separately to answer the questionnaire questions. I was. A completed questionnaire tool took about 20 to 30 minutes to complete for each nurse interview, which involved meeting with 3-5 nurses each day. In the presence of the investigator, a nurse filled out the forms.

Phase (II): implementation of educational program for nurses

- **Planning of educational program:**

  - About a month passed during this phase. Based on the findings of the first assessment of nurse knowledge, practice, and attitudes as well as a review and expert revision of the most recent pertinent literature, the educational program (Appendix IV) was created. Nursing students' learning requirements were defined and divided into knowledge and practice categories. Assessments of needs and requirements are converted into goals and objectives for educational programs. Goals were divided into general and particular categories.

  - **Implementation of educational program:**

In addition to sessions for orientation and pre-test preparation at the beginning of the program, the educational program was executed throughout the course of 11 sessions (5 theory sessions and 4 practical sessions). rice paddies Repetition's program was terminated, and a post-test was administered.

Each session began with a refresher of the information covered in the preceding one, followed by a brief explanation of the new topic in language that was appropriate for the caregiver. During the delivery of educational programme sessions, motivational and reinforcing strategies such as praise and acknowledgment were employed to encourage learning. From the first day of the program's implementation, brochures were given to all participating nurses. Each class covered a different topic with broad and detailed aims, as well as interesting media and techniques.

According to their working schedule, the group of studied nurses is organised into 12 nurses for each shift. It was difficult to gather all the nurses at once, so they were divided into groups of about 6 nurses for each shift, with consultations taking place twice during each shift and educational programs being carried out for each group one at a time as appropriate for them to reduce the depth of work stress and extend their time in the ICU.

The timing of educational software classes or coaching lectures was as follows: for nurses working the morning shift, classes started at 11 am or 12 pm, for nurses working the afternoon shift, classes started at 3 pm or 4 pm, and for nurses working the night shift, classes started at 9.00 pm.

One consultation was performed per day, sometimes two or three, and the length of the consultation varied from shift to shift by 30 minutes, most of the time by two hours. These changes were related to the working environment, the situation in the ICU emergency room, which included cardiac arrest, new patient admissions, a lack of staff due to absenteeism, and the availability of ICU specialists.

Every organization obtained the same nursing academic software content and used the same teaching methods, including conversation; real objects, handouts, posters, and information to ensure that all nurses were exposed to an identical learning experience.

Phase (III): Evaluation of the effectiveness of educational program:

This phase was conducted to:

Nurse performance (knowledge, practice, and attitudes) was evaluated using the pre-assessment methods both immediately before the start of the educational program and at the follow-up 14 weeks later (I, II, and III). Analyze the effects of educational initiatives on

Analyze how educational initiatives affect patient outcomes. To accomplish this, choose patients based on inclusion and exclusion criteria while using tools (IV, V). This information was gathered following the start of the program. The patient was assessed with subglottic suction immediately following the installation of the ETT and again 48–96 hours later.

III. Administrative design

A formal letter detailing the goal of the study and the process for submitting the program was written to the Director of Beni Suef University Hospital with the agreement of the Dean of Nursing, Ain Shams University. Obtain approval before doing it in order to do study.

Result

Table 1: Frequency and percentage distribution of demographic characteristics of nurses under study (n=35).

Items	N	%
Age (years)		
• 20 < 25	18	51
• 25 < 30	15	43
• ≥ 30	2	6
Mean±SD 25.14±3.28		
Gender		
• Male	23	65.7
• Female	12	34.3
Educational level		
• Diploma	1	2.9
• Technical institute	24	68.6
• Bachelor	9	25.6
• Higher degrees	1	2.9
Years of experience		
• < 1	4	11.4
• 1 < 5	21	60.0
• ≥ 5	10	28.6
Mean±SD 4.41±2.61		
Attendance subglottic suction courses		11.4
• Yes	4	
• No	31	88.6

Table (1) shows that the mean age of surveyed nurses was her 25.14±3.28 years, of whom (65.7%) were male. Regarding educational level, the result was that 68.6% of her surveyed nursing staff were graduates of technical colleges. In addition, (60%) she has less than 5 years of experience from 1 year. Regarding training, (88.6%) had never participated in subglottic suction training.

Table 2: Comparison between nurses' satisfactory level of knowledge regarding subglottic suction pre, immediately post, and follow-up implementation of educational program (N=35).

Item	Satisfactory level of knowledge						Pre /Immediately post		Immediately Post /Follow-up		Pre /Follow-up	
	Pre		Immediately Post		Follow-up		T test	P value	T test	P value	T test	P value
	N	%	N	%	N	%						
Anatomy and physiology of respiratory system.	0	0.0	17	48.6	13	37.1	-17.188	0.000**	4.583	0.000**	-10.084	0.000**
Insertion of subglottic suction ETT and complication.	0	0.0	12	34.3	6	17.1	-10.103	0.000**	4.428	0.000**	-7.217	0.000**
Subglottic suction procedure.	0	0.0	9	25.7	4	11.4	-12.997	0.000**	3.467	0.001**	-11.782	(0.000**
Mechanical ventilator (MV).	0	0.0	12	34.3	3	8.6	-7.413	0.000**	-1.642	0.110	-7.990	0.000**
Ventilator associated pneumonia (VAP).	0	0.0	17	48.6	14	40.0	-12.154	0.000**	0.709	0.483	-9.715	0.000**
Total	0	0.0	15	42.9	12	34.3	-23.633	0.000**	4.290	0.000**	-18.328	0.000**

Table 2: shows that, there is an improvement of nurses total level of knowledge immediately post and follow-up comparing to pre-program with decline at follows-up phase but not reach to preprogram 0%, 42.9%, 34.3%.

Table 3: Comparison between nurses' satisfactory level of practice regarding subglottic suction pre, immediately post, and follow-up implementation of educational program (N=35).

Item	Satisfactory level of knowledge						Pre /Immediately post		Immediately Post /Follow-up		Pre /Follow-up	
	Pre		Immediately Post		Follow-up		T test	P value	T test	P value	T test	P value
	N	%	N	%	N	%						
Subglottic suction ETT care	0	0	19	54.3	8	22.9	-13.509	0.000**	2.191	0.035*	-7.056	0.000**
Deflation and inflation of subglottic ETT.	1	2.9	15	42.9	7	20.0	-12.410	0.000**	12.410	0.000**	-9.063	0.000**
Cuff pressure measurement	1	2.9	17	48.6	8	22.9	-13.509	0.000**	2.368	0.024	-14.093	0.000**
Continuous subglottic suction	4	11.4	17	48.6	11	31.4	-8.982	0.000**	3.524	0.033*	-9.063	0.000**
Intermittent subglottic suction	2	5.7	12	34.3	8	22.9	-9.393	0.000**	-9.393	0.000**	-7.324	0.000**

Table 3: shows that, there is an improvement of nurses level of practice regarding endotracheal tube care pre, immediately post and follow-up with a decline at follow-up phase but not reach to preprogram 0%, 54.3%, 22.9% respectively. In addition, it was observed that there is a highly statistically significant difference of nurses level of practice pre/immediately post and pre/follow up with   (p value 0.000**), also there is statistically significant difference of nurses level of practice immediately post/ follow-up   with (p value 0.035*).
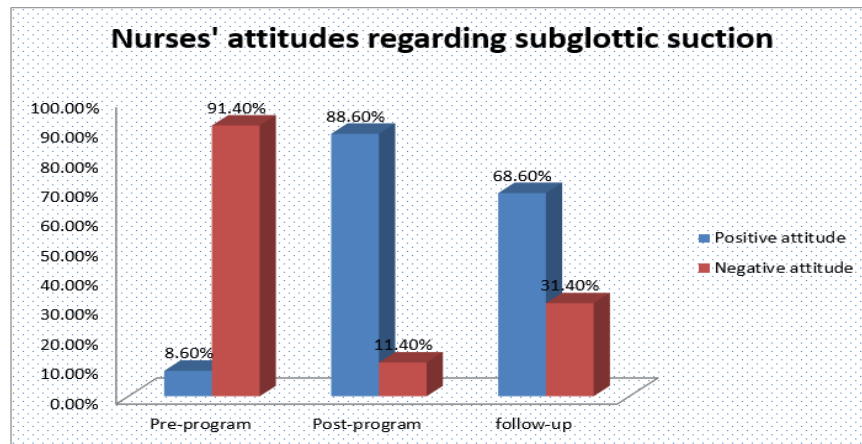

Figure 1: Percentage distribution of nurses' attitude regarding subglottic suction pre, immediately post and follow-up implementation of educational program (n=35).

Figure (1) illustrates that, (91, 40%) of the studied nurses have negative attitude pre implementation of educational program, meanwhile (88,60, 68.60%) of the studied nurses have positive attitude immediately post and follow- up implementation of educational program.

Table 4: Frequency and percentage distribution of demographic characteristics of the studied patients' (N=80).

Items	N	%
Age		
• 18-<30	18	22.5
• 30-<40	20	25.0
• 40-<50	25	31.3
• >=50	17	21.3
Sex		
• Male	46	57.5
• Female	34	42.5

Table 4: reveals that, 31.3% of the studied patients age is (40-<50) years. As regard to sex, the results revealed that the (57.5%) of the patients are males.

Table 5: Frequency and percentage distribution of (MCPIS) immediately after intubation and during 48-96 hours of intubation for the studied patients (N=80).

Items	Immediately after intubation		Duration 48-96 hours of intubation			
	N	%	N	%	X2	P value
Temperature						
• ≥ 36.5 or ≤ 38.4	60	75.0	66	82.5	4.419	0.110
• ≥ 38.5 or ≤ 38.9	16	20.0	14	17.5		
• ≥ 39 or < 36.5	4	5.0	0	0.0		
White blood cells (WBCS)						
• ≥ 4000 or ≤ 11.000	79	98.8	66	82.5	12.432	0.000**
• < 4000 > 11.000	1	1.3	14	17.5		
• Band forms ≥ % 50	0	0.0	0	0.0		
Tracheal secretions						
• Absent	56	70.0	41	51.2	5.891	0.015*
• Non purulent	24	30.0	39	48.8		
• Purulent	0	0.0	0	0.0		
Oxygenation						
• >240or ARDS	10	12.5	9	11.3	0.060	0.807
• ≤240 or no evidence of ARDS	70	87.5	71	88.8		
Chest x ray						
• No infiltration	57	71.3	46	57.5	3.298	0.0609
• diffuse or patchy	23	28.7	34	42.5		
• Localized infiltration	0	0.0	0	0.0		
VAP						
Yes	0	0.0	1	1.3	1.006	0.316
No	80	100.0	79	98.8		

Table 5: shows that, all of the studied patients are not diagnosed with VAP immediately post intubations, also (98.8%) of them have not the diagnosed of VAP after intubation for 48-96 hours.

DISCUSSION

The findings of the present study revealed that the mean age of nurses was 25.14 ± 3.28 years for the demographics of the surveyed nurses. This is in line with the findings of Hassan et al., who found that over half of the nurses surveyed were between the ages of 20 and 25.

Less than two-thirds of the nurses in the current study were male, according to the gender distribution of the nurses surveyed. This result did not line up with Sharma et al. 2014's findings, which concurred that most of the nurses under investigation were female. The nature of the intensive care unit (workload, stress, and needs of critically sick patients) necessitates that male nurses put up with this kind of work, according to researchers.

According to the statistics, around two-thirds of the trained nursing personnel are college of technology eligible in terms of educational level. According to this finding, 2 out of the 30 nurses who were studied had a bachelor's degree. From a research perspective, this means that Beni-suef University's Institute of Nursing graduates are compelled to work at Beni-suef University Hospital before being transferred to other institutions, whether they are linked with the Ministry of Health or not. Maybe as a result of the ban on participation in another being a hospital. [14]

Less than two-thirds of the nurses surveyed had ICU experience between one year and less than five years, according to the most recent findings about this topic. I was. The findings of Tadros et al. 2019 who discovered that more than half of the nurses had less than five years of experience are consistent with this outcome. This finding may be the result of increasing nurse turnover brought on by the workload in intensive care units, according to researchers.[15]

The current study revealed an improvement in nurses' overall level of knowledge regarding subglottic suction and VAP, with a highly statistically significant difference between nurses' levels of knowledge prior to and immediately after treatment and prior to and following treatment, with a decline at immediately post-treatment and subsequent treatment. This result was consistent with the findings of Mishra and Rani's study from 2020, which indicated that the educational program had improved nurses' understanding. According to the researcher, the decline at follow-up is a result of the head nurse not continuously monitoring the staff's performance with relation to subglottic suction. [14]

This study revealed a statistically significant difference in nurses' overall level of practice with regard to endotracheal tube (ETT) care, subglottic deflation and inflation, cuff measurement of ETT and subglottic suction prior to and following the implementation of an educational program, and post/follow-up phase. Additionally, there was a statistically significant change between the overall score of the nurses' level of practice before, after, and during the follow-up phase after the educational program was implemented. This information was provided by Azabu et al. (2017), who investigated the influence of organized curriculum on nursing practice in the prevention of ventilator-associated pneumonia in the emergency room. This can be explained by the desire and need to raise the bar for the execution of these procedures in order to give nurses the tools they need to do their jobs effectively. [16]

A majority of the nurses in the study had negative attitudes toward subglottic suction prior to the implementation of the program; however, more than two thirds of the nurses had positive attitudes right after the program's implementation; and more than two thirds of the participant nurses had positive attitudes at the implementation of the program's follow-up educational component. This was in line with the findings of Karkada & Cherian in 2015, who noted that the pre-test total score of positive attitude was low when compared to the right away following the test and the follow-up. [17]

According to the current study's findings on the demographics of the researched patients, one-third of them were between the ages of 40 and 50. This was in line with Diab et al.,2021 who noted that fewer than one third of patients were between the ages of 40 and 50. [18]

More over half of the samples were male when it came to gender. According to Valles et al., this makes sense. His research revealed that more than 50 % of the patients looked at were men.[19]

In the current study, he was the only patient who received a VAP diagnosis following subglottic aspiration based on the Modified Clinical Pulmonary Infection Score (MCPIS) 48–96 hours after the patient's intubation. Three patients were diagnosed with VAP following the intervention, according to a reviewer of "Investigating the function of subglottic secretory aspiration in avoiding ventilator-associated pneumonia in patients with invasive mechanical ventilation." This study's finding confirms the second research idea (implementation of an educational program on subglottic suction would have a positive impact on patient outcomes).[2]

CONCLUSION

The training program's implementation enhanced the nursing staff's subglottic suction performance, and there was also a slight difference in the scores for ventilator-associated pneumonia (VAP), which suggested a decrease in the number of cases. Finally, the results of the present study supported the research hypothesis by showing that the implementation of educational programs had a positive effect on student-nurse performance and patient outcomes.

Recommendations

The researchers recommend replicating the current study with a larger sample to allow for generalization of results and wider use of the designed program.

• Importance of establishing subglottic suction procedures in nursing student curricula.

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