

## **Effectiveness of an Educational Program on Nurses' Knowledge toward Prevention of Pneumothorax Attendant with Mechanical Ventilation at Intensive Care Unit in AL-Hussein Medical City Hospital in Holy Karbala**

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### **Abstract**

**Aims:** The study aims at determine the effectiveness of the educational program on nurses' knowledge about Pneumothorax attendant with mechanical ventilation. **Methodology:** A quasi-experimental research design was used with a pre- and post-test strategy for both the studied and control groups to achieve the study's goals. A total of (60) nurses who served in an intensive care unit during the research period, met the study requirements, and agreed to take part in the study. Data were analyzed with the aid of descriptive-inferential statistics.

**Results:** There is a non-significant difference between the study and control groups at p-values greater than 0.05 in the pre-test, but a significant difference between the study and control groups at the post-test with p-values less than 0.01 in the post-test. In terms of the statistical mean, the research results show that after implementing the program, the study group responses increase as compared to the control group. **Conclusion:** After the post-test for the study group for the educational program concerning pneumothorax attendant with mechanical ventilation, nurses' knowledge improved. The control group, on the other hand, did not show any improvement in their awareness between the pre- and post-tests. Encourage nurses to attend training sessions to develop their skills and practice in order to stay current on pneumothorax prevention while using mechanical ventilation.

**Key-words:** Knowledge, Nurses, Pneumothorax, Education Program.

## INTRODUCTION

The presence of air in the pleural cavity, known as pneumothorax, is a serious complication of mechanical ventilation that is linked to increased morbidity and mortality. It is a life-threatening condition found in the differential diagnosis of respiratory failure and chest pain, and it necessitates prompt identification and treatment <sup>[1]</sup>. In the United States, the rate of spontaneous pneumothorax is 7.4–18 cases per 100,000. In the Intensive Care Unit (ICU), pneumothorax is also a common issue in critically ill patients, affecting 4–15 percent of patients <sup>[2]</sup>. Pneumothorax is a life-threatening complication of mechanical ventilation that, if left untreated, has a high mortality rate. Thoracic trauma or iatrogenic injuries, such as complications of central line positioning, regional blocks, or mechanical ventilation, are the most common etiologies of Pneumothorax in adult surgical patients. All that is required is preparation for personnel who deal with patients with respiratory problems <sup>[3]</sup>. Pneumothorax was discovered to be an independent indicator of mortality during mechanical ventilation, and it was linked to a substantial increase in the duration of stay in the ICU, hospital stay, and mortality of all mechanically ventilated patients. If barotrauma is a complication of mechanical ventilation, mortality rates range from 46 percent to 77 percent <sup>[4]</sup>. "Pneumothorax is a medical emergency that needs a high index of suspicion, as well as timely diagnosis and treatment. Physical examination or imaging tests such as chest X-ray, ultrasonography, and computed tomography (CT) scan may be used to diagnose Pneumothorax <sup>[5]</sup>. Pneumothorax is linked to a longer period of stay, as well as an elevated risk of morbidity and mortality. The majority of pneumothorax cases are iatrogenic, resulting from barotrauma caused by mechanical ventilation (MV). IP is linked to underlying pulmonary disease as well as high ventilatory environments" <sup>[6]</sup>. The degree of Pneumothorax (severity) was graded based on the percentage of hemi-thorax on a chest radiogram: less than or equal to 20% of hemi-thorax was considered mild, 21-40% of hemi-thorax was considered moderate, and more than 40% of hemi-thorax was considered extreme. Delayed diagnosis, poor health care, and Pneumothorax treatment all played a role in life threatening conditions <sup>[7]</sup>. Therefore, the present study is concerned with determining the knowledge toward prevention of Pneumothorax attendant with mechanical ventilation to implement educational program for purpose of enhancing nurses knowledge mechanical ventilation Pneumothorax patients. The investigator was interested in study this problem because Pneumothorax considered a major

problem which has an impact upon the patients and so dealing the nurses with adequate knowledge about those condition to provide knowledge to minimize the work difficulties and patient safety.

## **METHODOLOGY**

A quasi-experimental research design was used with a pre and post-test method for both the studied and control groups to achieve the study's goals. A total of (60) nurses who served in an intensive care unit during the research period, met the study requirements, and agreed to take part in the study.

The total number of nurses employed in the intensive care unit at AL-Hussein Medical City Hospital, Karbala, Iraq was purposefully chosen and divided into two groups: thirty nurses in the research group were introduced to the nursing education program, while thirty nurses in the control group were not. The demographic profiles of the two groups were almost identical.

The "knowledge test composed of (20) items, multiple choice questions. The test covered relevant points from the major content area of the education program. The questionnaire sheet is related to nurses' knowledge carried out during the morning and afternoon shift. For the purpose of this study, the number of correct responses of the knowledge questionnaire was used as the measurement of the level of knowledge. Each question comprised of (4) alternative for multiple choice. The questions were scored as correct question (2) point and the incorrect question (1) point. Through the application the descriptive statistic, data were analyzed. "Frequencies and percentages, mean+ S.d".

"Fail knowledge (mean <1.5), Pass knowledge (mean  $\geq$ 1.5)"

## **RESULTS AND DISCUSSION**

The application of a nursing training curriculum to nurses' awareness of pneumothorax prevention in conjunction with mechanical ventilation for nurses working in intensive care units is addressed. The information was gathered by the use of a knowledge test, and it was then analyzed and interpreted in accordance with the study's goals. The educational program is intended to provide nurses with sufficient and important information about pneumothorax prevention while using mechanical ventilation.

### **Nurses knowledge towards Pneumothorax at Pre Test for both Groups (Table1):**

The research sample responses were assessed at the pre-test for study-control classes, according to the findings. The study's findings show that the study group failed the pre-test on awareness of pneumothorax prevention by using mechanical ventilation (Average 1.5). Due to less years of experience and limitation of training, add to that education attainment (if Bachelor's graduated better than Diploma in those importance area of care). This finding highlights the need for further education on how to avoid pneumothorax by using mechanical ventilation. This finding is consistent with that of Kesieme et al. (2016), who conducted a report on nurses' knowledge in a Nigerian semi urban university hospital's intensive care unit. Their findings revealed that nurses with limited experience need additional training to become eligible <sup>[8]</sup>.

"The deficit knowledge pre-posttest in both study and control groups regarding prevention of pneumothorax attendant with mechanical ventilation might be due to several reasons; the nurses do not develop and update their knowledge continuously, most of nurses who work in health institutions quit book reading so they do not follow up and only indulge in nursing practices, consequently they became unable to remember some information particularly the knowledge that related to pneumothorax".

Furthermore, in a study by Markle (2014), the described study deals with common mechanical ventilation complications. Owing to a lack of expertise and preparation, finding information has been linked to the prevention of complications <sup>[9]</sup>.

"As well as, study of Hadi and Abdul-Wahhab (2016), conducted study deals with nurses knowledge towards mechanical ventilation. Their findings confirmed that need to special training programs to promote nurses knowledge concerning mechanical ventilation (especially in weaning and endotracheal suctioning techniques) added to that Encourage the nurses to complete their academic study to be equipped with advance skills& knowledge that enable them to provide efficient care" <sup>[10]</sup>.

Furthermore, "our findings disagree with finding of study include 100 nurses who work at intensive care unit assessed for their knowledge towards respiratory distress syndrome and mechanical ventilation. The findings demonstrated the overall nurses knowledge were good level, it constituted 68% as a majority, due to the nurses work in those area were Bachelor graduated and participated in training sessions" <sup>[11]</sup>.

### **Nurses knowledge towards Pneumothorax at Post Test for both Groups (Figure 1):**

The findings showed that the research sample responses were assessed at the post-test for the study category. The post-test results show that the study group has clear knowledge of how to avoid pneumothorax by using mechanical ventilation (Mean 1.5), Owing to the influence of educational initiatives, the post-test knowledge of the experimental group was lower than that of the control group. The findings are consistent with a study conducted in Nassiriyah City, which focuses on the prevention of mechanical ventilation complications. Findings show that nurses had limited knowledge prior to implementing the program, but post-evaluation showed a high level of knowledge among ICU nurses about mechanical ventilation complications prevention <sup>[12]</sup>.

In addition, our results are consistent with those of a study performed in an intensive care unit and addressing nurses' awareness of how to avoid ventilator-associated pneumonia. The majority of nurses were unaware that the mechanical ventilator humidifier needed to be adjusted weekly to avoid VAP. Researchers urge all Iraqi ICU nurses to participate in inclinical training in order to enhance nurses' acquisition and to review the quality of nursing curricula in order to recognize content flaws. It is important that VAP prevention recommendations be incorporated into nursing school preparation and teaching <sup>[13]</sup>.

### **Difference between the Study and Control Group responses at Pre-test and Post -test (Table 2):**

"The results show that there is a non-significant difference between the study and control groups in the pre-test with a p-value greater than 0.05, but a significant difference between the study and control groups in the post-test with a p-value less than 0.01. In terms of the statistical mean, the research results show that after implementing the program, the study group's responses increase as compared to the control groups. Which determined the efficacy of the studied instructional program by increasing awareness scores among nurse workers in the study community, and which allowed for confirmation of the value or success of implementing the suggested program. This finding is consistent with findings from a study conducted at Ibn Alnafees Teaching Hospital, which focused on nurses' knowledge of chest tub drainage. Their results revealed that there are highly significant variations in nurses' awareness of chest drainage system nursing interventions between pre and post-test in the

research group, while there are minor to no differences between pre and post-test in the control group" [14].

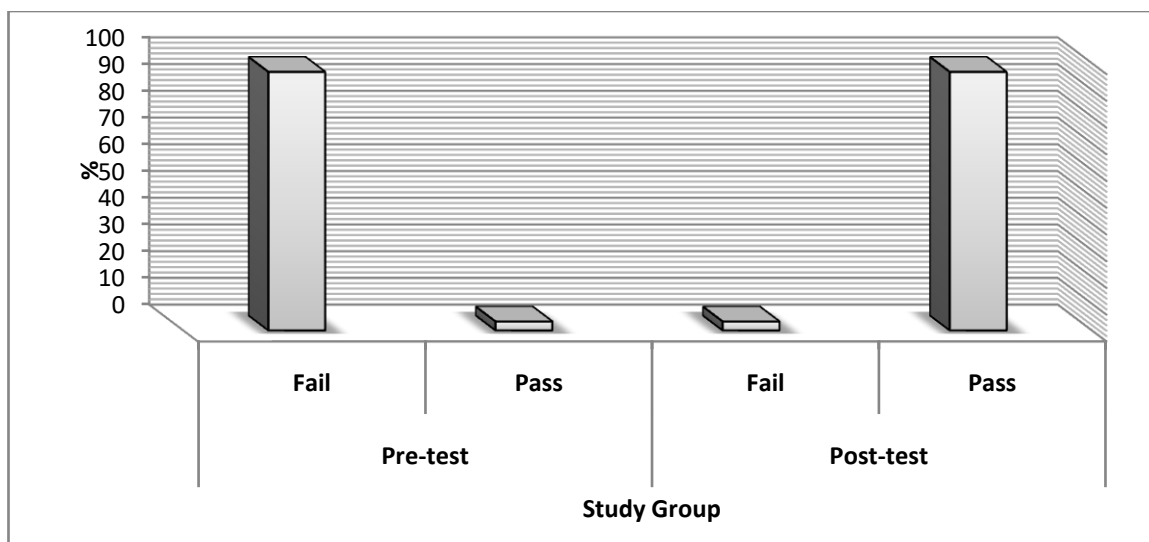
## CONCLUSION

After the post-test for the study group for the educational program concerning pneumothorax attendant with mechanical ventilation, nurses' knowledge improved. The control group, on the other hand, did not show any improvement in their awareness between the pre- and post-tests. Encourage nurses to attend training sessions to develop their skills and practice in order to stay current on pneumothorax prevention while using mechanical ventilation.

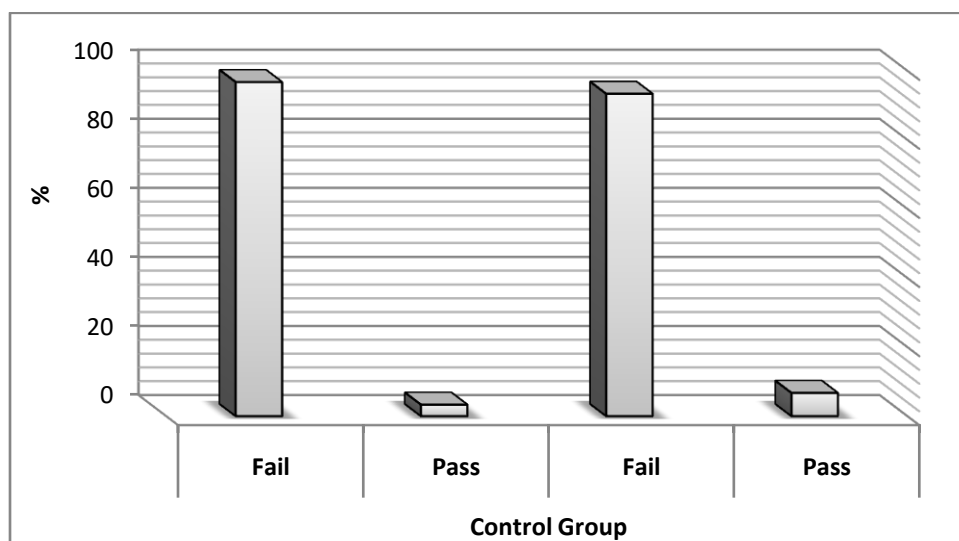
**Table1:Descriptive Statistic Nurses Demographic Variables**

<b>Demographic Data</b>	<b>Groups</b>	<b>Freq.</b>	<b>%</b>
<b>Age / Years</b>	20-29 years	25	83.3
	30-39 years	4	13.3
	40-49 years	1	3.3
	50 and older	0	0.0
<b>Gender</b>	Male	18	60.0
	Female	12	40.0
<b>Residence</b>	Urban	22	73.3
	Rural	8	26.7
<b>Marital Status</b>	Single	6	20.0
	Married	23	76.7
	Widow	1	3.3
<b>Education level</b>	School nursing	5	16.7
	Diploma	17	56.7
	Bachelor's	8	26.7
<b>Years of experience</b>	<5 years	16	53.3
	5-10 years	9	30.0
	>10 years	5	16.7
<b>Training session in nursing</b>	No	14	46.7
	1 session	9	30.0
	2 sessions	4	13.3
	≥ 3 sessions	3	10.0

(Freq.): Frequency, (%): percentage



**Figure 1: Comparison between the Overall Study Group Responses at two levels of measurement (pre-test and post-test)**



**Figure 2: Comparison between the Overall Control Group Responses at two levels of measurement (pre-test and post-test)**

**Table 2: Mean Difference (Independent Sample t-test) between the Study and Control Group responses at pre-test and post -test**

Periods of measurements	Groups	N	Mean	Std. Deviation	t-value	d.f.	p-value
Pre-test	Study	30	1.075	0.183	0.000	58	1.000 NS
	Control	30	1.067	0.183			
Post-test	Study	30	1.887	0.183	15.771	58	0.000 HS
	Control	30	1.11	0.254			

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