

# Impact of Implementation Nursing Guidelines on Minimizing Ventilator Associated Pneumonia among Intensive Care Patients

Hala Ibrahim zaiton(PhD)<sup>1\*</sup> Elham Youssef Elhanafy(PhD)<sup>2</sup>

1.Assistant professor of Medical – Surgical Nursing Faculty of Nursing, Zagazig University. Egypt

2.Lecturer – Nursing Administration, Faculty of Nursing, Damanhur University. Egypt

hala\_zaton@yahoo.com

## Abstract

Responsibilities of nurses for minimizing rate of mechanical ventilation pneumonia may differ among countries as it is a serious complication of mechanical ventilation, which increases patients stay in the Intensive Care Unit (ICU) and overall length of hospital stay, **this study aims to** identify impact of nursing guideline on minimizing ventilator-associated pneumonia among patients. A quasi-experimental design was used in this study, **the study setting** was will Medical and Surgical Intensive Care Units in King Fahd Hospital (Saudi Arabia). **The subject of this study** composed of two groups, **the first group** composed of all patients admitted to ICU and received mechanical ventilation during the study period as well as free from any signs of pneumonia were enrolled into the study while **the second group** composed of nurses whom provide direct nursing care to the patients and their numbers were nurses. **Three tools** the first one was patients sheet to collect necessary data, including age; gender; reason for initiating mechanical ventilation and admitting diagnosis, tool two was observation checklist which developed to evaluate nurse's practice provided to patients, and tool three was guidelines protocol adopted from Centers for Disease Control and applying in four sessions for minimizing of ventilator-associated pneumonia. **The conclusion** of the study were decreasing rate of duration of mechanical ventilation in hours, and length stay of the patients in ICU in hours in post nursing guidelines compared to pre nursing guidelines, as well as Minimizing rate of ventilator associated pneumonia.

**Keywords:** - Nursing Guideline - ventilator associated pneumonia – patients- intensive care unit.

## 1. Introduction

Central Nursing guidelines for optimal intensive care unit services and personnel for hospitals will facilitate both local and regional delivery of consistent and excellent care to critically ill patients. (Crit Care Med 2001; 29) Elward et al, (2002) mentioned that, ventilator-associated pneumonia (VAP): refers specifically to nosocomial bacterial pneumonia that has developed in patients who are receiving mechanical ventilation.

Incidence of ventilator-associated pneumonia among patients in intensive care unit in King Fahd National Guard (Saudi Arabia), was 202 patients, 41(25.2% had VAP. The incidence density was 16.8/1000 person days of ventilation. (Infection Control Hosp Epidemiol. 2000 Apr; 21(4) : 271-3.

Nurses are in a unique position to prevent the transmission of nosocomial infections. These study focus on the impact of nursing guidelines on minimizing of ventilator-associated pneumonia among intensive care patients. Hampton et al (2005), stated that, the use of specific nursing interventions for mechanically ventilated patients could decrease average ventilator times and average length of stay with no concomitant increase in reintubations.

Livingston (2000) stated that Interventions to prevent VAP should begin at the time of, or if possible, before intubation and should be continued until extubation.

Measures should be taken to reduce the incidence of VAP, and several methods have been employed with varying levels of success. The benefits of appropriate positioning to reduce reflux and aspiration, improving oral hygiene, tracheostomy versus transtracheal ventilation and oral versus nasal tube have been identified as prescribed by (Dodek et al., 2004).

Nurses are constantly present at the patients's bedside, so they are the primary healthcare professional responsible for monitoring the patients's respiratory status. They are expected to keep an eye on any equipment required by the patients, including ventilators and monitoring equipment, and to respond to monitor alarms (Guentner, 2006).

Weinburger et al (2002) stated that, there are many side effects and complications associated with mechanical ventilation as trauma to the lungs from excessive pressures volumes, damage caused by high levels of oxygen, tracheal stenosis as well as the increased risk of infection. Nurses are constantly present at the patients' bedside, so they are the primary healthcare professional responsible for monitoring the patients' respiratory status.

### 1.1 Subjects and methods:

#### Aims of the study

The present study was aimed to identify impact of nursing guidelines on minimizing ventilator-associated

pneumonia among patients.

**Research questions:**

Did nurses aware about nursing guidelines or not?

**Subjects and methods:**

**Study design and setting**

A quasi-experimental design was used in the present study. The study was conducted in Medical and Surgical Intensive Care Units in King Fahd Hospital (Saudi Arabia).

**Subjects of the study:**

**Group I –Nurses:-**

All nurses provided direct nursing care for patients who received mechanical ventilation in the above mentioned settings and they were 30 nurses at different age and years of experience as well as, different qualification.

**Group II- Patients:-**

All patients were admitted to Intensive Care Unit who received mechanical ventilation and free from any signs of pneumonia during admission. Total number = 180 patients which divided into two groups:

**Control group:** - composed of 90 patients whom received ordinary nursing care.

**Experimental groups:** - composed of 90 patients whom received their care after applying nursing guidelines to nurses for minimizing ventilator-associated pneumonia.

**Inclusion criteria:-**

X-ray was done to observe the shadow of pneumonia in the chest before and after admission for both the control and experimental groups of patients.

**3-Tools of the study:**

The data collection tools for this study were composed of three tools; these included patients sheet as well as observational checklist for nurses as well as nursing guideline

Tool I: (Patients sheet):

It includes data about patients such as name of the unit, age, sex, admitting diagnosis, indication of MV, duration of MV, length stay in ICU and X-ray was done to observe the shadow of pneumonia in the chest before and after admission for both the control and experimental groups of patients and after receiving MV for 5 days .

Tool 2: An observational checklist:

A clinical observational checklist was constructed by the researchers from nursing review, as well as from previous experience with the nurses in clinical setting. It was performed daily during three shifts and performed two times pre and post applying guidelines nursing guideline .

It includes:

- ✓ Infection control measures such as:
- ✓ Hand washing:
- ✓ Protective clothes as gloves, gown and mask
- ✓ Handling of soiled linen
- ✓ Provide general hygiene
- ✓ Oral hygiene.

-The scoring system for the observational checklist consisted of given two points for the done step, while zero for the step not done. The higher scores indicated a higher level of practices. Those score classified as:

Unsatisfactory	(< 60 %)
Satisfactory	(60 %)
Good	(≥75 %)

**Tool 3: Nursing Guideline**

The Nursing Guideline applied in this study was Guided according to the guideline of Centers for Disease Control, Prevention and the prevention of ventilator-associated pneumonia, it includes:-

-Wash hands after contact with mucous membranes, respiratory secretions, or objects contaminated with respiratory secretions. Wash hands before and after contact with patient.

-Educate healthcare workers about nosocomial bacterial pneumonias and infection control procedures used to prevent these pneumonias.

-Wear gloves for handling respiratory secretions or objects contaminated with respiratory secretions.

-Provide subglottic suctioning before deflating the cuff of an endotracheal tube or before moving the tube.

-Elevate the head of the bed to 30° to 45° if not contraindicated.

-Develop and implement a comprehensive oral hygiene program to provide oropharyngeal cleaning and decontamination with or without an antiseptic agent.( Centers for Disease Control and Prevention:2009)

### Methods of data collection :-

1-An official permission for data collection in Medical and Surgical Intensive Care Units in King Fahd Hospital (Saudi Arabia). was obtained from hospital administrative personnel .Meeting and discussion were held between the researcher and the nursing administrative personnel to make them aware about aims and objectives of the research, as well as, to get better cooperation during the implementation phase of the research.

2-Development of the tools after review of literatures.

3-Validity:

It was established for face and content validity by a panel of five expertise's who revised the tools for clarity, relevance, applicability, comprehensiveness, understanding, and ease for implementation and according to their opinion minor modifications was applied.

4-Ethical consideration:

Written consent were obtained from nurses to agree to participated in the present study.

5-Pilot study:

A pilot study for tools of data collection was carried out in order to test whether they are clear, understandable, feasible and valid. For this study, the researcher randomly selected 5 staff nurses to participate in the pilot study. Also it helped estimation to the time needed for data collection. No modification was done and the sample was added to the total study. The researcher was observing nurses practical skills about the studied procedures. The time needed to complete the checklist depended on the time of the procedure.

6-Data collection:

The time needed to fill checklist depend up on the time of procedure and filled by the researcher during nurse's performance inside the unit in the three shifts .

The duration of data collection was one year starting December 2012- December2013

7-Statistical design:

Data were checked, entered and analyzed by using SPSS (version 15) software computer package (special package for social science). Data were expressed as number and percentage for categorical variables. Range and mean  $\pm$  standard deviation for continuous variables. Chi Square (X<sup>2</sup>), t test, ANOVA (F test), paired t test and correlation coefficient (r) were used when appropriate. P value < 0.05 was considered to be statistically significant.

### 1.1.1Results.

Table (1): Characteristics of studied patients throughout guidelines protocol (Total number=180).

Characteristics of studied patients	Pre nursing guidelines N=90(100%)		Post nursing guidelines N=90(100%)	
	No	%	No	%
● Attended unit:				
▪ Surgical ICU	44	48.9	46	51.1
▪ medicalICU	46	51.1	44	48.9
● Age:				
▪ 20-30 years (neonate)	46	51.1	44	48.9
▪ 30-40 years	34	37.8	30	33.3
▪ > 40 (patients)	10	11.1	16	17.8
● Gender:				
▪ Male	52	57.8	46	51.1
▪ Female	38	42.2	44	48.9
● Indication of mechanical ventilation:				
▪ Respiratory distress syndrome	12	13.3	16	17.8
▪ Apnea	42	46.7	36	40.0
▪ Respiratory failure	18	20.0	16	17.8
▪ Cardiac arrest	6	6.7	4	4.4
▪ Paralysis of respiratory muscle	4	4.4	6	6.7
▪ Sepsis	2	2.2	10	11.1
▪ Post-Operation	6	6.7	2	2.2
● Chest X ray(+ve)	44	48.9	20	22.2

▪ **Table1.** shows that, the 48.9% of studied patients were from Medical ICU and 51.1% were from Surgical ICU in pre nursing guidelines, compared to 51.1% and 48.9% in post nursing guidelines respectively. Concerning ages of patients, 51.1% were aged from 20-30 years in pre nursing guidelines compared to 48.9% in post nursing guidelines, followed by 37.8% aged from 30-40 years in

pre nursing guidelines compared to 33.3% in post nursing guidelines . On other hand 11.1% were aged 40 or more in pre nursing guidelines compared to 17.8% in post nursing guidelines .

- As regards to gender it was found that 57.8% were males and 42.2% were females in pre nursing guidelines compared to 51.1% & 48.9% in post nursing guidelines respectively.
- Regarding indications of ventilated patients, in pre nursing guidelines protocol it was found that 46.7% of patients ventilated due to apnea followed by 20% due to respiratory failure while 13.3% due to respiratory distress syndrome, mean while both cardiac arrest and post operation had 6.7%, followed by 4.4% due to paralysis of respiratory muscles and only 2.2% due to sepsis. As compared to post nursing guidelines it was found that 40% due to apnea followed by both RDS and respiratory failure which constitute 17.8%, while sepsis were 11.1% of the indication of ventilated patients. moreover paralysis of respiratory muscles were constitute 6.7% and cardiac arrest were 4.4%.
- It was revealed from the same table that, 48.9% of studied patients had positive chest radiograph suggestive ventilator associated pneumonia in pre nursing guidelines and this percentage decreased to reached 22.2% in post nursing guidelines.

**Table (2):Duration of mechanical ventilation and length of stay in intensive care unit among studied patients**

Items	Pre nursing guidelines	Post nursing guidelines	significant test
	Mean ± SD (Range)		
● Duration of MV in hours:	337.5 ± 260.3 (120-1152)	215.8 ± 109.8 (120-480)	P < 0.05*
● Length of stay in ICU in hours:	398.2 ± 267.5 (120-1152)	259.1 ± 154.2 (120-672)	P < 0.05*

P < 0.05 significant (S) \*

Table 2. illustrated the mean duration of mechanical ventilation in hours it was 337.5 ± 260.3 hours in pre nursing guidelines which is decreased to 215.8 ± 109.8 hours in post nursing guidelines.

Regarding to the length of stay of the patients in ICU in hours in pre nursing guidelines it was 398.2 ± 267.5 hours and decreased to 259.1 ± 154.2 hours in post nursing guidelines. It was obvious that there was statistical significance in duration of mechanical ventilation and length of stay of the patients in ICU throughout guidelines protocol.

**Table (3): Nurse's Practice about Assessment of Respiratory System As Well As Suctioning Among Studied Patients Throughout Guidelines Protocol.**

Items	Pre (n=30)		Post (n=30)		2X	P value
	No	%	No	%		
1- Respiratory system:						
▪ Assess respiratory rhythm	2	6.7	5	16.7	0.65	0.42
▪ Assess movement of the chest wall. (symmetric bilaterally and coordinated with breathing )	0	0.0	0	0.0	0.0	1.0
Total Mean ± SD (range)	0.2±0.4 0-2		0.3±0.7 0-2		paired t 1.0	0.32
2- Suctioning from the ETT:						
- Wash hands	12	40.0	20	66.7	4.29	0.03*
- Wear gloves and mask	20	66.7	25	83.7	2.22	0.13
- Insert the catheter into the Endotracheal tube gently by using aseptic technique	10	33.3	15	50.0	1.71	0.19
- Time of suctioning not exceed than 15 seconds	20	66.7	26	86.7	3.35	0.06
- Used proper size of catheter	20	66.7	23	76.7	0.74	0.39
- Discard suction tube immediately after one single use	0	0.0	0	0.0	0.0	1.0
- Record and report						
Amount	0	0.0	0	0.0	0.0	1.0
Characteristics of secretions	12	40.0	20	66.7	4.29	0.03*
Respiratory status	10	33.3	17	56.7	3.3	0.069
Patients's response to procedure	4	13.4	9	30.0	2.45	0.11
Total Mean ± SD (range)	5.8±1.4 4-8		9±2.3 6-14		paired t 10.7	< 0.001**

P < 0.05 significant (S) \*

P < 0.01 highly significant (H.S) \*\*

Table 3. portrays nurse's practice about assessment of respiratory system as well as suctioning among studied patients throughout guidelines protocol. It was found that the total mean practice score regarding assessment of respiratory system was  $0.2 \pm 0.4$  in pre nursing guidelines and increased to  $0.3 \pm 0.7$  in post nursing guidelines. It was found no statistically significant difference among studied nurses throughout guidelines protocol.  $P = 0.32$

In relation to suctioning was  $(5.8 \pm 1.4)$  as total mean score practice in pre nursing guidelines while increased to  $(9 \pm 2.3)$  after guidelines protocol. A statistically highly significant difference was found among studied nurses throughout guidelines protocol.

**Table (4):Nurse's practice about ventilator management among studied patients throughout guidelines protocol.**

Items	Pre (n =30)		Post (n=30 )		2X	P value
	No	%	No	%		
<b>Ventilator management:</b>						
- Humidifiers should always be stored clean and dry	30	100.0	30	100.0	0.0	1.0
- Humidifiers should always be filled with sterile water	30	100.0	30	100.0	0.0	1.0
- Laryngoscope is disinfected after each patients use	30	100.0	30	100.0	0.0	1.0
- Ventilator is disinfected after each patients use	30	100.0	30	100.0	0.0	1.0
<b>Perform suctioning of the patients airway</b>						
▪ Endotracheal tube	30	100.0	30	100.0	0.0	1.0
▪ Oropharyngeal	30	100.0	30	100.0	0.0	1.0
▪ And nasopharyngeal as needed	30	100.0	30	100.0	0.0	1.0
- Monitor arterial blood gases with each ventilator change and with any clinical change	20	66.7	27	90.0	4.81	0.02*
<b>Monitor all ventilator setting, including</b>						
▪ Mode	0	0.0	0	0.0	0.0	1.0
▪ Oxygen saturation	10	33.3	26	86.7	17.78	0.001**
▪ Tidal volume rate	0	0.0	0	0.0	0.0	1.0
- Adjust level of humidifier water	5	16.7	20	66.7	7.94	0.004*
- Monitor temperature of humidifier as body temperature	5	16.7	20	66.7	7.94	0.004*
- Change ventilator tubing and humidification equipment as need or weekly as needed	6	20.0	9	30.0	0.8	0.37
Total Mean $\pm$ SD (range)	18.5 $\pm$ 2.1 14-24		20.0 $\pm$ 2.4 18-24		paired t 3.16	0.003*

$P < 0.05$  significant (S) \*

$P < 0.01$  highly significant (H.S) \*\*

Table 4. shows that, the total mean nurse's practice score regarding ventilator management was  $18.5 \pm 2.1$  in pre nursing guidelines and improved to reach  $20.0 \pm 2.4$  in post nursing guidelines.

- The same table portrays that there is statistical significance among studied nurses throughout guidelines protocol.  $P < 0.001$

Table (4): Nurse's practice about ventilator management among studied patients throughout guidelines protocol.

Items	Pre (n =30)		Post (n=30 )		2X	P value
	No	%	No	%		
Ventilator management:						
- Humidifiers should always be stored clean and dry	30	100.0	30	100.0	0.0	1.0
- Humidifiers should always be filled with sterile water	30	100.0	30	100.0	0.0	1.0
- Laryngoscope is disinfected after each patients use	30	100.0	30	100.0	0.0	1.0
- Ventilator is disinfected after each patients use	30	100.0	30	100.0	0.0	1.0
Perform suctioning of the patients airway						
▪ Endotracheal tube	30	100.0	30	100.0	0.0	1.0
▪ Oropharyngeal	30	100.0	30	100.0	0.0	1.0
▪ And nasopharyngeal as needed	30	100.0	30	100.0	0.0	1.0
- Monitor arterial blood gases with each ventilator change and with any clinical change	20	66.7	27	90.0	4.81	0.02*
- Monitor all ventilator setting, including						
▪ Mode	0	0.0	0	0.0	0.0	1.0
▪ Oxygen saturation	10	33.3	26	86.7	17.78	0.001**
▪ Tidal volume rate	0	0.0	0	0.0	0.0	1.0
- Adjust level of humidifier water	5	16.7	20	66.7	7.94	0.004*
- Monitor temperature of humidifier as body temperature	5	16.7	20	66.7	7.94	0.004*
- Change ventilator tubing and humidification equipment as need or weekly as needed	6	20.0	9	30.0	0.8	0.37
Total Mean ± SD (range)	18.5±2.1 14-24		20.0±2.4 18-24		paired t 3.16	0.003*

P < 0.05 significant (S) \*

P < 0.01 highly significant (H.S) \*\*

Table (5): Nurse's practice about universal precaution throughout guidelines protocol.

Items	Pre (n=30)		Post (n=30)		2X	P value
	No	%	No	%		
1- Hand washing:						
- When visibly soiled	20	66.7	26	86.7	3.35	0.06
- Before patients contact	10	33.3	15	50.0	1.71	0.19
- After patients contact	10	33.3	15	50.0	1.71	0.19
- After contact with a source of microorganisms	20	66.7	30	100.0	12.0	0.001*
- Before performing an invasive procedures	10	33.3	15	50.0	1.71	0.19
- After removing gloves	10	33.3	10	33.3	0.0	1.0
- Alcohol rub is used	19	63.4	22	73.4	0.69	0.4
Total Mean ± SD (range)	6.6±2.2 4-10		6.7±1.8 6-10		paired t 0.0	1.0
2- Protective clothes:						
a- Gloves						
- Contact with surfaces and article visibly soiled	10	33.3	15	50.0	1.71	0.19
- Performing vein puncture	18	60.0	20	66.7	0.29	0.59
- Handling specimen	0	0.0	10	33.3	12.0	0.001*
- Remove and discard gloves after each individual task before leaving bed	0	0.0	5	16.7	5.36	0.02*
b- Gown						
- Wear moisture-proof apron or gown whenever there is the potential of a body fluid contacting your clothes	18	60	18	60.0	0.0	1.0
c- Mask						
- Whenever there is the possibility of splash of any type of body fluid	10	33.3	20	66.7	6.67	0.009*
3 - Handling of soiled linen:						
- Put on gloves and wear a plastic apron during bed making	0	0.0	10	33.3	12.0	0.001**
- Linens are kept away from body to avoid contamination	10	33.3	20	66.7	6.67	0.009*
- Placing linens on chair, tables or on the floor are avoided	0	0.0	5	16.7	5.36	0.02*
- Soiled linens are kept in leak proof bags	0	0.0	5	16.7	5.36	0.02*
- Shake or toss linens are avoided	10	33.3	20	66.47	6.67	0.009*
Total Mean ± SD (range)	3.7±2.4 0-8		5.2±1.3 2-8		Paired-t 3.4	0.01*
3 - Handling of soiled linen:						
- Put on gloves and wear a plastic apron during bed making	0	0.0	10	33.3	12.0	0.001**
- Linens are kept away from body to avoid contamination	10	33.3	20	66.7	6.67	0.009*
- Placing linens on chair, tables or on the floor are avoided	0	0.0	5	16.7	5.36	0.02*
- Soiled linens are kept in leak proof bags	0	0.0	5	16.7	5.36	0.02*
- Shake or toss linens are avoided	10	33.3	20	66.47	6.67	0.009*
Total Mean ± SD (range)	1.3±0.9 0-2		6.3±0.7 6-8		paired t 21.7	< 0.001**

P < 0.05 significant (S) \*

P < 0.01 highly significant (H.S) \*\*

Table 5 .shows nurse's practice about universal precaution throughout guidelines protocol. It was found that, the



total mean practice score regarding hand washing was  $6.6 \pm 2.2$  in pre nursing guidelines compared to  $6.7 \pm 1.8$  in post nursing guidelines. It was found no statistically significant difference among studied nurses throughout guidelines protocol.  $P=1.0$ .

The same table illustrated that,  $3.7 \pm 2.4$  as total mean score practice regarding wearing protective clothes in pre nursing guidelines compared to  $5.2 \pm 1.3$  in post nursing guidelines. It was found that, there was statistically significant difference among studied nurses throughout guidelines protocol.  $P= 0.01$ .

It was found that, the total mean practice score was  $1.3 \pm 0.9$  in pre nursing guidelines and increased to  $6.3 \pm 0.7$  in post nursing guidelines. It was found statistically significant difference among studied nurses throughout guidelines protocol.  $P < 0.001$ .

Are presented in table 8. that the total mean scores of nurses practice throughout the guidelines protocol illustrated in table 30. It was found that, the total mean score was  $41.7 \pm 14.1$  in pre nursing guidelines compared to  $51.6 \pm 3.9$  in post nursing guidelines. It was found that, there was statistically significant difference between pre and post nursing guidelines.  $P < 0.001$ .

**Table (6): Nurse's practice about general hygiene among studied patients throughout guidelines protocol.**

Items	Pre (n=30)		Post (n=30)		2X	P value
	No	%	No	%		
Provide general hygiene:						
- wash hands	0	0.0	10	33.3	12.0	0.001**
Prepare the necessary linen -	30	100.0	30	100.0	0.0	1.0
- Fill the bath basin one-half full of warm water	20	66.7	30	100.0	0.0	1.0
- Place the rubber sheet on bed	0	0.0	5	16.7	5.36	0.02*
- Start with eyes, wipe each eye from the inner to outer aspect of the lid with water only	0	0.0	10	33.3	12.0	0.001**
- Clean the ears gently by using moisten cotton balls with water only	5	16.7	10	33.3	2.22	0.13
- Cleanse the face by warm water only	20	66.7	30	100.0	12.0	0.001**
- Wash head with soap and water	10	33.3	20	66.7	6.67	0.009*
Place patients in bed and dry the head quickly -	10	33.3	20	66.7	6.67	0.009*
- Remove the napkin and clean the buttocks	30	100.0	30	100.0	0.0	1.0
- Wash infant's body	10	33.3	20	66.7	6.67	0.009*
- Dry infant carefully especially the skin folds	5	16.7	10	33.3	2.22	0.13
- Dress the infant	30	100.0	30	100.0	0.0	1.0
- Clean the finger nails and toe nails	0	0.0	5	16.7	5.36	0.02*
- Clean the equipment	0	16.7	10	33.3	2.22	0.13
Recording for:-						
▪ Time	0	0.0	0	0.0	0.0	1.0
▪ Observations	10	33.3	20	66.7	6.67	0.009*
Total Mean $\pm$ SD (range)	12.3 $\pm$ 1.3 10-14		19.4 $\pm$ 1.7 16-22		paired t 30.7	< 0.001**

$P < 0.05$  significant (S) \*

$P < 0.01$  highly significant (H.S) \*\*



**Table (7): Nurse's practice about oral hygiene among studied patients throughout guidelines protocol .**

Items	Pre (n=30)		Post (n=30)		2X	P value
	No	%	No	%		
Oral hygiene:						
- Wash hands	0	0.0	10	33.33	12.0	0.001**
- Apply disposable gloves	10	33.3	20	66.7	6.67	0.009*
Position the patients on his/her side-						
- Clean patients's mouth using toothbrush or sponge toothetts moistened with peroxide and water	5	16.7	20	66.7	15.4	0.001**
- Rinse patients's mouth with a clean swab	0	0.0	5	16.7	5.36	0.02*
- Rinse patients's mouth with a clean swab	17	56.7	28	93.4	10.76	0.001**
- Suction secretions as they accumulate, if necessary	15	50.0	26	86.7	0.07	0.79
- Apply water soluble jelly to patients's lips	0	0.0	25	83.4	42.86	0.001**
- Clean equipment and return it to its proper place	5	16.7	10	33.3	2.22	0.13
- Record and report procedure and any abnormal observation	0	0.0	5	16.7	5.36	0.02*
Total Mean ± SD (range)	3.5±1.3 2-6		6.4±0.8 6-8		paired t 11.0	< 0.001**

P < 0.05 significant (S) \*

P < 0.01 highly significant (H.S) \*\*

Nurse's practice about oral hygiene among studied patients throughout guidelines protocol was illustrated in table 7. it was found that, the total mean practice score was  $3.5 \pm 1.3$  in pre nursing guidelines and improved to reach  $6.4 \pm 0.8$  in post nursing guidelines. It was found statistically significant difference among studied nurses throughout guidelines protocol.  $P < 0.001$ .

**Table (8) Total means scores of nurses' practice throughout the guidelines protocol.**

Total score	Pre	post	Paired t-test	p-value
Total practice	Mean ±SD range		12.5	<0.001**
	41.7±14.1 30-52	51.6±3.9 44-60		

Nurse's practice about general hygiene among studied patients throughout guidelines protocol was illustrated in table 6. It was found that, the total mean practice score was  $12.3 \pm 1.3$  in pre nursing guidelines and increased to  $19.4 \pm 1.7$  in post nursing guidelines. It was found statistically significant difference among studied nurses throughout guidelines protocol.  $P < 0.001$

#### IV-Discussion

Ventilator-associated pneumonia (VAP) is nosocomial pneumonia that develops later than or at 48 in mechanically ventilated patients after initiating ventilation (Elward et al, 2007). Therefore, critical care nurse should be skillful, highly trained especially when caring for patients on mechanical ventilation.

In relation to the characteristics of studied patients throughout guidelines protocol, it was noted that more than half at age 20-30years in pre nursing guidelines compared to post nursing guidelines were less than half at age 30-40 and followed by more than 40 years , regarding their indication of mechanical ventilation, it was noticed that their most common problems were apnea followed by respiratory failure and respiratory distress syndrome throughout guidelines protocol. In relation to the chest radiograph, it was found that there is statistical significance related to the shadow of pneumonia between pre & post nursing guidelines, the incidence of the ventilator associated pneumonia decreased to less than half in post nursing guidelines. this is show the importance of using guidelines protocol on reducing the incidence of ventilator associated pneumonia. This finding agrees with Bigham et al., (2009) who reported that ventilator associated pneumonia rate was reduced after program implementation.Elward et al, (2002) added that, the clinical criteria for pediatric ventilator associated pneumonia included new or progressive and persistent infiltrate, consolidation or cavitations on chest radiograph and at least three of the following; temperature instability, leukopaenia, new purulent sputum or change in amount or character of sputum, apnea or tachypneo, nasal flaring or grunting, wheezing, crackles or ronchi, cough, worsening gas exchange, increased O2 requirements or increased ventilatory demand and bradycardia or tachycardia. While Turton P, (2008) reported that, the chest X ray changes can be because

oedema, atelectasis, hemorrhage and hematological markers are produced in response to many insults on the body.

Regarding mean duration of mechanical ventilation and length stay of the patients in ICU in hours, it was decreased in post nursing guidelines than pre nursing guidelines, there is statistical significance in duration of mechanical ventilation and length stay of the patients in ICU throughout guidelines protocol, this could be related to the fact that using guideline protocol has been demonstrated to be safe and effective in reducing time of mechanical ventilation. This finding agrees with studies done by Henneman (2005) and Galley, O'Riordan (2006) have shown similar results in relation to ventilation time and length of stay in ICU when nurses directed guideline protocol for minimizing rate of ventilator associated pneumonia.

Patients with ventilator-associated pneumonia also had a higher mortality as stated by Elward et al (2007) it was in the present study found that a significant drop in the VAP rates from the pre intervention period to the post intervention period. This finding agrees with Bigham et al., (2009) who mentioned that ventilator-associated pneumonia is significantly associated with increased pediatric intensive care unit length of stay, mechanical ventilator days, and mortality rate.

Schleder (2004) and Hunter (2006) stated that, VAP is associated with increased length of ventilator dependence, intensive care unit hospital stay, and mortality. Finally, in the current study analysis of data showed that, impact of the nursing guidelines protocol on minimizing ventilator associated pneumonia among intensive care patients.

The nurses constitute the highest number of personnel working in hospital, hence any defect in their role will affect on the quality of care given to the patient, and therefore they require continuous training programs as well as follow up their care provided to the patient. The goals of continuous training for nurses is to enhance knowledge, practice, and attitude of them and ultimately to promote the quality of health care delivery to the public. Zack et al, (2002) reported that, training program should be widely employed for infection control in the intensive care unit setting and can lead to substantial decreases in cost and patient mortality attributed to hospital-acquired infections. On the other hand a study done by Wiebelans (2001) emphasized that training program for nurses personal as method for continuous updating and renewal of their knowledge and skills to maintain and improve competence. Therefore the aim of this study was to identify impact of guidelines protocol on minimizing ventilator-associated pneumonia among intensive care patients.

The present study clarified that there were statistically significant among studied nurses between pre and post nursing guidelines regarding ventilator management and infusion preparation as well as universal precaution as wearing protective clothes (gloves, mask, and gown) and handling of soiled linen. As stated by Pediatric Affinity Group (2009) the care of the ventilator includes clearing the circuit of condensate and preventing condensate from draining into the patient's airway, heated ventilator circuits, changing ventilator circuits when visibly soiled as preventing contamination of the equipment to reduce VAP.

Foxman (2003) found in his study that the level of nurses' performance related to infection control improved after implementation of the program. Gloves are used as protective barrier to prevent contamination when touching blood, body fluid, secretion, excretion, mucous membranes and non intact skin, also gloves are used to protect the patient from the health care worker's flora (Solotkin, 2002). Woodrow (2000) emphasized that proper hand washing technique is the single greater measure that can be employed to prevent the spread of infection. Similarly Taylor (2001) who indicated that, the safest way of nurses to protect themselves and their patient through careful hand washing. In addition study done by Elkin et al (2000) in USA evaluate the efficacy of an trainingal feed back intervention program on hand washing, it was found that performance of nurses improved after trainingal program. In the same line Foglia et al (2007) stated that the trainingal intervention and efforts to improve adherence to hand hygiene for patients have been associated with decreased VAP rates. In contrast In the present study performance of studied nurses related to hand washing was not significant difference between pre and post nursing guidelines.

Mechanical oral care interventions aim to physically remove dental plaque and debris from the oral cavity (Grap et al, 2004). Although nurses have used foam swabs for many decades, the toothbrush is more effective in removing dental plaque; however, success depends on how often the toothbrush is used and for what duration (Franklin et al, 2000 and Pearson et al, 2002). In our study Statistically significant it was found among studied nurses throughout guidelines protocol related to general hygiene and oral hygiene, and this finding in the same line with Munro et al (2009) who mentioned that good oral hygiene and the use of antiseptic oral decontamination reduces the bacteria on the oral mucosa and the potential for bacterial colonization in the upper respiratory tract. This reduction in bacteria has been shown to reduce the potential for the development in ventilator-associated pneumonia for patients on mechanical ventilation.

Also, Bauer (2000) reported that patient's hygiene occur through complete bed bath, oral care, eye care and skin care. Perry and potter (2002) revealed good personnel hygiene reduces transmission of infection. In the same line Woodrow (2000) illustrated that poor hygiene with lack of bathing and cleanness are the most common causes for skin problem. This finding goes in the same line with Fields (2008) who showed in his study that the

VAP rate dropped to zero within a week of beginning the every-8-hours tooth brushing regimen in the intervention group, the study was so successful that the control group was dropped after 6 months, and all intubated patients' teeth were brushed every 8 hours, maintaining the zero rate until the end of the study.

Finally the present study revealed that there was a statistically significant difference after implementation of guideline protocol. Inadequate performance in pre nursing guidelines might be due to lack of opportunity for continuous education available in the hospital to improve the nurses' practice and may be due to also shortage of equipment, lack of supervision, as well as absence of head nurse supervision and guidance for close observation and reinforcement as well as the nurses were over crowded with work.

### Conclusion

Based on the results of the present study it could be concluded that there was highly statistically significant difference regarding the level of studied nurses' practice in pre nursing guideline comparing to post nursing guideline, in addition significant minimizing in the VAP rates between studied patients after application of the nursing guideline. The total time patients spent on mechanical ventilation and the length of stay in the ICU reduced in post nursing guideline compared to pre nursing guideline .

### Recommendation

- 1- Guideline protocol used for minimizing rate of VAP is an effective strategy in the management of mechanical ventilation for critically ill patients.
- 2- Development of training program for nursing staff in ICU should be conducted to newly jointed nurses.
- 3- Booklet about guideline protocol for prevention ventilator associated pneumonia should be available at ICU.
- 4- Adequate highly qualified nurses for observation and guidance should be available .
- 5- Nurses- patient ratio should be 1-3.
- 6- And finally, nursing research is an important means of improving nursing skills, which in turn will strengthen the nurse's voice in the interdisciplinary team and enhance patient care.

### References

- 1-Bauer T. (2000): Ventilator associated pneumonia: incidence, Risk factors and Microbiology. *Semin Respir Infect.* Dec; 15(4):272-9.
- 2-Bigham MT, Amato R, Bondurant P, Fridriksson J, Krawczeski CD, Raake J, Ryckman S, Schwartz S, Shaw J, Wells and D, Brill R. (2009): Ventilator-associated pneumonia in the pediatric intensive care unit: characterizing the problem and implementing a sustainable solution *Journal of Pediatrics.* 154(4):582-587.
- 3-Centers for Disease Control and Prevention. (2009): Guideline for prevention of catheter-associated urinary tract infections. located at [http// www.google.com](http://www.google.com).
- American College of Critical Care Medicine: Critical care delivery in the intensive care unit: Defining clinical roles and the best practice model. *Crit Care Med* 2001; 29 2007–2019 23. (c). Guidelines
- 4-Dodek P, Keenan S, Cook D, Heyland D, Jacka M, Hand L, Muscedere J, and Brun-Buisson C. (2004): Evidence-based clinical practice guidelines for the prevention of ventilator associated pneumonia. *Annals of Internal Medicine;* 141: 305–313.
- 5-Elkin M, Perry A, and Potter P. (2000): *Nursing intervention & clinical skills.* (2nd ed). Philadelphia: Mosby Co, PP. 47-50
- 6-Elnaway A, Abdelfattah M, Metwally H, Barakat Sh, and Hassan I, (2006): Ventilation acquired pneumonia incidence in Egypt. In: *J of Trop Pediatrics,* Vol.52,P.185.
- 7-Elward A, Warren D, and Fraser V. (2002): Ventilator-associated pneumonia in pediatric Intensive Care Unit patients: Risk factors and outcomes. *J of American Academy of Pediatrics,* Vol.109,P.758.
- 8-Elward A, Meier M, and Foglia E. (2007): Ventilator-Associated Pneumonia in Neonatal and Pediatric Intensive Care Unit Patients, Division of Infectious Diseases, Department of Pediatrics, American Society for Microbiology; 20(3): 409–425.
- 9-Hunter JD. (2006): Ventilator Associated Pneumonia. *Postgraduate Medical Journal;* 82:172-178.
- 10-Fields LB. (2008): Oral care intervention to reduce incidence of ventilator-associated pneumonia in the neurologic intensive care unit. *Jo*
- 11-Foglia E, Meier M, and Edward A. (2007): Ventilator-associated pneumonia in neonatal and pediatric intensive care unit patients. *Clin Microbiol Rev.* 20:409-425. *Journal of Neuroscience Nursing.* 40(5):291-8, 2008 Oct.
- 12-Foxman B. (2003): Epidemiology of urinary tract infections: incidence, morbidity and economic costs. *Dis Mon.* Feb,49(2):53-70.
- 13-Franklin D, Senior N, James I, and Roberts G. (2000): Oral health status of patients in a paediatric intensive care unit. *Intensive Care Medicine,* 26(3), 319-324.

- 14- Galley J, O’Riordan B. Royal Nursing College. Guidance for nurse staffing in critical care. 2003. <http://www.rcn.org.uk/direct> (Accessed 2006).
- 15-Grap M, Munro C, Elswick R, Sessler C, and Ward K. (2004): Duration of action of a single, early oral application of chlorhexidine on oral microbial flora in mechanically ventilated patients: A pilot study. *Heart and Lung*, 33(2), 83-91.
- 16-Guentner K, Hoffman L, Happ M, Kim Y, Dabs A, Menelsohn A, and Chelluri L. (2006): Preferences of Mechanical ventilation among survivors of prolonged mechanical ventilation and tracheostomy. *American Journal of critical Care*.
- 17-Hampton D, Griffith D, and Howard A. (2005): Nursing manuals contents. *Protocol. Management Rehabil Nurse*, Jul-Aug., 30(4). Located at <http://www.Med.Nuc.edu>.
- 18- Henneman EA. Liberating patients from mechanical ventilation, a team approach. *Crit Care Nurs* 2001;21(3):25-33.
- 19-Livingston D. (2000): Prevention of ventilator-associated pneumonia. *Am J Surg.*; 179(2 suppl 1):12–17.
- 20-Munro CL, Grap MJ, Jones DI, McClish DK, and Sessler CN. (2009): Chlorhexidine, tooth brushing and preventing ventilator-associated pneumonia in critically ill adults. *American Journal of Critical Care*. Sep;18(5):428-437.
- 21-Pearson L, and Hutton J. (2002): A controlled trial to compare the ability of foam swabs and toothbrushes to remove dental plaque. *Journal of Advanced Nursing* 39(5), 480–489.
- 22-Pediatric Affinity Group. (2009): Ventilator-associated pneumonia. How-to guide pediatric supplement. Available at: <http://www.nichq.org/pdf/VAP.pdf> Accessed February 22, (archived by WebCite® at <http://www.webcitation.org/5eq7EDUH8>
- 23-Perry AG, and Potter PA. (2002): *Clinical Nursing skills techniques*. 5th ed. St. louis: Mosby co. PP:922-929.
- 24-Schleder B. (2004): Taking Charge of Hospital Acquired Pneumonia . *Nurse Practitioner* ,29:50-53.
- 25-Solotkin K and Knipe C. (2002): Nursing management; patients with burns. In: Lewis S, Heitkemper M, and Dirksen S. *Medical-Surgical Nursing; Assessment and management of clinical problems*, 5th ed. Toronto: Mosby Co, PP.523-550.
- 26-Taylor C, Lillis C, and LeMone P. (2008): *Fundamentals of nursing: the art and science of nursing care*. (8th ed), J.B. Lippincott, New York ,PP: 1100-1144.
- 27-Turton P. (2008): Ventilator-associated pneumonia in paediatric intensive care, *Critical Care Nurses, Nursing in Critical Care*.
- 28-Wiebelans P and Hansen S. (2001): *Hospital Infection Control, Policies and practice Procedure*. London. W.B. Saunders Co, PP.5-13. Vol 13 No (5).
- 29-Woodrow P. (2000): Primary Biliary Cirrhosis. *Am. J of Nursing*; (12):52-57.a
- 30-Weinburger B, Laskin D, Heck D, and Laskin J. (2002): Oxygen toxicity in preterm infants. *Toxicology and Applied Pharmacology*; 181: 60–67.
- 31-Zack J, Garrison T, Trovillion E. (2002): Effect of an training program aimed at reducing of VAP. *Crit Care Med*, 30(11).P2407-2412.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:

<http://www.iiste.org>

## CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

**Prospective authors of journals can find the submission instruction on the following page:** <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

## MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

Academic conference: <http://www.iiste.org/conference/upcoming-conferences-call-for-paper/>

## IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

