

Effect of Instructional Guideline on Nurses' Performance Regarding Weaning of Patients from Mechanical Ventilation

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Abstract

Background: Weaning a patient from mechanical ventilation (MV) and eventually to extubation is a challenge for critical care nurses who play a vital role in assessing a patient's readiness for weaning. **Aim:** Evaluate the effect of instructional guideline on nurses' performance regarding weaning of patients from MV. **Hypothesis:** The implementation of instructional guideline will have a positive effect on nurses' performance through improvement of nurses' knowledge and practice regarding weaning of patients from MV. **Design:** A quasi-experimental design was utilized to conduct this study. **Setting:** The study was conducted at the Intensive care units in Ain Shams University Hospital. **Subjects:** A Convenient sample of all available (40) nurses who working at the previously mentioned setting. **Tools:** Two tools were used for data collection I. Nurses' Self-administered Questionnaire: It included two parts: Part 1: Nurses' demographic characteristics, Part 2: Nurses' knowledge regarding weaning of patients from MV. II. Nurses' practice observational checklists to assess level of nurses' practice regarding weaning of patients from MV. **Results:** the mean age for nurses under study was 30.9 ± 8.8 , 47.5% of them were within the age group between 25 to ≤ 35 years. 62.5% of the nurses were female, 65% were married. 42.5% of the nurses were had diploma nursing. There was a positive correlation with highly statistically significant relation between the total score of nurses' knowledge and practice with marked improvement after implementation of instructional guideline about weaning of patients from MV. **Conclusion:** there was a statistically significant improvement after instructional guidelines implementation regarding nurses' performance related to weaning of patients on ventilators. **Recommendation:** Critical care units in hospitals should be equipped by Arabic instructional guideline for nurses' performance weaning for patients on ventilators to improve the quality of patient's care and decrease the complications for this patient.

Keywords: Instructional guideline, Weaning, mechanical ventilation and nurses' performance

Introduction

Mechanical ventilation is known as the process of mechanically assisting or substituting spontaneous breathing. The goal of it is to "breathe for the patient" until person is sufficiently recovered to breathe on his own" (Sole et al., 2020).

When a patient is under general anesthesia or is experiencing a serious illness in an intensive care unit, mechanical ventilation (MV) is commonly utilized as a short-term measure. The purposes of MV are to supply oxygenation, protect against barotrauma to decrease the patient's work of breathing (WOB), to ensure patients comfort, and to correct any acid-base imbalances. 40% of all patients entering are on MV. Caregivers should start making plans for patient weaning as soon as the decision to mechanically ventilate a patient is made (Robert and Kacmarek, 2018).

Weaning criteria are used when a patient appears ready to be intubated. These include normal breath sounds, little to no secretion, an improved chest x-ray, and a series of quick bedside pulmonary function tests to determine whether the patient will likely be able to breathe without a ventilator. The process of abruptly or gradually discontinuing ventilator support and reestablishing spontaneous breathing is known as weaning from MV (Goligher et al., 2016 & Elliott et al., 2017).

Patients are weaned off from mechanical ventilation using one of three primary methods. Those include the T-piece, continuous positive airway pressure (CPAP), pressure support ventilation (PSV), and synchronized intermittent mandatory ventilation (SIMV). To reduce the work of breathing, the PSV is frequently used with SIMV. The weaned method selected is determined by the patient's respiratory condition and the duration of time

that has spent on the MV (Sengupta et al., 2018).

As nurses learn through on-the-job training, reflective practice is crucial in nursing education. nursing education should focus on the following four fundamental patterns of knowing: (a) empirical derived from factual knowledge; (b) aesthetic derived from awareness of the patient and the situation's overall context; (c) personal knowing derived from self-awareness and empathy toward the circumstance; and (d) ethical derived from attitude and knowledge This enables nurses to critically evaluate existing practices and determine whether there is a need for change (Gunther, 2021).

Guidelines can aid in enhancing care uniformity; nevertheless, even after accounting for case mix, research from throughout the globe shows that the frequency of procedures varies significantly among physicians, specialties, and geographical areas. Patients that have the same clinical issues are managed differently depending on their clinician, facility, or location. A guideline serves as a solution (William, 2021).

Significance of the study

In ICUs, about 30% of patients need mechanical ventilation; 80% of these patients can be weaned off without special assistance and within two days, while the remaining 20% need long-term mechanical ventilation and there are many complications that happen to them and numerous complications affect their respiratory, musculoskeletal, hydro-electrolyte, and renal systems, as well as their cardiovascular, psychological, and gastrointestinal systems, in addition to their incidence of infections and barotraumas (Rolim et al., 2020).

Despite being a life-saving procedure, mechanical ventilation can have negative physiological and psychological effects on the patient. Therefore, stopping mechanical support as quickly as possible should be a top focus for critical care nurses. Up to 40% of the patient's overall ventilator time can be devoted to weaning from mechanical ventilation (Rollnik et al., 2017 and Stephens et al., 2019).

Weaning properly may lower mortality and re-intubation rates. Nurses can aid with patient preparation and successful weaning. This will shorten the patient's time to weaned off the ventilator and lessen the needed for long-term care facilities (Niraj, 2018). Therefore, there is a strong need to evaluate the effect of instructional guideline on nurses' performance regarding weaning of patients from MV. This evaluation might assist to save costs by enhancing patient care, shortening hospital stays, and lowering complications. Additionally, this was hoped that the implementation of nursing guidelines for weaning patients off from mechanical ventilators would offer professional nurses a reliable foundation from which to work, increase their autonomy, verify their work, and prevent unnecessary delays.

Aim of the study

The aim of this study was to evaluate the effect of instructional guideline on nurses' performance regarding weaning of patients from mechanical ventilation through the following:

- Assess nurses' knowledge regarding weaning of patients from mechanical ventilation.
- Assess nurses' practices regarding weaning of patients from mechanical ventilation.
- Develop and implement instructional guideline regarding weaning of patients from mechanical ventilation.
- Evaluate the effect of instructional guideline regarding weaning of patients from mechanical ventilation.

Research hypothesis:

The current study hypothesized that:

- The implementation of instructional guideline will have a positive effect on nurses' performance through improvement of nurses' knowledge and practice regarding weaning of patients from mechanical ventilation.

Operational definition:

Nurse's performance involves the fulfillment of action. In the current study, performance includes both nurses' knowledge and practice

related to weaning of patient from mechanical ventilation.

Subjects and Methods

Research design: A quasi-experimental (one group pre/posttest design) was utilized to conduct this study.

Setting: The study was conducted at the Intensive care units in Ain Shams University Hospital, Cairo, Egypt. The building was located at the 1st floor and consists of three rooms for males and females; 1st room included 17 beds, 2nd room included 17 beds and 3rd room included 2 beds for isolation cases.

Subjects: A Convenient sample of all available (40) nurses who were working at the previously mentioned setting from both gender.

Tools of data collection:

Tool I: Nurses' Self-administered Questionnaire:

It was developed by the researcher in an Arabic language based on reviewing relevant and recent literatures .It included the following two parts:

Part 1: Nurses' demographic characteristics:

This part used to assess nurses' demographic characteristics which included 6 closed ended questions (age, gender, level of education, years of experiences, marital status and training courses).

Part 2: Nurses' knowledge:

It was developed by the researcher in an Arabic language based on reviewing relevant and recent literatures (*Cederwall et al., 2018; Jean-Michel, 2018 and Sole et al., 2020*), This part concerned with assessing nurses' knowledge level regarding weaning of patients from mechanical ventilation. This part consisted of 39 closed ended questions in the form of Multiple Choices Questions (MCQs) and true or false, about Anatomy & physiology of the respiratory system, mechanical ventilator definition, normal respiration rate, indication & types, modes of MV, ETT & Tracheostomy, definitions& indication of weaning, stages of weaning, Obtaining an arterial blood gases sample (ABGs), suction and complications of MV, Nursing role before starting weaning, during & after the weaning& extubation.

Scoring system, the nurses' questionnaire consisted of 39 questions in the form of multiple choice and true or false questions. (One) a grade was given for each corrects answers, and (Zero) for the incorrect answer. The total score of questionnaire was 39 grades.

The total level of knowledge was:

Satisfactory score for knowledge $\geq 80\%$ = 31 grades.

Unsatisfactory score for knowledge $< 80\%$ = 8 grades.

Tool II: Nurses' practice observational checklists:

This tool was developed by the researcher in an Arabic language based on review of relevant recent related literatures (*Jean-Louis and Serge, 2019 & Gunther, 2021*). It was used to assess level of nurses' practice regarding weaning of patients from mechanical ventilation. It included the following sections: 1. Pre-weaning practices (assist with intubation, connect ventilator, airway suctioning and nasopharyngeal suction) 2. Monitoring of the patient during weaning from mechanical ventilator (endotracheal intubation (ETT) care, care of tracheostomy tube, ETT or tracheostomy tube suctioning, ABG and weaning of the patients from MV) 3. Extubation technique & post extubation care (assist with extubation, decannulation, oral care and oral suctioning).

Scoring system:

In accordance with the steps, the researcher assigned the procedures' marks. Each step was graded (One) if done correctly, and (Zero) if not done or incorrectly done.

The total nurses' practice was:

- Satisfactory level of practice $\geq 80\%$
- Unsatisfactory level of practice $< 80\%$

Operational design

The operational design includes preparatory phase, content validity and reliability, pilot study and field work.

Preparatory phase:

It was included reviewing of related literature and theoretical knowledge of various aspects of

the study using books, articles, and periodicals to develop tools for data collection.

B) Tool validity and reliability:

- **Tool Validity:**

Tool validity was conducted to determine whether the tool covered the aim of the study or not. It was tested through panel of seven experts; three professors, three assistant professors and one lecturer of medical surgical nursing from Ain Shams University who review the tool to ensure its validity for comprehensiveness, accuracy, clarity and relevance.

- **Tool Reliability:**

Reliability of the developed tools was tested using alpha Cronbach's model which is a model of internal consistency and its normal range between 0 and 1 (value more than 0.5 denote acceptable reliability). The reliability for these tools was 0.81.

C) Pilot study:

A pilot study was carried out on four nurses from the study subjects to test the clarity, applicability, feasibility and relevance of the tools used and to determine the needed time for the application of the study tools. The nurses who were included in the pilot study were included to the sample because no modification was done after conducting pilot study.

D) Field work:

The instructional guideline designed to be practical and theoretical in nature addressing knowledge necessary for nurses about weaning from mechanical ventilation. Data were collected (from the beginning of June 2021 till end of November, 2021) during morning and afternoon shift three days/week. The observation checklist was carried out to assess practice of the nurse caring for weaning patients on ventilators that was filled in by the researcher by direct observation while the questionnaire was carried out to assess knowledge of the nurses caring for weaning patients on ventilators. Both the questionnaire and the observation checklist were carried out before delivering instructional guideline (pre phase), and

finally after three months from studying instructional guideline, (post phase).

Instructional guideline about nurses' knowledge and practice regarding weaning of patients from ventilator:

Booklet was designed in Arabic language and developed by the researcher based on the results obtained from assessment of the nurses' knowledge and practice, as well as literature review, which included anatomy and physiology of the respiratory system, the overview about MV and weaning process (definitions, indication, types, modes, indicator for weaning, complications, suctioning, role of the nurse before starting weaning, during & after the weaning of patients from MV).

This study conducted through four consecutive phases: assessment, planning, implementation and evaluation. Data collection was done pre and post implementation of the instructional guideline.

Assessment phase:

During this step, the researcher met with each nurse who was a part of the study and gave a comprehensive description of the goal in order to obtain their verbal consent as well as their approval and cooperation. The researcher observed for all study subject to collect baseline data & the modified instructional guideline was developed based on a review of related literature and assessment tool (pretest).

Assess nurses' level of (knowledge & practice) regarding weaning from mechanical ventilation by using questionnaire and nurses' observational checklist.

Planning and Implementation phase:

Determine the program strategies (timetable sessions, teaching methods, media used, learners' activities, evaluation methods, selecting the teaching place and the program finances).

The sessions were performed in the training unit with the permission of the responsible supervisor nurse. The total number of sessions was 10 sessions, 4 theoretical sessions/ 6 practical per group.

Based on tools of data collection the researcher was developed the instructional

guideline about weaning from mechanical ventilation will be designed in a simple Arabic language in the light of related literature based on nurses' needs. It colored printed and supplemented by photos for more illustration and help the nurses to demonstrate understanding of the content.

Teaching methods included group discussion, role playing, demonstration and re-demonstration, models, and pictures.

Evaluation phase

This phase was included evaluating the effect of instructional guideline on the nurse's level of (knowledge & practice) by comparing the results pre and post the instructional guideline implementation by using the same data collection tools and it was done immediately after finishing the instructional guideline implementation.

Administrative and Ethical considerations:

The research was approved a written consent was obtained from nurses participating in the work after explaining the nature and purpose of the study.

The necessary approvals were obtained from the director and nursing director of Ain Shams University Hospital.

Written consent was taken from nurses who agreed to participate in the research process. Permission was taken from the administrative personnel and the head nurses/supervisors of critical care units.

Nurses were assured data confidentiality, and the researchers initially introduced themselves to the study subjects and nurses were informed that their participation is voluntary and they can withdraw at any time from the work.

Statistical analysis:

The statistical software for social science (SPSS), version 22, was used to arrange, categorized, tabulate, and statistically analyze the obtained data in evaluate the change for nurses before and after receiving instructional guidance. Using numbers and percentages, data were shown in tables and charts. Percentage (%), mean and standard deviation (SD), Paired t-test, Chi-square (X²), ANOVA test, and

Pearson coefficient(R) were all included in the statistical study. P 0.05* was used to determine statistical significance for the differences and relationships.

Results

Table 1 Reveals that the mean age for nurses under study was 30.9±8.8, 47.5% of them were within the age group between 25 to ≤35 years. 62.5% of the nurses were female, 65% were married. 42.5% of the nurses were had diploma nursing. Regarding the years of experience about 40% of the nurses their years of experience was between one to less than five years.

Fig. 1 shows that, 85 % of the studied nurses didn't attend any training courses about weaning of patients from MV.

Table 2 illustrates that, 95% & 92.5% of nurses had a satisfactory level of knowledge regarding ABGs and definition & indication of weaning at post implementation phase. And 87% of them had a satisfactory level of knowledge related to modes of MV and nursing role before starting weaning, also 85% of nurses had a satisfactory level of knowledge about mechanical ventilator definition, indication & types, ETT & Tracheostomy, and 82.5% of studied subject had a satisfactory level of knowledge regarding suction and complications of MV, nursing role during & after the weaning & extubation at post implementation instructional guideline compared to pre implementation phase.

While 33% of the studied nurses had a satisfactory level of total knowledge pre implementation of the instructional guideline, which improved to 82, 5% post the guideline's implementation, with highly statistically significant differences at (P < 0.001).

Table 3 shows that at post implementation of instructional guideline, 87.5% of nurses had a satisfactory level of practice regarding airway suctioning, and 82.5% of them had a satisfactory level of practice about assist with extubation and ETT or tracheostomy tube Suctioning. 80% of nurses had a satisfactory level of practice related to assist with intubation, nasopharyngeal suction, ETT care, tracheostomy tube care, ABGs, and weaning of the patients from MV, decannulation and oral

care. While 70% & 67.5% of them had a satisfactory level of practice about connect ventilator and oral suctioning compared to pre implementation phase. While 32.5% of the studied nurses had satisfactory total scores for their level of practices regarding weaning of patients from ventilators, which improved to 80 % post the guideline's implementation, with highly statistically significant differences at ($P < 0.001$) between pre and post implementation.

Table 4 reveals that there was a highly statistically significant relation between the total satisfactory nurses' level of knowledge and their demographic data (age, gender, education level, and years of experience) pre and post implementation of instructional guideline at ($p < 0.001$). When a nurse's age increased, their level of knowledge also did so.

Additionally, there were relation between the level of knowledge among nurses and their qualifications, when a nurse's education level increased; there was an increase in the nurses' level of knowledge.

Also, there was a relation between the number of years of experience and the nurses' level of knowledge, whenever an increased nurse's year of experience there was an increase in the level of knowledge.

Furthermore, there were statistically significant differences at ($P < 0.05$) between the total satisfactory nurses' level of knowledge and their previous training courses about patients weaning from MV pre and post implementation phases.

Table 5 illustrates that there were highly statistically significant relation between total satisfactory nurses' level of practices and their demographic characteristics (age and gender) pre and post implementation of instructional guideline at ($p < 0.001$).

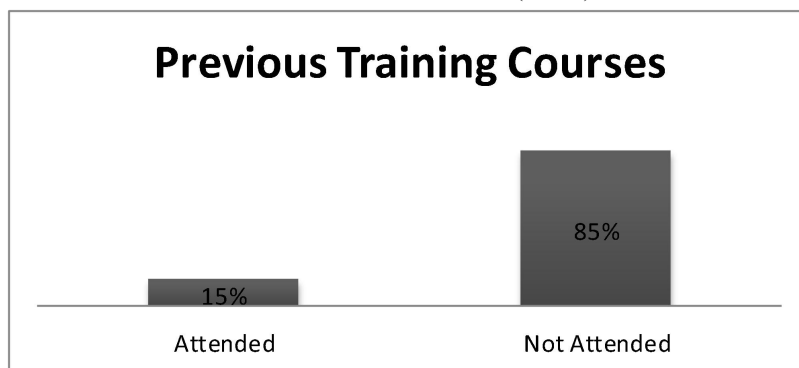
While there were statistically significant differences between the total satisfactory nurses' level of practices and their educational level, years of experience and previous training courses about patients' weaning from MV pre and post implementation phases at ($p < 0.05$).

So, whenever the nurses' level of education, years of experience and previous training course attendance increased, as such increased their level of practice.

Table 6 shows that there was a positive correlation with highly statistically significant relation between the total score of nurses' knowledge and practice after implementation of instructional guideline about weaning of patients from MV.

Table (1): Number and percentage distribution of the studied nurses according to their demographic characteristics (N=40)

Items	No.	%
Age:		
<25	13	32.5
25- <35	19	47.5
35- <45	7	17.5
≥45	1	2.5
Mean ± SD	30.9±8.8	
Marital Status:		
Married	26	65
Single	14	35
Gender:		
Female	25	62.5
Male	15	37.5
Level of Education:		
Diploma nursing	17	42.5
Technical institute	10	25
Bachelor degree	12	30
Master degree	1	2.5
Years of experience:		
<1	3	7.5
1 - <5	16	40
5 - <10	11	27.5
≥10	10	25

Fig. (1): Distribution of the studied nurses according their attending training courses about weaning of the patients from the mechanical ventilator (N= 40)**Table (2):** Comparison of nurses' level of knowledge pre- and post-implementation of instructional guideline (N=40).

Knowledge items	Pre				Post				X ²	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%	No	%		
Anatomy & physiology of the respiratory system.	3	7.5	37	92.5	22	55	18	45	19.00	<0.000**
Definitions & Types of MV.	7	17.5	33	82.5	31	77.5	9	22.5	23.56	<0.000**
Indication of MV.	14	35	26	65	34	85	6	15	20.00	<0.000**
Modes of MV.	12	30	28	70	35	87.5	5	12.5	21.16	<0.000**
ETT & Tracheostomy.	16	40	24	60	34	85	6	15	19.00	<0.001**
Definitions& indication of Weaning.	21	52.5	19	47.5	37	92.5	3	7.5	16.00	<0.001**
Stages of weaning process.	10	25	30	75	33	82.5	7	17.5	23.00	<0.001**
ABGs.	29	72.5	11	27.5	38	95	2	5	9.00	<0.05*
Suction.	10	25	30	75	33	82.5	7	17.5	23.00	<0.001**
Complications of MV.	23	57.5	17	42.5	33	82.5	7	17.5	6.25	<0.05*
Nursing role before starting weaning process.	19	47.5	21	52.5	33	82.5	7	17.5	13.89	<0.000**
Nursing role during weaning.	18	45	22	55	35	87.5	5	12.5	26.66	<0.000**
Nursing role after weaning & Extubation.	19	47.5	21	52.5	33	82.5	7	17.5	13.89	<0.000**
Total	12	30	28	70	33	82.5	7	17.5	21.0	<0.001**

Table (3): Comparison of nurses' level of practices pre- and post-implementation of instructional guideline (N=40).

Practices Items	Pre				Post				X ²	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No	%	No	%	No	%	No	%		
Pre-weaning practices :										
Assist with intubation	13	32.5	27	67.5	32	80	8	20	19.00	<0.000**
Connect ventilator	12	30	28	70	28	70	12	30	16.00	<0.000**
Airway Suctioning.	12	30	28	70	35	87.5	5	12.5	21.16	<0.000**
Nasopharyngeal suction	13	32.5	27	67.5	32	80	8	20	19.00	<0.000**
Monitoring of the patient during weaning from MV:										
ETT care.	15	37.5	25	62.5	32	80	8	20	17.00	<0.000**
Care of Tracheostomy Tube.	13	32.5	27	67.5	32	80	8	20	19.00	<0.000**
ETT or Tracheostomy Tube Suctioning	16	40	24	60	33	82.5	7	17.5	17.00	<0.000**
Obtaining an ABGs	13	32.5	27	67.5	32	80	8	20	19.00	<0.000**
Weaning of the patients from MV.	13	32.5	27	67.5	32	80	8	20	19.00	<0.000**
Extubation technique & post extubation care:										
Assist with Extubation	14	35	26	65	33	82.5	7	17.5	19.00	<0.000**
Decannulation	16	40	24	60	33	82.5	7	17.5	17.00	<0.000**
Oral care.	15	37.5	25	62.5	32	80	8	20	17.00	<0.000**
Oral Suctioning	5	12.5	35	87.5	27	67.5	13	32.5	21.00	<0.001**
Total	13	32.5	27	67.5	32	80	8	20	24.34	<0.001**

Not significant P> 0.05 (NS)* Significant P < 0.05 ** highly significant P < 0.001(HS)

Table (4): Relation between total score of nurses' knowledge and their demographic characteristics (n=40)

Demographic characteristics	Total Score of Nurses' Knowledge				Paired t-test	P-value	ANOVA	P-value
	Pre		Post					
	Mean	SD	Mean	SD	t		f	
Age:								
<25	44.000	17.362	65.375	11.277	-4.559	<0.001**	4.310	0.023*
25- <35	49.381	9.785	68.142	8.805	-8.489	<0.001**	1.000	0.423 NS
35- <45	56.333	2.517	69.000	7.549	-3.295	<0.001**	20.000	<0.001**
≥45	56.333	2.517	69.000	7.549	-3.295	<0.001**	20.000	<0.001**
Gender:								
Female	47.227	14.400	66.206	10.338	-6.976	<0.001**	7.959	<0.05*
Male	47.545	10.699	69.454	7.594	-5.290	<0.001**	17.472	<0.001**
Level of Education:								
Diploma nursing	48.000	11.371	67.381	8.089	-8.183	<0.001**	16.000	<0.05*
Technical institute	38.166	20.682	65.125	6.377	-4.448	<0.001**	7.759	0.009*
Bachelor degree	52.800	11.593	69.333	13.217	-3.447	<0.001**	10.126	<0.001**
Master degree	56.333	2.517	69.000	7.549	-3.295	<0.001**	20.000	<0.001**
Years of experience:								
<1	44.789	15.230	70.157	9.044	-6.641	<0.000**	4.200	0.037*
1 - <5	51.900	7.0150	65.000	8.755	-5.363	<0.000**	6.157	0.007*
5 - <10	53.000	9.643	65.333	7.767	-3.049	<0.000**	1.000	0.444 NS
≥10	47.625	15.702	63.500	12.083	-5.099	<0.000**	14.832	<0.000**
Previous training courses about MV								
Yes	51.333	7.991	68.166	10.815	-3.846	0.012*	22.085	<0.001**
No	47.117	14.079	66.911	9.630	-6.872	<0.001**	3.182	0.085 NS

Not significant P> 0.05 (NS)* Significant P < 0.05 ** highly significant P < 0.001(HS)

Table (5): Relation between total score of nurses' practices and their demographic characteristics (n=40)

Demographic characteristics	Total Score of Nurses' practices				Paired t-test t	P-value	ANOVA f	P-value
	Pre		Post					
	Mean	SD	Mean	SD				
Age:								
<25	37.333	7.933	51.666	8.621	-6.720	<0.05*	3.185	0.149
25- <35	33.937	14.977	50.125	9.471	-4.336	<0.001**	18.156	<0.001**
35- <45	47.545	10.699	69.454	7.594	-5.290	<0.001**	17.472	<0.001**
≥45	45.333	2.081	53.333	5.033	-2.667	<0.001**	19.000	<0.001**
Gender:								
Female	35.965	12.196	50.344	9.566	-5.882	<0.001**	7.368	<0.05*
Male	36.545	8.970	53.363	5.334	-5.575	<0.001**	22.750	<0.001**
Level of Education:								
Diploma nursing	36.523	10.279	51.285	6.167	-8.210	<0.05*	27.069	0.010*
Technical institute	28.333	15.832	54.333	5.278	-2.556	<0.05*	9.606	0.005*
Bachelor degree	41.300	8.945	59.625	11.734	-2.129	<0.001**	6.536	<0.001**
Master degree	47.545	10.699	69.454	7.594	-5.290	<0.001**	17.472	<0.001**
Years of experience:								
<1	34.368	11.823	53.842	8.301	-6.278	<0.001**	2.333	0.133 NS
1 - <5	40.100	6.279	49.400	6.449	-4.169	<0.05*	1.000	0.444 NS
5 - <10	40.666	6.658	53.883	6.506	-2.115	<0.05*	16.612	<0.001**
≥10	35.875	15.833	47.000	11.426	-2.721	<0.05*	14.832	<0.001**
Previous training courses about MV								
Yes	40.500	6.220	53.166	6.145	-3.907	<0.05*	20.425	<0.001**
No	33.944	14.123	48.055	14.532	-6717	<0.001**	14.468	<0.001**

Not significant P> 0.05 (NS)* Significant P < 0.05 ** highly significant P < 0.001(HS)

Table (6): Correlation between total score of nurses' knowledge and total score of nurses' practice pre and post implementation of the instructional guideline (n=40)

Total nurses' practice	Total nurses' Knowledge	
	r	P-value
Pre	0.827	<0.000**
Post	0.458	<0.001**

Not significant P> 0.05 (NS)* Significant P < 0.05 ** highly significant P < 0.001(HS)

Discussion

Weaning is the process of gradually withdrawal the patients from MV. Usually consists of three stages: first, the patient is gradually removed from the ventilator, then the tube, and lastly, oxygen. The earliest weaning from MV is carried out while still maintaining patient safety. Weaning begins once the patient has recovered from their acute medical and surgical problems and when the main cause of the respiratory failure has been identified and resolved **Robert and Kacmarek (2018)**.

The current study, showed that near to two thirds of the nurses in this study were female with a high proportion of them were being married, and less than half of them being between the ages of 25 to less than and equal to 35 years, with a mean age of 30.9 ± 8.8 . More than one thirds of the nurses were diploma nursing with experience from one year to less than five years. This might be due to critical care units need young age workers to be able to accomplish the hard duties and needs in such area.

Ali (2013) and Majeed (2017) supported these findings, revealing that the mean age of nurses was (30.70 ± 5.99) ; more than two-thirds of nurses were female and less than half of nurses had experience <5 years.

These results were disagreement with results reported by **Mesquita, et al. (2014)** who found that, most participants were female, aged between 22 and 32 years.

As regard attending training courses about weaning of patients from MV, the result of the present study showed that majority of the studied nurses didn't attend any training courses. This result comes in agreement with **Mariam, et al. (2018)** who reported that majority of intensive care unit (ICU) nurses didn't attend any training courses. From a researcher viewpoint this might be caused by a lack of ICU training courses and shortage time.

Regarding nurses' knowledge, the finding of this study revealed that most of nurses had a satisfactory level of knowledge regarding definition & indication of weaning and ABGs at post implementation phase. And majority of them had a satisfactory level of knowledge related to mechanical ventilator definition, indication &

types, modes of MV, ETT & Tracheostomy, suction and complications of MV, Nursing role before starting weaning, during & after the weaning & extubation at post implementation instructional guideline compared to pre implementation phase. This could be explained by nurses' interest in and need for knowledge about this field, as well as nurses' awareness of the importance of knowledge about this subject in order to fulfill their duties effectively.

This result agrees with **Mariam, et al. (2018)** who reported that majority of the study group had highly improvement in nurses' knowledge related to weaning from mechanical ventilation.

According to nurses' practices, the current study illustrated that at post phase implementation of instructional guideline, majority of nurses had a satisfactory level of practices regarding assist with intubation, airway suctioning and nasopharyngeal suction, ETT care, tracheostomy tube care, ETT or tracheostomy tube Suctioning, ABGs and weaning of the patients from MV, assist with extubation, decannulation and oral care. And more than two thirds of them had a satisfactory level of practice about connect ventilator and oral suctioning compared to pre implementation phase. This improvement could be due to good effect of the instructional guideline on nurses' level of practice.

Tadros, et al. (2019) and Rollnik (2017) supported this finding, revealing that there was a highly improvement in nurses' practice after implementation of Self Learning Package.

This study revealed that only less than half of the studied nurses had a satisfactory total scores for their level of knowledge & practices regarding weaning of patients from ventilators pre implementation of the instructional guideline compared to post implementation instructional guideline, the majority of nurses showed an marked improvement, with highly statistically significant differences. This result indicates that a planned instructional guideline was successful in raising nurses' level of knowledge & practice in weaning of patients from MV.

This result agrees with **Mahmoud (2015)** who reported that the educational program's implementation improved nurses' knowledge and

practices.

In the same line, **Zainib, et al. (2017)** reported that there was a statistically significant improvement in the nurses' level of knowledge & practice post implementation of the educational program compared to pre implementation.

Regarding the relation between nurses' level of knowledge & practice and their age & gender the current study showed that, there were highly statistically significant relation between total satisfactory nurses' level of knowledge & practices and their age & gender pre/post implementation phase. This finding was consistent with **Indira (2012)** who reported that there was a statistically significant difference between total nurses' level of knowledge & practice and their age & gender pre/post implementation of teaching program. This finding was contrary with **Abbas & Mua'ala (2013)** who found that there was no statistically significant difference between ICU nurses' age and gender and their knowledge and practice.

In relation to nurses' knowledge & practice and their qualifications, According to findings of this study, there was a highly statistically significant relationship between a nurse's overall knowledge score and their qualifications. As a result, nurses with bachelor's & master degrees had higher mean scores for their level of knowledge and practice during the pre and post implementation phases than did nurses with diplomas or technical nursing degrees. **Majeed (2017)** supported these findings; ICU nurses' knowledge and practice were found to be highly statistically significant in relation to their education level.

Regarding to nurses' knowledge & practice and their years of experience, the findings of this study showed that there were highly statistically significant relation between total score of nurses' knowledge & practice and their years of experience pre/post implementation, whenever an increased nurse's year of experience there was an increase in their level of knowledge and practice. This result disagrees with **Mahmoud (2015)** who reported that there was no statistically significant difference in knowledge and practice among ICU nurses with different experience.

As regards nurses' knowledge & practice and their previous training courses about MV, The results of this study revealed that there were statistically significant differences between the total score of nurses' knowledge & practice and their previous training courses about weaning from MV. The study finding was contradicted with **Abbas, & Mua'ala, (2013)** who reported that there was no statistically significant difference in knowledge & practice was found between ICU nurses and their training courses.

Regarding the correlation between total score of nurses' knowledge and practice pre and post implementation of the instructional guideline, showed that there was a positive correlation with highly statistically significant relation between the total score of nurses' knowledge and practice whenever an increased in nurses' level of knowledge there was an increase in their level of practice. This result comes in agreement with **Wongrostrai, et al. (2016)** who reported that there was a statistically significant difference in knowledge & practice was found between ICU nurses after implementation phases.

From the researcher's point of view; this result reflected planned instructional guideline was effective in improvement of nurses' knowledge and practice regarding weaning from ventilator and proved the hypothesis of this study.

Conclusion

Based on the findings of the present study, it can be concluded that:

Implementing instructional guidelines had a highly statistically significant positive effect on nurses' level of knowledge and practice in weaning patients from MV at the post-implementation phase.

Also, there was a statistically significant improvement after instructional guidelines implementation regarding nurses' performance related to weaning of patients on ventilators.

Recommendations

Based on the findings of the current study, the following recommendations can be suggested:

- A replication of present study can be

conducted with a large sample.

- A further study to be carried out in different settings on a larger sample for a wider utilization of the instructional guideline, in order to achieve generalization of the results.
- An orientation program for staff newly appointed to the ICU should be conducted including education with regard weaning from mechanical ventilator.
- Replication of the study on a larger nonprobability representative sample to achieve more generalizable results.
- The importance of conducting the instructional guideline in a wider field including all hospitals to raise the efficiency of nursing care provided.

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