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## Nurses Performance about Safety Weaning from Mechanical Ventilation of Critically Ill Adults and Children

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**Abstract:** Mechanical ventilation is a most life-supportive medical aid for critically-ill adults and children suffer from respiratory failure. Ventilator weaning is that the method of gradually withdrawing artificial ventilation for brief or long time in critical care setting. Weaning from ventilator is a difficult task for nurses, and knowing about weaning criteria is most important component for getting successful outcome for the critically-ill adults and children with mechanical ventilation. **Aim:** assess the nurses performance about safety weaning from mechanical ventilation of critically ill adults and children . By using a descriptive study design the study conducted on 50 nurses working in critical care units of adult and pediatric intensive care units. **Data collected by,** structured interviewed questionnaire and observation checklist. **Results:** the study revealed that two fifth working in medical intensive care and 28% of them working in pediatric intensive care 56% of studied nurses had unsatisfactory level of knowledge and 58% of them had unsatisfactory practice level regarding weaning criteria of mechanical ventilation, with statistically significant relation between training courses, educational level, age and assessed parameters among the studied nurses. **Conclusion:** More than half sector of the studied nurses had inadequate knowledge and practice regarding weaning from mechanical ventilation of critically ill adults and children at intensive care units. Hence, it is strongly **recommended** for need of protocol, in-service training, supervision and reinforcement for improvement of weaning knowledge and practice among nurses working adult and pediatric intensive care units.

**Keywords:** Nurse, Performance, Weaning, Mechanical ventilation.

### INTRODUCTION

Mechanical ventilation (MV) considered as alive support system for critically ill-intubated adults and children, by using a machine that helps patients to maintain oxygenation and carbon dioxide excretion, the initiation of MV is depending on patients' ability to support their oxygenation and/or ventilation needs, the patient, who cannot stay within normal range of CO<sub>2</sub> levels and acid-base status, indicated as respiratory failure (Rose et al., 2014).

Approximately 40 percent of adults and 55 percent of children admitted to an intensive care unit (ICU) need mechanical ventilation. Most adults and children are simply weaned off ventilation at the first attempt, while weaning of others is difficult and more complicated (Farias 2011; Wunsch 2013; Shahin 2014). ICU mortality for ventilated adults is about 30% (Esteban 2013) and 13% in ventilated children (Farias 2011).

Weaning from ventilator refers to independent breathing restoration in an individual dependent on mechanically assisted ventilation, which includes gradually exposing the patient to longer time of partially supported or independent breathing (Newmarch, 2016). Weaning patients from the ventilator is complex as the nurse needs to discontinue ventilation while give continuous care, patient-focused, individualized weaning care plans and highlighting the expanding role of the ICU nurse (Lavelle and Dowling, 2011).

Delays in MV weaning the patient is associated with longer length of stay and higher mortality in ICU which increase the number of complications and may lead to increased cost ,so the nurse must be well trained, develop sound knowledge and practical skills and intaking care of patient with mechanical ventilator in order to develop them as effective potential and competent nurse practitioner (Peñuelas, 2011)

Nurses must be have knowledge about the ventilator modes function and limitations, respiratory distress causes and dysynchrony with the ventilator, and suitable management in order to give high-quality patient-centered care. Basic knowledge for ICU nurses is knowledge beyond that required to register as a nurse; it is this knowledge that nurses use to give safe care to critically ill adults and children. Knowledge itself does not ensure safe practice but safe practice is not possible without knowledge (Grossbach et al., 2011)..

Safe practice is a moral and professional duties of the nurse. Therefore knowledge is an important first attempt in safe patient care. Assessing the knowledge and practice of ICU nurses allows for the introduction of suitable education protocols in ICUs. This could rise both patient safety and the individualized care of patients receiving protocol-directed care ( Perrie et al., 2014).

#### Significance of the study

About 90% of all ICU critically ill adults and children requiring mechanical ventilator support as a life saving measure. Approximately 30% of patients who require mechanical ventilation are not simply weaned. Positive

patient outcomes depends on an understanding of the principles of mechanical ventilation and the patient care needs as well as, weaning plans, and patients tolerance of changes in ventilator setting (Todorova *et al.*, 2013). Care of the patient on mechanical ventilation is an everyday assignment in the critical care unit. Therefore, it is essential to assess the nurses performance about safety weaning from mechanical ventilation of critically ill adults and children at intensive care units

**Aim:**

To assess the nurses performance about safety weaning from mechanical ventilation of critically ill adults and children .

**Specific Objectives:**

- Assess the nurses knowledge about safety weaning from mechanical ventilation.
- Evaluate the nurses practice about safety weaning from mechanical ventilation.
- Identify the relationship between their knowledge and practice about safety weaning from mechanical ventilation and their socio-demographic characteristics

**Research Questions:**

1. Are the nurses knowledgeable about safety weaning from mechanical ventilation?
2. What is their practice about safety weaning from mechanical ventilation?
3. What is the relationship between their knowledge and practice about safety weaning from mechanical ventilation and their socio-demographic characteristics?

**Study Design:** A descriptive study design was used for the study.

**Sample and setting:**

A hospital based study conducted among fifty nurses' working at the port said general hospitals (Almery and El-Naser). Non probability, enumerative sampling technique was used. It was carried out at critical care units include medicine intensive care unit (MICU), coronary care unit (CCU), surgery intensive care unit (SICU) and pediatric intensive care unit(PICU) in both hospitals. The study population was all the nurses working in previously mentioned critical care units in both hospitals.

**Data collection tools:**

Data were collected by using two tools.

**Tool (1)** include two parts:

**Part 1:** include questions on socio-demographic characteristics of the sample and consisted of (8) items.

**Part 2:** includes structured questionnaire that was used to measure the knowledge of studied nurses. The questionnaire include 15 items with a score from 0 to15. The reliability of the checklist was 0.60.

**Tool(2)** observational checklist that developed by the researcher to assess nurses practice about safety weaning from mechanical ventilation. It consisted of two columns ;(done=1 and not done=0). The checklist include 20 items with a score range from 0 to 20. The reliability of the

checklist was 0.81. If the nurse total score at the level of 61 so their stratification will be judged as uncertain. If the total scored 60 or less was considered dissatisfied.

**Data collection procedure:**

An official consent was acquired by send of an official letter to the hospital director to carry out the study after explaining the aim of the research. Nurses were requested to participate. The study tools were distributed, and collected immediately .Data collection took two months from January 2018 to April 2018.

**Ethical Considerations:**

The study aim and expected outcomes were explained to each study subject, who were assured that all the data will be used for the research aim only, they were informed that the study was harmless and that their agreement to participate is a prerequisite in order to be involved in the study.

**Operational Definition:**

Term performance :Is completion of a task with application of knowledge, skills and abilities (Shields& Brown .,et al. 2015).

**Statistical Design:**

The collected data statistically analyzed using statistical package for social science (SPSS) version 20, running on IBM compatible computer Qualitative data were expressed as relative frequency and percent distribution, and for comparison between groups, the Chi square. The p value ≤ 0.05 was considered significant.

**RESULTS**

**Table(1)**represents studied nurses socio-demographic data. The table shows that more than three quarter (78%) of the studied nurses were range in age from 20-25 years old. Also 62% of the studied nurses has had diploma degree, with two fifth of them(40%) working in MICC followed by 28% of them working in PICC. Regarding to training courses, the result revealed that more than two third (68%) of the studied nurses don't attend training courses related to mechanical ventilation weaning. All of them said there was no protocol about weaning at the unit .60% of them had equal and less than 5 years of work experience.

Studied nurses level of total score knowledge regarding critically ill adults and children safety weaning shown in **Table(2)**. This table shows that more than half (56%) of studied nurses had un satisfactory knowledge level.

**Table (3)** represents distribution of total score of nurses' level of practice regarding process of weaning from mechanical ventilation of critically ill adults and children. This table shows that 58% of studied nurses had un satisfactory level of practice.

Studied nurses level of practice regarding weaning method is revealed in **Table (4)** . This table shows that more than one third (38%) of studied nurses use T-piece weaning trial method. All of nurses use T-piece had satisfactory practice regarding T-piece weaning trial.

**Table (5)** represents relation between training courses, educational level, age and assessed parameters among the studied nurses. This table shows statistically significant relation between items about anatomy and physiology of respiratory system knowledge with training course

following by over all knowledge with education level, finally documentation with age ( $p\text{-value} \leq 0.05$ ), with no relation with other items.

**Table: 1. Studied nurses socio-demographic characteristics n=50.**

Variable	Number	Percentage	
Age (years)	< 20	2	4
	20 up to 25	39	78
	25 up to 35	7	14
	≥ 35	2	4
Qualification	Bachelor's degree	4	8
	Technical institution	14	28
	Diploma	31	62
	Others	1	2
Clinical Area	Medical	20	40
	Coronary	11	22
	Surgery	5	10
	Pediatrics	14	28
Years of experience in ICU work	≤5 years	30	60
	>5 years	20	40
Marital status	Single	20	40
	Married	30	60
Protocol about weaning	Yes	0	0
	No	50	100
Presence of manual for weaning	Yes	16	32
	No	34	68
Responsibility for mechanical ventilation	Full responsibility	0	0
	Sharing with physician	20	40
	No responsibility	30	60
Training courses regarding MV weaning	Yes	16	32
	No	34	68

**Table 2: Studied nurses level of total score knowledge regarding critically ill adults and children safety weaning from mechanical ventilation (n=50).**

Items	Correct answer			
	Unsatisfactory < 60%		Satisfactory ≥ 60%	
	No	%	No	%
Anatomy and physiology of respiratory system	29	58	21	42
Knowledge about weaning from mechanical ventilation	28	56	22	44
Knowledge about mechanical ventilation	23	46	27	54
Total score of nurses' Knowledge	28	56	22	44

**Table 3: Studied nurses' level of total score practice regarding safety weaning from mechanical ventilation of critically ill adults and children (n=50).**

Items	Correct answer			
	Unsatisfactory < 60%		Satisfactory ≥ 60%	
	No	%	No	%
Practice regarding patient assessment	14	28	36	72
Assessment of pulmonary function parameters	50	100	0	0
Assessment of ABG	14	28	36	72
Patient communication before starting weaning	0	0	50	100
Preparation for weaning from mechanical ventilation	0	0	50	100
Documentation before, during and after weaning process	2	4	48	96
Total score of nurses' practice	29	58	21	42

**Table 4: Studied nurses' level of practice regarding weaning method (N=50)**

Items		NO	%	
Methods	T-piece weaning trial	19	38	
	IMV and SIMV weaning method	13	26	
	CPAP trials (level 0 – 10 cmH <sub>2</sub> O) with or without flow-by option	18	36	
Practice for each method	T-piece weaning trial	Unsatisfactory < 60%	0	0
		Satisfactory ≥ 60%	19	100
	IMV and SIMV weaning method	Unsatisfactory < 60%	4	30.8
		Satisfactory ≥ 60%	9	69.2
	CPAP trials (level 0 – 10 cmH <sub>2</sub> O) with or without flow-by option	Unsatisfactory < 60%	1	5.6
		Satisfactory ≥ 60%	17	94.4

**Table 5: Relation between training courses, educational level, age and assessed parameters among the studied nurses:**

Items	Training course	Educational level	Age
	p-value	p-value	p-value
Knowledge about anatomy and physiology of respiratory system	0.04*	0.05	0.5
Knowledge about mechanical ventilation	0.3	0.6	0.9
Knowledge about weaning from mechanical ventilation	0.06	0.07	0.6
Over all Knowledge	0.5	0.02*	0.8
ABG Assessment	0.08	0.5	0.6
Documentation	0.6	0.1	0.01*

\*Significance at P≤0.05

## DISCUSSION

The intensive care unit is the most suitable place to care for critically ill adults and children under MV (Tang et al, 2012). Nurses who are caring for patients supported with MV require special technical skills. Nurses must be equipped with basic information of ventilator settings, with expertise in monitoring and highly competent in assessing safety of patient and complication prevention (Grossbach et al, 2011).

So the current study aim was to assess the nurses performance about safety weaning from mechanical ventilation of critically ill adults and children at intensive care units, as to prevent prolonged mechanical ventilation which lead to longer length of stay and higher mortality in ICU. Consequently, ways to ventilator weaning processes improvement have been sought (Jordan et al, 2016)

In the light of the current study results. The study reveal that more than half of studied nurses had un satisfactory level of total score knowledge of nurses regarding safety mechanical ventilation weaning. This finding was supported by a study conducted in Nelson Mandela Metropolitan University, Port Elizabeth, South Africa Domingo,(2011) reported that 92.5% of studied sample obtained a knowledge score ≤ 50% whereas 7.5% of them obtained scores of ≥50% .

In the same line , Pradhan and Shrestha, (2017) who study nurses' knowledge regarding weaning criteria of mechanical ventilation in a teaching hospital, Chitwan, found that 54.4%

of nurses had inadequate knowledge regarding weaning criteria. The results in contrast with, a hospital based descriptive study done in Koirala Institute of Health Science by Perrie,(2006) and, stated that knowledge regarding definition of mechanical ventilation(100%), and definition on ventilator weaning were (82.9%).

On respect of, total score of nurses' level of practice regarding weaning from mechanical ventilation in the current study. The results shows that more than half of studied nurses had un satisfactory level of practice. This results disagree with Osman, (2017) who done a study on nurses' performance regarding weaning of patient's from mechanical ventilation, mentioned that 73.3% of the studied nurses had satisfactory knowledge level regarding weaning of patient from mechanical ventilation. Also the same percentage was competent during practicing care for mechanically ventilated patient.

From the researcher opinion lack of knowledge and practice of the study nurses is due to that most of the study group don't attend training courses related to mechanical ventilation weaning as reported by more than two third of the studied nurses and there was a statistical significant relationship between knowledge and training courses in the present study which also supported the researcher view. These explanations supported also by finding of as well as agree with Layth and Al-Tameemi , (2017) effectiveness of an instructional program on nurses' knowledge regarding nursing follow up to mechanical ventilation weaning in

intensive care units in Baghdad teaching hospitals found that there were associations between nurses' educational level and specific training courses in ICUs with their overall knowledge in his study.

**Pradhan and Shrestha, (2017)** who study nurses' knowledge regarding weaning criteria of the patients with mechanical ventilation in a teaching hospital, Chitwan, found association between level of knowledge regarding weaning criteria with age ( $p \leq 0.006$ ), professional experience ( $p \leq 0.001$ ), clinical areas ( $p=0.002$ ) and professional experience in critical area ( $p \leq 0.001$ ). This was a good supportive to the finding of the present study that revealed association between overall knowledge with education level, and documentation with age.

Those explanation and findings are in the opposite side with **Darshan , Krishnan , Krishnan (2009)** who assessed the knowledge of staff nurses on mechanical ventilation and found that there is no significant association between knowledge scores of staff nurses in relation to their demographic data. Another study conducted in Yenepoya Medical College Hospital, Deralakatte , Mangalore by **Mehta and Bhattarai, (2012)**, reported that critical area is not significant of level of knowledge on weaning criteria . As well as present study findings were disagree with **Fathimath et al., (2013)** who found that there is no association between knowledge score and demographic variables such as years of experience ( $p=0.34$ ), ICU training( $0.64$ ), and level of education( $p=0.5$ ).

Finally the study revealed that there was no protocol about weaning at the unit to help refresh information and all of the study group had no full responsibility about weaning. As , over recent years the weaning application moved from an informal approach to a formal approach, based on clinician education and experience using guidelines or protocols (**Rose 2011**)

## CONCLUSION &RECOMMENDATIONS

It is concluded that more than half of the nurses' knowledge and practice regarding safety weaning from mechanical ventilation of critically ill adults and children was inadequate. And that there is statistically significant relation between knowledge training course and education level, So it is highly recommended to need of protocol, in-service training, supervision and reinforcement for improvement of weaning knowledge and practice among nurses in critically ill adults and children.

## REFERENCE

- [1]. **Darshan K, Krishnan P, Krishnan RN**, Knowledge of staff nurses on nursing activities to be carried out in an emergency department, Inter National Journal of General Medicine, Published online March 2009 ; vol 2.1-2
- [2]. **Demingo XP**. Professional nurses' knowledge regarding weaning the critically ill patient from mechanical ventilation (M.Sc. Nursing Thesis, South Africa: Nelson Mandela Metropolitan University) 2011.
- [3]. **Esteban A, Frutos-Vivar F, Muriel A, Ferguson ND, Peñuelas O, Abaira V, et al**. Evolution of mortality over time in patients receiving mechanical ventilation. American Journal of Respiratory and Critical Care Medicine 2013;188 (2):220–30.
- [4]. **Farias JA, Fernández A, Monteverde E, Flores JC, Baltodano A, Menchaca A, et al**. Mechanical ventilation in pediatric intensive care units during the season for acute lower respiratory infection. A multicenter study. Pediatric Critical Care Medicine 2012;13(2):158–64.
- [5]. **Fathimath SKA, Jancy G, Jancy T, et al**. Assessment of knowledge regarding mechanical ventilation among staff nurses working in selected hospital Mangalore with a view to develop an information pamphlet. International Journal of Recent Scientific Research. 2013;4(9):1410-1413.
- [6]. **Grossbach I, Chlan L, Tracy MF**. Overview of mechanical ventilatory support and management of patient- and ventilator-related responses. Critical Care Nurse. 2011;31(3):30-44.
- [7]. **Jordan J, Rose L, Dainty KN, Noyes J, Blackwood B**. Factors that impact on the use of mechanical ventilation weaning protocols in critically ill adults and children: a qualitative evidence-synthesis. Cochrane Database of Systematic Reviews 2016, Issue10.
- [8]. **Lavelle C, Dowling M**. the factors which influence nurses when weaning patients from mechanical ventilation findings from a qualitative study. Intensive and Critical Care Nursing. 2011;27(5):244-52.
- [9]. **Layth A. K. Al-Tameemi**. "Effectiveness of An Instructional Program on Nurses' Knowledge Regarding Nursing Follow Up to Weaning From Mechanical Ventilation in Intensive Care Units in Baghdad Teaching Hospitals." IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 6, no. 4, 2017, pp. 0107.
- [10]. **Mehta RS, Bhattarai BK**. Critical care nurses' knowledge on adult mechanical ventilation management. 2012.
- [11]. **Newmarch C**. Caring for the mechanically ventilated patient part one. Nursing Standard.2016;20(17):55-64.
- [12]. **Osman D.M**. nurses' performance regarding weaning of patient's from mechanical ventilation. Master degree. Ain Shams University. Faculty of nursing,2017.
- [13]. **Peñuelas O, Frutos-Vivar F, Fernández C, Anzueto A, Epstein SK, Apezteguía C, et al**. Ventilator Group. Characteristics and outcomes of ventilated patients according to time to liberation from mechanical ventilation. American Journal of Respiratory and Critical Care Medicine 2011;184(4):430–7.
- [14]. **Perrie H,Schmollgruber I; Bruce J C, Becker PJ**, Knowledge of intensive care nurses in selected care areas commonly guided by protocols South. Afr. j. crit. Care(Online) ,2014.vol.30 n.1
- [15]. **Perrie HC**. Knowledge of intensive care nurses in selected care areas commonly guided by protocols. Doctoral dissertation, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg) 2006.
- [16]. **Pradhan C, Shrestha R**. Nurses' knowledge regarding weaning criteria of the patients with mechanical ventilation in a teaching hospital, Chitwan. J Pulmonol Clin Res.2017;1(1):11-14.

- [17]. **Rose L, Blackwood B, Egerod I, Haugdahl H, Hofhuis J, Isfort M, et al.** Decisional responsibility for mechanical ventilation and weaning: an International Survey. *Critical Care* 2011;15(6):R295
- [18]. **Rose L, Dainty KN, Jordan J and Blackwood B,** weaning from mechanical ventilation Ascoping review of qualitative studies, *American journal of critical care*, September 2014, Volume 23, No. p. 5.
- [19]. **Shahin J, Harrison D, Rowan KM.** Is the volume of mechanically ventilated admissions to UK critical care units associated with improved outcomes?. *Intensive Care Medicine* 2014;40:353–60.
- [20]. **Shields J, Brown M., et al.** *Managing Employee Performance and Reward: Concepts, Practices, Strategies.* Cambridge University Press. 2015; pp. 125.
- [21]. **Tang W.M, Tong C.K, YU W.C, Tong K.L, & Buckley T. A** Outcome of Adult Critically Ill Patients Mechanically Ventilated on general Medical Wards. *Hong Kong Med Journal*, 2012, 18, 284-290
- [22]. **Todorova L, Vassilev P, Matveev M, et al.** Generalized net model of a protocol for weaning from mechanical ventilation. *Proceeding of the Bulgarian Academy of Sciences.* 2013;66(4):611-616.
- [23]. **Wunsch H, Wagner J, Herlim M, Chong DH, Kramer AA, Halpern SD.** ICU occupancy and mechanical ventilator use in the United States. *Critical Care Medicine* 2013;41(12): 2712–9.