Assiut Scientific Nursing Journal
http://asnj.journals.ekb.eg http://www.arabimpactfactor.com
DOI: 10.21608/ASNJ.2023.178590.1463 http://olddrji.lbp.world/indexedJournals.aspx
https://vlibrary.emro.who.int/journals/assiut-scientific-nursing-journal

Weaning Outcomes among Mechanically Ventilated Patients: Burn's Wean Assessment Program Versus Routine Method

Omaima Mohamed Ahmed Saleh[1], Warda Youssef Mohammed[2], Manal Mohamed Abd elnaeem[3] & Sanaa Saber Mohamed[4]

[1.] Clinical Instructor of Critical Care and Emergency Nursing, Faculty of Nursing, Sohag University, Egypt
[2.] Professor of Critical Care and Emergency Nursing, Faculty of Nursing, Cairo University, Egypt
[3.] Assistant Professor of Critical Care and Emergency Nursing, Faculty of Nursing, Assiut University, Egypt
[4.] Lecture of Critical Care and Emergency Nursing, Faculty of Nursing, Sohag University, Egypt

Abstract:

Background: Weaning from mechanical ventilation frequently relies on individual decision and expertise. This could lengthen the duration of the mechanical ventilation link and raise healthcare costs. Therefore, the present study **aimed** to compare between Burn's Wean Assessment Program and the routine method on outcomes of mechanically ventilated patients at Sohag University Hospital. Three **research hypotheses** were formulated. **Quasi experimental research design** was used. The study was **carried out** in the general intensive care unit. **A convenience sample** of 110 adult male and female patients connected to mechanical ventilators for more than 72 hours were recruited to fulfill the purpose of this study. They were divided randomly into two equal matched groups. **four tools** were used to collect data pertinent to this study which are; **I) Routine Weaning Assessment sheet for Mechanically Ventilated Patients, II) Burn's Wean Assessment Checklist**, **III) Mechanically Ventilated Patient's outcomes Assessment sheet and III) APACHE II Finding** of this study documented a reduction of MV connection time period no patients connected on mechanical ventilation above 10 days in study group while 17patients(30.9%)in control with highly significant p value (.001), reduced length of hospital stay with a higher rate of success between study and control groups with highly significant p value (.001) . So the three stated research hypotheses can be supported. **Conclusion:** based on the study finding, it can be concluded that using BWAP seems to be much better than the routine weaning method. **Recommendations:** Replication of this study on a larger probability sample for generalization.

Keywords: Burn's Wean Assessment Program, Mechanically Ventilated patients, Routine Weaning Method & Weaning Outcomes.

Introduction:

When a person is unable to breathe sufficiently on their own, a mechanical ventilator steps in to do the breathing work for them. Other names for the mechanical ventilator are ventilator, respirator, and breathing apparatus. **(American Thoracic Society, 2020).** Stabilizing the alveolar gas compartments, ensuring a suitable degree of pulmonary gas exchange, and normalizing or reducing the effort of breathing are the main objectives of mechanical ventilation support. In fact, during the mechanical ventilation period, the patient's underlying cause of respiratory failure is treated. **(Windisch, et al., 2020).** Long-term mechanical ventilation comprises a higher risk of consequences like ventilator-associated pneumonia (VAP), tracheal ischemia, lung damage, and diaphragmatic muscle dysfunction, all of which raise the mortality risk. Additionally, patients who have trouble weaning use about 40% of the resources in the intensive care unit environment. **(Schönhofer, et al., 2020).**

Weaning is the process of removing the patient's endotracheal tube and mechanical support, and it can take anywhere between 56% and 90% of the time required for MV. **(Keykha et al., 2017).** A vital step in the weaning process is determining whether the patient is ready. Weaning a patient with respiratory failure brought on by a respiratory illness is a difficult task, though. Because MV itself is connected with many problems, as well as improper weaning can lead to respiratory failure and re-intubation, the decision of weaning still represents a challenge to the respiratory physician **(Jeong & Lee 2018).**

Even with medical advancements, weaning too soon or too late is still a problem. One typical reason for late weaning is delays in determining readiness to wean. Patients with prolonged ventilation may consequently suffer from pneumonia caused by the ventilator, airway injury, post-extubation disorientation, drug dependence, other types of increased morbidity, and even greater death rates. **(Chaitanya Kaul, et al, 2021).**

Expected Results of the Weaning Process or Weaning Success, defined as the capacity to sustain

spontaneous breathing for 48 hours after extubation without requiring re-intubation and intrusive mechanical ventilation **(Zein et al., 2016)** and weaning failure, which is defined as the necessity for ventilation assistance within the first 48 hours after weaning from the MV device, re-intubation, and the inability to sustain spontaneous respiration following weaning. **(Windisch, et al., 2018)**

There are many techniques available to evaluate a patient's preparedness for MV device separation. These instruments assess a patient's readiness for weaning, and it has been claimed that they help patients wean from an MV device on schedule. **(Yazdannik. et al., 2016)**. The Burns Wean Assessment Program's (BWAP) original checklist was created as a tool to assess a patient's readiness for weaning from the ventilator. It systematically evaluates weaning parameters for patients and looks at all parameters related to pulmonary function, gas changes, physiological conditions, and psychological conditions of the patient. **(Baptistella et al., 2018)**.

In patients who needed long-term mechanical ventilation (LTMV) for more than 21 days, this instrument was a reliable predictor of effective weaning and extubation. Additionally, their findings revealed that successful extubation outcomes are connected with an m-BWAP score of 60 or lower. **(Jeong & Lee 2018). Therefore,** the current study aims to compare the weaning outcomes of mechanically ventilated patients at Sohag University Hospital between Burn's Wean Assessment Program and the standard weaning approach.

Significance of the study:

Records of intensive care unit at Sohag University Hospital in the year of (2020) revealed that the number of patients admitted to intensive care unit was approximately 615 patients (88.3 % of them were on mechanical ventilation) **(Hospital records of Sohag University, 2020).** Sometimes patients not found bed with mechanical ventilation in ICU due to other patients spend long time on mechanical ventilation, So was from our duties to searches about solving the problem of long time mechanical ventilation for saving resources and reducing cost and complication of mechanical ventilation

There for this study reduce connection on mechanical ventilation and increase the chance for survive with decreasing complications of mechanical ventilation.

Aim of the study: The present study aims to compare between Burn's Wean Assessment Program and the routine method on outcomes of mechanically ventilated patients at Sohag University Hospital

Research hypotheses: To fulfill the aim of this study, the following research hypotheses were formulated:

1- Mechanically ventilated patients who are weaned by using BWAP will show significant increase in success rate of weaning than that among the control group patients who are exposed to the routine weaning methods.

2- Duration of connection to mechanical ventilation of the study group patients who are weaned by using BWAP will be lesser than that among the control group.

3- The length of ICU stays among mechanically ventilated patients who are weaned by BWAP will be lesser than that among the control group subjects who are exposed to routine weaning method.

Operational Definitions:

Weaning outcomes refers to: success rate of weaning, duration of connection on mechanical ventilation and length of ICU stays

success rate of weaning: measured by Burn's Wean Assessment score if score more than 17 indicate readiness for success weaning if score less than 17 indicate way for failing weaning.

Duration of connection on mechanical ventilation: measured by calculating number of days patient connected on mechanical ventilation

Length of ICU stays: measured by calculating number of days patient stays in intensive care unit.

Patients and Methods:

Research design: Comparative Quasi-experimental research design was used to conduct this study.

Setting: The study was carried out in the general intensive care unit at Sohag University Hospital, which contains twelve beds in three separated rooms each room contains four beds. These units receive patients who have a variety of critical conditions that need mechanical ventilation support and who were admitted directly from the emergency room or transferred from other hospital departments**.**

Sample: A convenience sample of 110 adult male and female mechanically ventilated patients were recruited to fulfill the purpose of this study. Their age ranged from 18 - 60 years old. Connected to mechanical ventilators for more than 72 hours, and divided randomly into two equally matched groups (study and control groups) 55 patients each. Their GCS scores are more than 9 on admission. Patients who were thermodynamically unstable were excluded from this study because need a lot of time to follow up on mechanical ventilation. Patients were matched according to age group, sex, hemodynamically stability and APACHE II score

The sample size was calculated by power analysis using (Epi-Info program) applying the following information:

- Expected frequency =50%

- Acceptance error =10%
- Confidence coefficient =95%
- Design effect=1
- Power=80%.

Four tools were used to collect data pertinent to this study. Two of them were developed by the researcher including the following: -

1. **Routine Weaning Assessment sheet for Mechanically Ventilated Patient** the total score of GCS is out of 15-points **(**Severe= GCS ≤ 8, Moderate= GCS 9- 12 and Mild = GCS ≥ 13)
2. **Burn's Wean Assessment Checklist** The total score of Burn's Wean Assessment Checklist is out of 26 points Burn's Wean Assessment score less than 17 indicate that the patient not ready for weaning Burn's Wean Assessment score more than 17 indicate that the patient is ready for weaning
3. **Mechanically Ventilated Patient's outcomes Assessment.**
4. **Acute Physiological and Chronic Health Evaluation II (APACHE II)** total score was between zero and 71, increasing score more than 35 is associated with increasing risk for hospital death

Tool (I): Covers 5 main parts which are; socio-demographic data of the patients, medical data, hemodynamic parameters, GCS and mechanical ventilation data.

Tool (2): Burn's Wean Assessment Checklist: this tool included 26 items, 12 items of them are for general measurement and 14 for patients' respiratory functions. to assess readiness of patients to be wean from MV **(Burn et al, 2010&Sepahyar et al, 2021)**

Tool (3): Patient's Outcomes Assessment sheet: This tool was developed to assess mortality rate, length of ICU stay, duration of connection with MV and success rate of weaning.

Tool (4): Acute Physiological and Chronic Health Evaluation II (APACHE II) it was developed to measure the severity of disease for adult patients admitted to intensive care units **(Jaganath 2020)**

Methods:

Data collection:

Data were collected in six months approximately. From October 2021 to December 2022.

Description of the Burn's Wean intervention Program:

Program definition: A procedure created for ICU nurses to provide nursing care for patients under MV in accordance with the BWAP.

Aim of the program: The program's goal is to identify any issues with the patient and address them in order to have them ready to be weaned.

Table (1): General and Respiratory Factors of BWAP and Relevant Nursing Interventions to be performed for each of the study group subjects.

BWAP	Nursing interventions
	Monitoring of the heart and CVP, evaluating the ventilator setting, taking into account pharmacological side effects, and performing a skin turgor test to check for dehydration and hemorrhage control
Metabolic stability	Keeping an eye on body temperature, measuring WBC, evaluating the color and volume of sputum, and suctioning the airways sterile procedures
Hydration, Electrolytes and nutrition	Controlling intake and output, monitoring aberrant electrolyte levels, and testing for skin turgor, peripheral edema, and cervical vein dilation Skin turgor test, raising low serum albumin levels, maintaining daily salt and potassium levels, taking into account muscular sensitivity and weakness, and starting TPN when needed
Comfort, Adequate sleep and rest	Assessing pain symptoms such as tachycardia, tachypnea, sweating, and sensitivity to the ventilator, avoiding regular patient care that isn't necessary, reducing the volume of alarms and ringtones, and refraining from chatting loudly at night are all good ideas.
Anxiety and agitation	Identifying and removing triggers for anxiety and agitation, such as hypoxia and hypercapnia, pain and fear, the need for suctioning, checking the ventilator setting, providing patients with clear explanations about how to care for themselves, and allowing them enough time to be alone with their families, are all important.
Normal bowel function	Daily sodium/potassium level monitoring, evaluation of ileus or aberrant bowel function, and gradual gavage to prevent cramps and diarrhea
Body strength	Range of motions

BWAP	Nursing interventions
Breathing rate and pattern, Respiratory sounds, Chest radiograph Sputum	Assessment of aberrant breathing patterns including Kussmaul and apnea, as well as patient compliance with the machine. respiratory physical therapy and suction
Abdominal distension	In addition to gradual gavage and paying attention to the patient's tolerance of a semi-seated position to lower intra abdominal pressure, other factors promoting abdominal distension and ileus include hypokalemia and a high-potassium diet.
Endotracheal and tracheostomy tube size	Determining the tube's size, assuring its appropriate insertion, and identifying when a replacement tube is necessary
Ability to maintain an open airway	Respiratory physiotherapy, frequent deep breathing, encouraging coughing, and monitoring swallowing ability
Arterial blood gases	proper ventilator parameter setup to address acid-base variations

(Sepahyar et al, 2021)

The present study was conducted on three phases;

The preparatory phase:

- An official Permission to conduct the study was obtained from the hospital responsible authorities in the general ICU after explaining the aim and nature of the study.
- An approval was obtained from the local ethical committee and the study was followed the common ethical principles in clinical research.
- The tools used in this study were developed by the researcher based on reviewing the relevant literature.
- **Content reliability:** The study tools were tested for content related validity by jury of 5 specialists in the field of critical care nursing and Anesthesia from Sohag University Hospital, and the necessary modifications were done.
- **Tool reliability:** Was done on the developed tools 1, and 3) by alpha Cronbach and reliability was 0.85 to assess the consistency and stability of the tools **(Sepahyar et al, 2021)**
- **A pilot study:** Was carried out before starting of data collection to test the feasibility and applicability of the study tools on 11patients (10%) of the sample to ascertain that these tools are relevant, inclusive, and covered what are supposed to be covered. Pilot study subjects were excluded from the actual study sample because major changes were done on the study tools.

Implementation phase:

Purpose and nature of the study was simply explained to the patients and their families in case of unconsciousness. And a consent was secured after informing the patients and /or their families that their confidentiality, privacy, and anonymity will be considered, assured and protected. Also, each of the study and control group subjects / families were informed that they had the right to refuse to participate and or withdraw from the study without any rationale at any time. And findings of this study will not be used for any purpose other than this study.

The studied sample fulfilling the research criteria were randomly assigned into two equal and matched groups (55 subjects for both study group and control groups).

Considering the following inclusion, exclusion and matching criteria.

Inclusion criteria:

Haemo-dynamically stable, with less than (30) APACHE II scores and of more than 9 GCS scores.

Exclusion criteria: brain death, septic shock, and thermodynamically. Unstable due to those patients consider as hopeless cases and need long time connected on mechanical ventilation

Matching criteria: (Age group from 1 to 5years), sex, GCS scores, and APACHE II scores.

Both study and control group subjects were exposed to the routine weaning hospital care. Then, the study group subjects were subjected to the intervention weaning program on top.

Procedure: Both study and control group subjects were exposed to the routine weaning hospital care (then the findings of the study is the effect of combined intervention (hospital routine and the BWAP program)

For The control group subjects:

- The researcher assessed patient socio-demographic data and medical data from file then, assessed hemodynamic state manually on admission and every 2 hours in morning and evening shift for six sequential days by using and the GCS on admission and once per shift all over the six sequential days using (tool 1)
- As well, patient's readiness for weaning by subjective judgment of physicians is recorded by using tool 1 and APATCHE II score was assessed on admission by using tool 4
- In the routine weaning method, The patient must meet the following requirements: good cough and swallow reflex, normal breathing without the need of a ventilator, a respiratory rate of no more than 35, a Spo2 of at least 90, and the capacity to lift the head from the bed and support a T-tube. The standard method for weaning patients off of

mechanical ventilation is spontaneous breathing trial

- Patients were also assessed utilizing tools 2 &3 on daily basis for six successive days all through the morning and afternoon shifts.
- **For the study group subjects:** the researcher assessed the patient hemodynamic state including (mean arterial blood pressure, respiratory rate, heart rate, blood pressure, central venous pressure and urinary output) every 2 hours in morning and evening shift using (tool 1)
- The researcher assessed Glasgow Coma Scale (GCS) to assess patient level of consciousness on admission and once per shift using (tool 1)
- The researcher assessed Laboratory investigations include (Arterial Blood Gas, Complete Blood picture, Blood, creatine level and Electrolytes) were evaluated to assess APACHE score and respiratory function using (tool 4)
- Burn's weaning assessment program was used to assess the patient's readiness for weaning from day of admission, the process of weaning was performed for the patients who obtain above 17 score from checklist by using (tool II)
- This assessment was conducted only in morning and afternoon shifts, and was stop at night shifts due to the patient's need to relax and the impossibility of weaning process.
- During the doctor's rounds in the morning and afternoon shifts, the study group evaluated the patients' preparedness for weaning and recorded any changes in the patients' conditions while filling out the checklist. The intensive care specialist who lived in the unit was notified if the patient received the desired score (>17). The weaning procedure was then initiated in accordance with the prescribed instructions. Nursing interventions were carried out throughout the day with a greater focus on the primary issue highlighted in the BWAP in the event that the patient did not achieve the desired score. Using Burn checklist 12 items of general condition and 14 items of respiratory function were assessed.
- The patient received the nursing care to improve outcomes of weaning and to prevent re-intubation including: -
- Maintenance of an effective airway clearance and gas exchange to prevent aspiration by Suction and feeding patient in nasogastric tube with head of the bed elevated 45 degrees as prescribed.
- And implementing the General and Respiratory Factors of BWAP and the Relevant Nursing Interventions performed to each of the study group subjects on daily basis al through the six days**.**

Evaluation phase: This phase was done after weaning for six hours by using (tool III) to evaluate utilizing Burn's Wean Assessment Program Versus Routine Method to predict outcomes of mechanically ventilated patients to determine (success rate, Duration of mechanical ventilation and Length of ICU stay) for both study and control group.

Ethical considerations:

Research proposal was approved from the Ethical Committee in the Faculty of Nursing Assiut University. Patients/ families were willing to participate in the study were informed that there will be no risks during application of this research. It follows the common ethical principles of the clinical research. They were assured that confidentiality, anonymity and privacy will be assured. And they have the right to refuse to participate and or withdraw from the study without any rationale any time. Then written consent was granted from each of the study and control groups.

Statistical analysis:

Collected data were coded, analyzed, and tabulated using SPSS 17.0 statistical software package. Statistical significance was considered when P-values are as follows: -

* P <0.05 ** P <0. 01 *** P <0.001

Results:

Sociodemographic and medical data of the studied subjects, tables from 2 to 5 are related.

Table (2): Comparison between study and control group subjects in relation to frequency distribution of demographic characteristics (N=110)

Variables	Study (N=55)		Control (N=55)		P. value
	N	%	N	%	Chi square test
Gender					
Male	25	45.5	25	45.5	0.340
Female	30	54.5	30	54.5	
Age					
18-35	14	25.5	17	30.9	0.136
36- 45	26	47.3	16	29.1	
46-65	15	27.3	22	40.0	
Mean ± SD	39.96±10.88		43.69±14.17		0.125
Comorbidity	30	54.5	31	56.3	0.998

** P <0.05 ** P <0. 01 *** P <0.001*

-Chi square test for qualitative data between the two groups

Table (3): Comparison between study and control group subjects in relation to cause of ICU admission (N=110)

Variables	Study (N=55)		Control (N=55)		P. value
	N	%	N	%	Independent T-test
Cause of ICU admission					
Respiratory causes	19	34.5	18	32.7	0.998
Cardiovascular causes	5	9.1	8	14.5	0.560
Renal causes	1	1.8	3	5.5	0.598
Neuromuscular causes	5	9.1	2	3.6	0.428
gastrointestinal causes	2	3.6	4	7.3	0.663
obstetric causes	6	10.9	9	16.4	0.767
Trauma	9	16.4	8	14.5	0.798
post-operative	8	14.5	3	5.5	0.209

** P <0.05 ** P <0. 01 *** P <0.001*

Chi square test for qualitative data between the two groups

Table (4): Comparison between Study and control group subjects in relation to Glasgow Coma Scale and APACHEII score (N=110)

Variables	Study(N=55)	Control(N=55)	P .value
	Mean± SD	Mean±SD	Independent T-test
Glasgow Coma Scale Chi square test Chi square test			
1st day			
Morning Shift	12.71±2.12	12.2±2.26	0.226
Evening shift	13.11±1.79	13.9±1.8	0.327
6th day			
Morning Shift	12.89±2.02	12.22±2.28	0.105
Evening shift	13.51±1.63	12.29±2.23	0.001**
APACHEII on admission	9.76±3.47	9.82±3.38	0.934

** P <0.05 ** P <0. 01 *** P <0.001*

- Independent T-test quantitative data between the two groups

Table (5): Comparison between study and control group subjects in relation to frequency distribution and mean of MV mode and parameters on admission (N=110)

	Morning shift					Evening shift				
	Study		Control		P. value	Study		Control		P. value
	N	%	N	%		N	%	N	%	Independent T-test
MV mode on admission										
AC	35	63.6	32	58.2	0.469	8	14.5	17	30.9	0.067
SIMV	19	34.5	23	41.8		28	50.9	27	49.1	
CPAP	1	1.8	0	0.0		19	34.5	11	20.0	
MV parameters on admission										
Fio2	48.18±10.2		44.91±9.98		0.092	42.73±6.51		42.09±5.42		0.579
Spontaneous RR	14.04±2.40		13.96±2.43		.875	14.18±2.36		14.11±2.52		.876
Tidal volume	482.44± 76.43		497.45± 94.85		0.363	483.35±76.33		497.45±94.85		0.392
PEEP	6.69±1.3		6.80±1.86		0.055	6.09±1.3		6.42±1.89		0.0267*
PS	7.45±1.21		7.75±1.06		0.183	7.51±1.16		7.75±1.05		0.269

** P <0.05 ** P <0. 01 *** P <0.001*

Chi square test for qualitative data between the two groups

***PS:** pressure support* ***RR:** respiratory rate* ***PEEP:** positive end expiratory pressure*

Testing research hypotheses: research hypotheses stated

(1) study group will show significant increase in success rate of weaning than control group

(2) duration of connection on mechanical ventilation among study group will be reducer than among control group

(3) length of ICU stay among patients who weaned by BWAP will be lesser than among who received routine care **table (6)** was related to this hypothesis

Table (6): Comparison between Study and control group subjects related to patient's clinical outcomes (N=110)

	Study (N=55)		Control (N=55)		P. value
	N	%	N	%	Independent Chi square
Success or failure of weaning					
Succeed	50	90.9	17	30.9	<0.001**
Failed	5	9.1	38	69.1	
State on discharge					
Died	6	10.9	9	16.4	0.405
transfer to another unit	49	89.1	46	83.6	
Duration on mechanical ventilation					
Less than 10 days	35	63,6	10	18,2	<0.001**
From 10-20 days	20	36,4	28	50,9	
More than 10 days	0	0,0	17	30,9	
Length of ICU stay					
Less than 10 days	31	56.3	7	12.7	<0.001**
From 10-20 days	14	25.45	21	38.2	
More than 10 days	10	18.18	27	49.1	

Chi square test for qualitative data between the two groups

** P <0.05 ** P <0. 01 *** P <0.001*

Table (7): Relationship between Burn's wean assessment for Study group with their socio demographic data (N=55)

	Unsuccessful		Successful		P. value
	N	%	N	%	
Gender					**Chi square test**
Male	1	20.0	24	48.0	0.231
Female	4	80.0	26	52.0	
Age					
18-35	1	20.0	13	26.0	0.798
36- 45	2	40.0	24	48.0	
46-65	2	40.0	13	26.0	
ICU Stay					
Less than 10 days	5	100.0	30	60.0	0.076
From 10-20 days	0	0.0	20	40.0	

** P <0.05 ** P <0. 01 *** P <0.001*

Chi square test for qualitative data between the two groups

Table (2): Shows that there was no statistically significant difference in studied patients in both study and control group in relation to gender and age groups P value was (0.340 &0.136 respectively).

Table (3): Regarding cause of ICU admission, the table illustrate that respiratory cause was the common cause in both study and control group with no statistically significant difference between them in this respect.

Table (4): Revealed that GCS scores differed significantly in the evening shift during the 1st day of admission with p values of (0.226&0.027* respectively), as well as in the 6th day with p values of (0.105&0.001** respectively). However, in relation to **APACHEII scores** on admission, no statistical difference was found between both groups.

Table (5): Displays that only **PEEP** mode differs significantly between both study and control groups on admission in in evening shift with p- value of (0.0267*).

Table (6): Revealed **successful weaning** in about (90.9%) of the study group subjects as compared to (30.9%) of the control group subjects with highly significant statistical difference between the two groups with p-value of (<0.001**). Thus, hypothesis one can be supported. Concerning **duration of mechanical ventilation,** a highly statistically significant difference was put into evidence between study and control group with p- value of (<0.001**). Thus, hypothesis two can be supported. Also, **length of ICU stay** differed significantly between the two groups with p- value of (<0.001**). **Thus, hypothesis three can also be supported.**

Table (7): Show that in relation to **Gender**, majority of successful and unsuccessful group were females (52% and 80% respectively) without significant difference P. value (0.231). regarding **age** the study revealed that common age of both successful and unsuccessful groups was (36-45) years with no significant difference P. value (0.798). Also, regarding **ICU Stay** both successful and unsuccessful groups stayed less than 10 days with no significant difference P. value (0.076).

Discussion:

Patients' readiness to be weaned from MV and management of the weaning process are extremely important since weaning patients from MV is a significant stage in treatment in the ICU. The patients should be taken off of assisted ventilation as soon as they can breathe on their own because MV causes a number of issues and improper weaning from the ventilator causes respiratory distress (**Yazdannik, et al, 2016**).

Intensive care in intensive care units (ICUs), nurses are the essential players who make decisions in emergency situations and consistently manage different nursing processes. One of the key duties of nurses in intensive care units is to determine when patients are ready to be weaned from MV (**Yazdannik,et al, 2016)**.

In terms of socio-demographic characteristics and clinical parameters:

Regarding to **gender**, the present study revealed that more than half of the sample subjects were females with no statically significant difference. This result may be due to females have greater risk than males due to highly exposure to stress and smokes from smoking food and patients enter to ICU was female more than male. This comes in consistent with the study done by (**Alkotamiet al, 2019)** the study found that, more than half of the studied patients were females. In contrary with the current study finding the study done by **(Ghiani et al, 2020)** the study showed that, More than two-thirds of cases involving weaning failure and success include males as the majority.

Regarding to **age**, the current study showed that nearly two thirds (74.6%and 69.1%) of the study and control groups their age above thirty-six years without statistically significant p value (0.136). **This result may be due** to most people above thirty-six years, they are more risk to expose to trauma and stress in the work also most of them are smokers. This is consistent with **Kasem, et al., (2019)**, the study showed that, there was no statistically significance difference between the study and control groups according to their age, mean age ± SD between (47.86 ± 15.94) and (47.41 ± 15.64) years respectively. and supported by (**Telle et al, 2021)** who examined Risk factors for hospitalization, invasive mechanical ventilation therapy, and death among all identified cases of COVID-19 in Norway and found that the majority of infected people were under 50, and that the likelihood of hospitalization, invasive mechanical ventilation therapy, and death increased with age. In contrasting with the current study finding the study done by (**Faramarzi, 2020**), the study found that, the bulk of the patients under study were older than 60 years.

Regarding to **comorbidity**, the finding of the current study revealed that the high percentage of patients had comorbidity in both study and control group without statistically significant difference p value (0.998) **This result may be due to** disease outbreaks in our time this come in consistent with (**Richardson et al 2020**) who studied (Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area)

This study showed that the first extensive case series of patients who were hospitalized consecutively and had diabetes or high blood pressure However, this case series' mortality rates were much lower.

On the other hand **(Guan et al 2020)** who studied (Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis) showed that, When compared to patients with a single comorbidity and patients with no comorbidities, patients with two or more comorbidities had considerably higher chances of meeting the composite end-point.

Regarding to the **reason of ICU admission**, found that one third of study and control groups the cause was respiratory disease. This result may be due to respiratory problems are the leading causes for compromising normal ventilation process, pulmonary circulation, and hence they are the most common diagnosis among the mechanically ventilated patients. This result was in conformity with the study conducted by (**Karagozoğlu et al, 2018),** they found that, Internal medical conditions were the primary cause of ICU hospitalization for the majority of research subjects and control group participants. On the other hand, the present study finding was disagreement with **(Lee et al, 2016),** they showed that, Neurological illnesses accounted for fewer than half of the first and second categories' admissions causes for patients.

Regarding to **neurological assessment according grades of GCS**, the current study showed that, there was improvement according to scale scores during evening shift at 6th day in the study group compared with the control group with highly statistically significant difference (P - value (0.001) This **result may be due to** gradual decreasing anesthesia for study group during evening shift and trying weaning also, good prognosis and good response to therapy. The current study consistent with (**Cinotti, et al., 2018),** they studied (Management and weaning from mechanical ventilation in neurologic patients) they found that, the majority of patients who predictors of successful extubated had semi coma GCS >9. The current study finding was contrasting with the study conducted by (**Okabe, 2018)** who studied (Risk factors for prolonged mechanical ventilation in patients with multiple injuries and blunt chest trauma) who showed nearly one third of both SMV and PMV groups were having GCS (≤ 9) with significantly difference (P- value 0.047)

Regarding **APACHEII score**, the present study showed that mean value on admission was (9.76±3.47) for study group which was slightly lower than control group (9.82±3.38) without statistically significant difference between both groups p value was (0.934). This **result may be due to** the most of the patients in both groups had organ disease before admission and randomization of the sample. this agreed with **(wang et al 2018)** who studied (the effect of chest physiotherapy with early mobilization on improving ex-tubation outcome in critically ill patients in intensive care unit) they reported that mean APACHEII score on admission in the study and control group (19.4 ± 8.7 & 21.2 ± 9.1) respectively without statistically significant difference between both groups p value was (.09). This disagreed with **(Shruti et al, 2018)** they studied acute respiratory failure caused by severe COPD necessitated the evaluation of 670 individuals, and the study revealed a very statistically significant difference P value (.001).

Regarding to **initial ventilated mode** the result showed that, no statistically significant difference was founded in both study and control group in relation to **MV mode on admission** in morning and evening shift p value was (0.469&0.067 respectively) with the highest number in both groups were connected to **AC** mode in morning shift while to **SIMV** mode in evening shift. This **result may be due to** trying weaning in evening shift by changing

ventilation mode from AC to SIMV and when patient tolerate SIMV mode then change it to weaning CPAP mode.

The current study finding was consistent with (**Abd-Elbaky 2020)** they found, During the MV connection, all of the patients under study remained connected to the mechanical ventilator in SIMV mode. On the other hand, the present study finding was opposite with (**Al-Banna et al, 2016)**, they claimed that continuous mandatory ventilation (CMV) mode was administered to more than two third of the study group.

Regarding to **ventilation parameters** the study demonstrated no statistically significant difference in all parameters in both morning and evening shift except for PEEP in evening shift p value was (0.0267) That may be due to inactivity and worse prognosis of patient's condition due to most patient had comorbidity. The current study finding was consistent with **(Yadak et al, 2019)** who studied (The Effect of Listening to Holy Quran Recitation on Weaning Patients Receiving Mechanical Ventilation in the Intensive Care Unit) and the results showed that there was no significant difference in all parameters between the groups as respiratory rate RR (0.50) and oxygen saturation SpO_2 (0.07). also supported by **(Mahmoud et al, 2020)** who studied Nursing Assessment for Predictors of Failed Weaning Among Prolonged Mechanically Ventilated Patients and reported that, there was statistical significant between study and control group in relation to PEEP ,and disagreed with **(Ya-chun, et al., 2018)** who studied ventilator dependence risk score for the prediction f prolonged mechanical ventilation and reported a significant difference regarding to fraction of inspired oxygen

Regarding to **Out Come Criteria:** Regarding to **success of weaning**, **Mortality rate**, **Duration of MV**, and **Length of ICU stay** the finding of the current study revealed that there was statistically significant decrease in the ICU stay, Mortality rate, and mechanical ventilation duration and increase weaning success in study group compared to control group. This **may be due to** using burn's wean assessment program that improve quality of patients care

In relation to success of weaning, the study showed that the majority of study group showed successful weaning and about few size of the study group showed unsuccessful weaning with highly statistically significant between study and control group p value was (<0.001). The current study finding was supported by **(Burns et al. 2010)** the study showed that, Patients with a BWAP score of 50 or higher had a much higher chance of successfully weaning than those with lower scores.. this disagreed with **(Jeong & Lee 2018),** they studied (Clinical application of modified burns wean assessment program scores at first spontaneous breathing trial in weaning patients from mechanical ventilation) they found that Although no significant results were found, the m-BWAP score might be a more useful predictor of weaning success.

Regarding to **duration of connection on mechanical ventilation** the study revealed that there was highly statistically significant between study and control group p value was (<0.001). **That may be due to** using Burn's wean assessment program and nursing intervention that performed to study group. this consistent with **(Eweas et al 2020)** who studied (Application of Modified Ventilator Bundle and Its Effect on Weaning Among Mechanically Ventilated Patients) the study showed p value was statistically significant between the study and control groups (0.005) also agreed with **(Sepahyar et al, 2021)** they showed that The length of MV was greatly shortened by nurses' comprehensive evaluation of the patient by BWAP., on the other hand **(Jeong & Lee 2018)** investigated who studied (Clinical Application of Modified BWAP Scores at First SBT in Weaning Patients from MV) they showed regardless of how long the MV has been there, the m-BWAP score at the time of the first SBT may accurately predict the likelihood of liberation.

Regarding **length of ICU stay** the study revealed that there was highly statistically significant between study and control group p value was (<0.001) that **may be due to** using protocol for weaning can reduce complications of mechanical ventilation and decrease chance for re intubation. The current study was in contrasting with **(Kenichi, et al 2019)** who studied a comprehensive protocol for ventilator weaning and extubation and reported that, there was no statistical significant difference between two groups regarding length of ICU stay

Conclusion:

According to the results of the study, the hypotheses can be supported, It can be concluded that, BWAP is mush useful in improving outcomes of mechanically ventilated patients, than using of routine weaning method.

For the nurse:

- Using burn wean assessment program as a routine nursing assessment tool for weaning readiness.
- Making training course for new nurse staff in intensive care unit about using burn wean assessment program

For research:
Using BWAP as an effective tool in deciding patients' readiness for weaning and for giving the best of weaning outcomes in another study

Limitation of the study:
Small sample size.
The need for doctor next to the researcher during application of the BWAP
Medical team was not cooperate enough

References:

- **Abd -Elbaky, M., Mohammed, E., (2020):** Effect of various body positions on the measurement of endotracheal tube cuff pressure among critical patients. International Journal of Novel Research in Healthcare and Nursing, vol (7), N (3), P. (42-50).
- **Abdelaleem, N., Mohamed, S., Abd ElHafeez, A., & Bayoumi, H. (2020):** Value of modified Burn's Wean Assessment Program scores in the respiratory intensive care unit: an Egyptian study. Multidisciplinary Respiratory Medicine, vol (15), N (1).
- **Al-Banna, M., Morsy, W., El-Feky, H., & Abdelmohsen, A. (2016):** Mechanical Ventilation: Relationship between Body Mass Index and Selected Patients' Outcomes at a University Hospital in Cairo. P. (1-14).
- **Alkotami, A., Rashed, K., Ragab, M., & Nassara, H. (2019):** Prognostic factors of patients requiring ventilatory support in the neuro-intensive care unit. Tanta Medical Journal, vol (46), N (3), p. (10-18).
- **Baptistella, A., Sarmento, F., da Silva, K., Baptistella, S., Taglietti, M., Zuquello, R., & Nunes Filho, J. (2018):** Predictive factors of weaning from mechanical ventilation and extubation outcome: A systematic review. Journal of critica care,vol(48),N (56) ,P.62
- **Burns, S., Fisher, C., Tribble, S., Lewis, R., Merrel, P., Conaway, M., & Bleck, T. (2010):** Multifactor clinical score and outcome of mechanical ventilation weaning trials: Burns Wean Assessment Program. American Journal of Critical Care, vol (19), N (5), pages (431- 439).
- **Eweas, A., Mohammad, S., Ali Sayyed, J., Abd Elbaky, M., & Bayoumi, M. (2020):** Application of Modified Ventilator Bundle and Its Effect on Weaning Among Mechanically Ventilated Patients. Minia Scientific Nursing Journal, 8(1), 121-129.
- **Gadre, S., Duggal, A., Mireles-Cabodevila, E., Krishnan, S., Wang, X. F., Zell, K., & Guzman, J. (2018)**: Acute respiratory failure requiring mechanical ventilation in severe chronic obstructive pulmonary disease (COPD). Medicine, vol (97), N (17).
- **Ghiani, A., Paderewska, J., Sainis, A., Crispin, A., Walcher, S., & Neurohr, C. (2020):** Variables predicting weaning outcome in prolonged mechanically ventilated tracheotomized patients: retrospective study. Journal of Intensive Care, vol. (8), N (19), p. (2-10).
- **Guan, W., Liang, W., Zhao, Y., Liang, H., Chen, Z., Li, Y., & He, J. (2020):** Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. European Respiratory Journal, Vol (55) N (5).
- **(Hospital records of Sohag University 2020).** Number of patients admitted to intensive care unit, were on mechanical ventilation.
- **Jaganath, U. (2020):** An overview of predictive scoring systems used in ICU. anaesthetics.ukzn.ac.za/wp-content, Vol (07), N (05)
- **Jeong, E., & Lee, K, (2018):** Clinical application of modified burns weans assessment program scores at first spontaneous breathing trial in weaning patients from mechanical ventilation, Acute and critical care journal, Vol (l33) N (4), p. 260.
- **Jia, Y., Kaul, C., Lawton, T., Murray-Smith, R., & Habli, I, (2021):** Prediction of weaning from mechanical ventilation using convolutional neural networks. Artificial intelligence in medicine journal, vol (117), N (102087) .
- **Karagozoğlu Ş, Yildiz FT, Gursoy S, Gulsoy Z, & Suha BK, (2018):** The Effect of Bundle Adaptation Control on VAP Speed and Length of Hospital Stay in Avoiding the Ventilator Associated Pneumonia (VAP) at Anesthesia Intensive Care Unit. Int J Nurs. Clin. Pract, vol (5), N, (295).
- **Khalafi, A., Elahi, N., & Ahmadi, F, (2016):** Continuous care and patients' basic needs during weaning from mechanical ventilation: A qualitative study. Intensive and Critical Care Nursing, Vol (37), p. (37-45).
- **Kirakli C, Ediboglu O, Naz I, Cimen P, Tatar D. (2014):** Effectiveness and safety of a protocolized mechanical ventilation and weaning strategy of COPD patients by respiratory therapists. J Thorac Dis.vol (6), N (1180) P.6.
- **Morton, P., Fontaine, D., Hudak, C., & Gallo, B. (2018):** Critical care nursing: a holistic approach.Philadelphia: wolters kluwer. DDC vol (616), N (02), P. (1288-1289)
- **Richardson, S., Hirsch, J., Narasimhan, M., Crawford, J., McGinn, T., Davidson, K. & Northwell COVID-19 Research Consortium. (2020):** Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. Jama, Vol (323) N (20), P (2052-2059).

- **Schoenhofer, B., Geiseler, J., Dellweg, D., Fuchs, H., Moerer, O., Weber-Carstens, S., & Windisch, W. (2020):** Prolonged weaning: S2k guideline published by the german respiratory society. Respiration, vol (99), N (11), P. 982-1084.
- **Sepahyar, M., Molavynejad, S., Adineh, M., Savaie, M., & Maraghi, E. (2021):** The effect of nursing interventions based on burns wean assessment program on successful weaning from mechanical ventilation: A randomized controlled clinical trial. Iranian Journal of Nursing and Midwifery Research, vol (26), N (1), P.34.
- **Telle, K., Grøsland, M., Helgeland, J., & Håberg, S. (2021):** Factors associated with hospitalization, invasive mechanical ventilation treatment and death among all confirmed COVID-19 cases in Norway: Prospective cohort study. Scandinavian journal of public health, Vol (49) N (1), P. (41-47).
- **Wang, T., Wu, C., & Wang, L. (2018):** Chest physiotherapy with early mobilization may improve extubation outcome in critically ill patients in the intensive care units. The clinical respiratory journal, Vol(12) N (11),P.(2613-2621).
- **Windisch, W., Dellweg, D., Geiseler, J., Westhoff, M., Pfeifer, M., Suchi, S., & Schönhofer, B. (2020)**: Prolonged weaning from mechanical ventilation: results from specialized weaning centers—a registry-based study from the WeanNet Initiative. Deutsches Ärzteblatt International, vol (117), N (12), P. 197.
- **Yadak, M., Ansari, K. A., Qutub, H., Al-Otaibi, H., Al-Omar, O., Al-Onizi, N., & Farooqi, F. A. (2019):** The effect of listening to holy Quran recitation on weaning patients receiving mechanical ventilation in the intensive care unit: A Pilot Study. Journal of religion and health,Vol(58) N(1),P.(64-73).
- **Yazdannik. A., Salmani. F., Rajpour. A., Abbasi. S.,** Application of Burn's wean assessment program on the duration of mechanical ventilation among patients in intensive care units: A clinical trial, Iranian Journal of Nursing and Midwifery Research | November-December 2016 | Vol. 17 | Issue 7
- **Zein, H., Baratloo, A., Negida, A., & Safari, S. (2016):** Ventilator weaning and spontaneous breathing trials; an educational review. Emergency, vol. (4), N (2), P. 65.