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Effect of Implemented Nursing Care on Breathing Discomfort and Weaning Outcomes for Patients Undergoing Mechanical Ventilation

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Abstract
Background: Breathing discomfort is one of the worst experienced symptoms by the mechanically ventilated patients in ICUs **Aim**: to evaluate the effect of implemented nursing care on breathing discomfort and weaning outcomes for patients undergoing mechanical ventilation. **Design**: A quasi-experimental research design. **Setting**: General intensive care unit at Assuit university hospital. **Patients and methods**: Convenient sample of 80 patients(40 patients for study group and 40 patient for control group) who were mechanically ventilated for >24 hrs. Breathing discomfort was evaluated according to patient conscious level and nursing care was done for study group and routine care for control group. **Tools** : Four tools were used for data collection in the study; Patient assessment, breathing discomfort evaluation: Part I :Respiratory distress observation scale(RDOS) and Part II**:** Dyspnea Visual Analogue Scale(D-VAS)**,** Patient outcomes assessment and nursing intervention tool **Results**: High statistical significant difference between study group and control group in relation to arterial blood gases and haemodynamic parameters after intervention. Concerning weaning outcomes; 57% of control group experienced weaning failure versus 35% in study group **Conclusion**: Implementing nursing care among the mechanically ventilated patients were effective in improving patient outcomes. **Recommendations**: Apply nursing care for breathing discomfort as a routine care in ICUs.

Keywords: Breathing Discomfort, Mechanically Ventilated, Nursing Care & Outcomes.

Introduction
Breathing discomfort is one of the most disabling symptoms of respiratory diseases and the main reason leading to intensive care units admission. Unfortunately, breathing discomfort is not routinely assessed which is considered negligence in patient rights. The way to express breathing discomfort by patients is variant and it can be difficult to assess breathing discomfort **(Vicent et al., 2017).**

Many critically ill patients become cognitively impaired or unconscious and lose the ability to report symptoms, although breathing discomfort can be known only from a patient's report; when self-reporting is impaired, the critical care nurse must depend on signs indicative of a patient's breathing discomfort. The mechanically ventilated patient who was unable to report this symptom is liable to under-recognition of distress symptoms and under-treatment **(Campbell, 2018).**

Nursing care to relieve breathing discomfort is crucial, one of the nursing interventions is chest physiotherapy which plays an important role for the mechanically ventilated patients as it is necessary for removal the retained secretions intubation, improve oxygenation, re-expand atelectatic lung, optimize ventilation and perfusion, improve changes in breath sounds , improve vital signs encourage weaning success reduce ICU length of stay and decrease hospital cost **(Gamal et al., 2015).**

Weaning of the mechanically ventilated patients involves two steps; weaning from the machine (after using a suitable weaning mode as continuous positive airway pressure) and extubation. The danger of weaning failure represented in its complications as increasing death rates which were much higher in reintubated patients than in successfully extubated patients **(Aziz et al., 2018)** so it is important to improve patient outcomes through effective evaluation of breathing discomfort and suitable nursing care.

Operational definitions

Nursing care: are the actual treatments and actions that are performed to help patients to reach the goals that are set for them**.**

Breathing discomfort: It is difficulty in breathing or shortness of breathwhich medically refered to dyspnea that can be caused by pulmonary or non-pulmonary diseases.

Patient outcomes: It is the end points of care and substantial changes in the health condition of patient that caused by nursing interventions, include length of stay, duration on mechanical ventilation, weaning outcomes and mortality.

Significance of study

Breathing discomfort during mechanical ventilation in the ICU may complicates care; worsen outcomes, lead to longer hospital stay, weaning failure and higher mortality rates. Assessment of nonverbal

messages may allow caregivers to destinate patient breathing discomfort **(Binks et al., 2017).**

About 49% of patients admitted to general intensive care unit at Assuit university hospital in previous year were suffering from breathing discomfort and most of them often needed to be mechanically ventilated **(Assiut university Hospital ICU records)**. In turn this reflect the importance of nursing care for the mechanically ventilated patients to improve patient outcomes.

Aim of Study

The aim of the present study is to evaluate the effect of implemented nursing care on breathing discomfort and weaning outcomes for patients undergoing mechanical ventilation.

To fulfill this aim; the following research hypotheses were formulated:

Research hypotheses

- Breathing discomfort was expected to be lower in study group than in control group after implementing nursing care.
- Haemo-dynamic parameters and arterial blood gases were expected to be improved in study group after intervention than in control group.
- Nursing care was expected to be effective in improving patient outcomes in study group than in control group.

Patients & Methods

Research design:

Aquasi-experimental research design was used to conduct this study.

Setting

The study was conducted at general intensive care unit at Assiut university hospital.

Subjects

A convenient sample included eighty adult male and female conscious and unconscious patients which divided into two groups (40 patients for study group) and (40 patients for control group), aged from (18-65 years old) admitted to general ICU that were eligible for inclusion in the sample for about 1year (from January 2019 to January 2020)**.**

Inclusion criteria

The study included patients who had the following criteria

- Intubated patients who were mechanically ventilated for >24 hrs.
- Patients who were diagnosed with pulmonary diseases

Exclusion criteria: The study excluded patients with The following criteria:

- Patients with metabolic acidosis, anemia, drug poisoning, psychogenic disorders or neuromascular disorders (non-respiratory drive increasing factors)
- Non-invasive ventilation (NIV)
- Pregnancy
- Drugs: Antibiotics, such as nitrofurantoin and sulfa drugs, heart medicines, such as amiodarone, Chemotherapy drugs such as bleomycin, cyclophosphamide, and methotrexate, Street drugs, Cholesterol Medications & Naproxen.

Study tools: Four tools were used in this study:

Tool I: Patient assessment tool

This tool developed by the researcher after reviewing the related literature. It was used to assess personal and clinical data of Patient; it covered the following:

Personal characteristics which included age, Body mass index (BMI) and sex.

Clinical data which covered; medical diagnosis, past medical history, date of admission, date of discharge, vital signs(respiratory rate, heart rate, body temperature and mean arterial blood pressure (MABP), central venous measurement and arterial blood gases (pH, paO_2 in mmHg, $PaCO_2$ in mm Hg, Pao_2/fio_2 ,SaO_2).

Tool II: Breathing discomfort assessment tool: this tool adopted from(Campbell, 2018) and(Corcioli et al., 2017), it used to assess level or degree of breathing discomfort and it consisted of two parts as following:

Part I : **Respiratory distress observation scale (RDOS) (pre and post) (Campbell, 2018a)**: to assess level of breathing discomfort in unconscious patient, it covered the eight following variables: heart rate, respiratory rate, accessory muscle use, paradoxical breathing pattern, nasal flaring, restlessness, grunting at end expiration, and fearful facial display. Variables are scored from 0 to 2 points and points are summed. Total scores range from 0 to 16, little or no distress (0-2), Mild respiratory distress (3), moderate respiratory distress (4-6) and sever respiratory distress (7 or more).

Part II: **Dyspnea-Visual Analogue Scale (D-VAS) (pre and post) (Corcioli et al., 2017) :** for conscious patient to assess level of breathing discomfort, it is a horizontal line of 10 cm from 0 to 10 (from no breathing discomfort to maximum level of breathing discomfort).

Tool III: Patient outcomes assessment tool

This tool aimed to assess the effect of the nursing care on patient outcomes, it covered: length of stay, type of discharge, weaning outcomes (as successful weaning or weaning failure), duration on mechanical ventilator, mortality rate and occurrence of other morbidities.

Tool IV: Nursing interventions tool: implementing this tool aimed to improve breathing discomfort and patient outcomes, it includes inhalation therapy,

positioning, chest physiotherapy, suctioning and oxygen therapy monitoring.

Methods

The study was conducted on three main phases, which were preparatory phase, implementation phase and evaluation phase:

l- Preparatory phase

Permission to conduct the study was obtained from the dean of faculty of nursing at Assuit University and from hospital responsible authorities after explanation of the aim and nature of the study. Development of tools after reviewing the related literature and tools were reviewed by 5 jury for face and content validity (two medical staff and three critical care nursing staff) from Assiut University.

Reliability of tools were done by using Cronbach`s Alpha test, it was 0.64 for respiratory distress observational scale (RDOS) and for Dyspnea visual analogue scale (D-VAS).

Ethical considerations

Research proposal was approved from ethical committee in the faculty of nursing, there was no risk on study subjects during application of the research, the study followed common ethical principles in clinical research, oral consent was obtained from the responsible person for the unconscious patients, confidentiality and anonymity were assured, study subjects had the right to refuse to participate or withdraw from the study without rational and subjects privacy was considered during collection of data.

A pilot study was conducted on 10% of study sample (8 patients) who met the determined selection criteria to test the feasibility and applicability of the tool and necessary modification was done and the eight patients of the pilot study were excluded from the study.

II-Implementation phase: was done on four sessions

Session I: Researcher introduced herself to staff and to patients and explained the maneuvers of evaluating breathing discomfort which applied for both study group and control group (pre and post intervention and routine care), this session took about 2 minutes:

The researcher asked patient, if oriented, are you complaining of breathing discomfort?" then he/she was asked to mark on Dyspnea Visual analogue scale (VAS) printed in Paper, it was graded from 0 (no breathing discomfort) to 10 (maximum degree of breathing discomfort).

Unconscious patient assessed for their breathing discomfort by using Breathing discomfort observation scale (RDOS) which compromised of eight variables: heart rate, respiratory rate, accessory muscle use, paradoxical breathing pattern, nasal flaring, restlessness, grunting at end expiration, and fearful facial display, each variable score ranged from 0 to 2 points, all variables were summed after applying the score on patient and the total scores range from 0 to16. The result of the scale as following: little or no distress (0-2), mild (3), moderate (4-6), sever (7 or more).

Pressure-controlled ventilation volume guaranteed (PCV-VG) was chosen by the anesthesist for study group and synchronized intermittent mandatory ventilation mode for control group and the following nursing care applied at the time of breathing discomfort (nursing care according the underlying cause of breathing discomfort):

Session II: it included Inhalation therapy and positioning, this session took about 15 minutes; inhalation therapy by using the prescribed nebulized medication was given before start of performing chest physiotherapy to reduce mucus viscosity, if patient had thick secretions. Positioning**;** bed head elevated and patient was placed in sitting position at degree of 30 and more, relax his shoulders and neck muscles **(Mezidi & Guérin, 2018).**

Session III: it included chest physiotherapy which included 2 parts (part I: vibration and part II: percussion); was performed after auscultating patient's chest, this session took about 15 minutes as following:

Part I: Vibration

It made during expiration, shaking patient chest to loosen secretion and dislodge it from its place to reach the main bronchi and then patient was motivated to cough after making percussion (if was conscious), the cycle of vibrations took 10-15 min, after 3-4 vibrations patient was encouraged to cough deeply using diaphragm and abdominal muscles, patient was given period of rest in phases during the cycle and was asked about his tolerance and vibrations was avoided over sternum, ribs, breast, or spine**(Gupta & Gupta, 2018).**

Part II: Percussion

The researcher cover patient chest with towel or piece of cloth, percussing sternum, ribs, breast, spine or stomach were avoided, hand was cupped to strike the chest, percussion shouldn't be painful to patient, percussion was usually done for 3-5mins.

Session IV: it included 2 parts (part I: Suctioning and part II: oxygen therapy monitoring), this session took about 1 minute**.**

Part I: Suctioning

Researcher explained the procedure to the patient (conscious or unconscious)**,** hyperoxygenation (100%) and hyperventilation up to 5 breaths was given to the patient before procedure to avoid hypoxemia, vacuum pressure was adjusted to be 100-120 CmH_2O for adult, endotracheal tube or tracheostomy was disconnected from oxygen source, researcher wear disposable gloves, open the

suctioning catheter from its sachet, connect it with suctioning tube**,** researcher then put on sterile gloves and holded catheter with the dominant hand then he proceeded it to the end of the ETT or tracheostomy to be 0.5-1 cm out of the tube , catheter then removed backward, cleaned with sterile water or saline, patient was hyperoxygenated in between suctioning, each time entry for the catheter took 5-15 sec, only 3 suctioning attempts during the procedure**,** after procedure hyperoxygenation was given, reassessment by auscultating patient chest was done, all single use equipment was disposed and documentation done **(Number et al., 2020).**

Part II: oxygen therapy monitoring; it took less than 1 minute

Anesthetists might increase oxygen concentration (FIO_2) on the mechanical ventilator up to 60 % (maximum) if patient was hypoxemic and researcher noticed patient response to increased oxygen concentration.

III-Evaluation phase

Evaluation of breathing discomfort by the researcher applied by using VAS (for conscious patients) and RDOS (for unconscious) after implementing nursing care, weaning outcomes (success or failure), Vital signs and ABG were also evaluated by the researcher after care in the 1st ,3rd and 7th day and patients' outcomes followed to investigate the effect of nursing care on duration of mechanical ventilation, weaning outcomes (success or failure) and length of stay.

Statistical analysis

Data was coded and transformed into specially designed form so as to be suitable for computer process, performed using the software spss, version 20, Data of obtained result were tabulated in the form of frequency using mean ± SD, number and percentage .Using t-test to determine statistical significance between two variables. Using chi-square test to determine significance between variables.

Results

The main results yielded by the present study were:

Table (1): Comparison between the study and control groups in relation to Personal characteristics and clinical data (n=80)

Items	Study Group		Control Group		P-Value
	No.	%	No.	%	
Age					
18-35	10	25%	10	25%	
36-50	14	35%	12	30%	0.65
51-65	16	40%	18	45%	
Age	45±16.5		46±14		0.67
Sex					
Male	21	52.5%	16	40 %	0.2
Female	19	47.5%	24	60%	
BMI	19±2		19.5±3		0.7
Consciousness level					
Conscious	10	25%	10	25%	1
Unconscious	30	75%	30	75 %	
Medical diagnoses					
Pulmonary embolism	4	10%	6	15%	
Pneumonia	6	15%	7	17.5%	0.76
COPD	12	30%	5	12.5%	
Pulmonary Edema	4	10%	5	12.5%	
Bronchopneumonia	3	7.5%	5	12.5%	
Asthma	4	10%	4	10%	
Respiratory failure	7	17.5%	8	20%	
Past history of diseases					
Hypertension (HTN)	7	17.5%	12	30%	
Diabetes (DM)	6	15%	8	-	0.5
Congestive heart failure	4	10%	-	-	
COPD	5	12.5	1	2.5%	
Non	18	45%	19	47.5%	

-Chi-square test - Significant at (P≤ 0.05) -BMI: body mass index -COPD: chronic obstructive pulmonary disease – HTN: hypertension*

Table (2): Comparison between study group and control group of patients in relation to breathing discomfort assessment by respiratory distress observation scale (RDOS) one hour after intervention (study group) and routine care (Control group) (n=80)

RDOS /day	Study M ± SD	Control M ± SD	P-value After
RDOS on the 1st day	2.04±1.6	5.5±2.6	.000***
RDOS on the 3rd day	1.5±.8	3.2±2	.000***
RDOS on the 7th day	1.1±0.4	3.8±1.9	.000***

--- *Independent sample t-test* *-RDOS: Breathing Discomfort Observation Scale*

Table (3): Comparison between study group and control group of patients in relation to Dyspnea Visual analogue scale (D-VAS) one hour after intervention (study group) and routine care (Control group) (n=80)

D-VAS /Day	Study M ± SD	Study M ± SD	P-value
VAS on the 1st day	2.3±.9	5.8±2.9	0.002**
D-VAS on the 3rd day	1.8±1	5.5±2.6	0.001**
D-VAS on the 7th day	2±0.8	5±3	0.005**

VAS: Breathing discomfort visual analogue scale *- T-test*

Table (4): Comparison between study group and control group in relation to haemo-dynamic parameters one after intervention (study group) and routine care (Control group) (n=80)

Haemo-dynamic parameters	Study M±SD	Control M±SD	P-value
On admission			
Temperature	37.7±0.4	37.3±1.6	0.12
Pulse	101±15	108±18	0.07
Respiratory rate	29.5±3.8	33±1	0.000***
Mean Arterial Blood Pressure	29±3	33	0.000**
Central Venous Pressure	11±12	10±5	0.7
On the 3rd day			
Temperature	37.6±0.5	37.5±0.6	0.4
Pulse	100±16.7	109±18	.02
Respiratory rate	25.5±8	33	0.000***
Mean Arterial Blood Pressure	77±13	77±20	0.9
Central Venous Pressure	9.7±4	11.9±12	0.6
On the 7th day			
Temperature	37±0.5	37.2±1.6	0.7
Pulse	100±15	108±17	0.05*
Respiratory rate	24± 6	30	0.000***
Mean Arterial Blood Pressure	77±14	74±21	0.43
Central Venous Pressure	10.5±5	11.9±12	0.45

- T-test

Table (5): Comparison between study group and control group in relation to arterial blood gas parameters (ABG) one hour after intervention for study group and after routine care for Control group(n=80)

ABG parameters	Study M ± SD	Control M ± SD	P-value
On admission			
PH	7.39 ±0.09	7.33±.08	.005**
PCO2	46.7 ±18	41.2±13	0.1
PO2	97 ±38	93.8±46	0.68
Sao2	95 ±4	93±7	0.10
PF ratio	205±66	184.5±89	0.23
On the 3rd day			
PH	7.40±0.09	7.35±.07	0.01*
PCO2	47±20	39.9±12	0.05*
PO2	110±31	95±10	0.04*
Sao2	99±3	91.7±15	0.03*
PF ratio	238±81	205±60	0.03*
On the 7th day			
PH	7.40±0.1	7.35±.07	0.008*
PCO2	47±20	40±12	0.03*
PO2	111±30	101±20	0.05*
Sao2	96±3	92±15	0.05*
PF ratio	241±80	209±60	0.05*

- T-test PH: acidity or power of hydrogen -PaO2: partial pressure of oxygen -PaCO2 partial pressure of carbon Dioxide -SaO2: oxygen saturation – PF ratio: PO2/FIO2- FIO2: fraction of inspired oxygen.

Table (6): Patient Outcomes among study group and control group (n=80):

Items	Study Group M±SD	Control group M±SD	P value
Duration on MV	8.8±3	11.4±5.5	0.01*
Length of stay in ICU	14.8±12	21±2.3	.004**
Mortality rate N (%)	15(37.5%)	26(65%)	0.014*
Weaning outcomes			
weaning failure	14(35%)	23(57.5%)	0.03*
weaning success	26(65%)	17(42.5%)	

- T-test -MV:mechanical ventilator -ICU : intensive care unit

Table (1): This table reveals personal characteristics and clinical data among the study and control groups**.** It shows that about 40% of study and control groups were in the age group of (51-65) years old,75% of both groups were unconscious and no statistical significance difference in relation to sex (P=0.2) and BMI(P=0.7). Most of study and control groups had no past medical history (P=0.5).

Table (2): Shows that there is a high statistical significant difference between study group and control group in relation to Mean RDOS after intervention from the 1st to the 7th day (P=0.000), Mean RDOS in the 1st day for study group was (2.04±1.6) after nursing intervention versus (5.5±2.6) after routine care for control group. In the 7th day Mean RDOS for study group was (1.1±.4) after intervention versus (3.8±1.9) after routine care for them.

Table(3): Shows that there is a highly significant statistical difference between study group and control group in relation to Mean VAS after intervention from the 1st to the 7th day(P=.002) and (.005) respectively ,Mean VAS in the 1st day for study group was (2.3±.9) after intervention versus (5.8±2.9) after routine care for control group. In the 7th day Mean VAS for the study group was (2 ±0.8) after intervention versus (5±3) after routine care for control group.

Table (4): This table shows that there is a Statistically significant difference between study group and control group in the first day regarding mean blood pressure (MABP) and respiratory rate,

(P=0.000). Concerning body temperature, pulse and CVP, there is no statistically significant difference between both groups. In the 3rd day there is statistically significant difference between both of them in relation to pulse and respiratory rate (P=0.02, P=0.000) respectively. In the 7th day as regarding pulse and respiratory rate there was statistically significant difference between both groups (P=0.05) and (P=0.000) respectively and no statistically significant difference between both groups in relation to body temperature, MABP and CVP.

Table (5): Shows that there is high statistical significant difference within normal range between study group and control group in the 1st day in relation to pH (P=0.005) and no statistical significant difference between both groups in relation to PCO2, PO_2, SaO_2 and PF ratio. There is statistically significant difference within normal range between study group and control group in the 3rd day in relation to PH, PCO_2, PO_2, SaO_2 and PF ratio P=0.01,0.05,0.04,0.03,0.03 respectively. In the 7th day there is a statistical significant difference within normal range between study group and control group in relation to PH (P=0.008), PCO_2 (P=0.03) ,PO_2 (P=0.03), Sao_2 (P=0.05) and PF ratio(P=0.05).

Table (6): Shows that the Mean duration on mechanical ventilator for study group and control group was (8.8±3) and (11.4±5.5) respectively with high significant statistical difference (P=0.01), regarding mean length of stay in ICU was found (14.8±12) and (21±2.3) for study and control group respectively with highly significant statistical difference between them(P=.004) ,concerning mortality rate was (37.5%) and (65%) for study group and control group respectively with high significant statistical difference. Regarding weaning outcomes, weaning failure rate was high (57.5%) for control group in comparison to (35%) for study group with high significant statistical difference between both groups (P=0.03).

Discussion

Breathing discomfort is one of the most prominent and distressing symptom in the intensive care units (ICU), however little attention was given to it in comparison to the great attention that has been given to detection and treatment of pain and anxiety **(Decavèle et al., 2019)**.

In present study, the mean age of study group and control group was between 35 and 60 years old, this can be attributed to occurrence of diseases increases after the age of 35 years, this is in line with **(Mabkhoot & Israa Abed, 2018)** who reported that breathing discomfort increases with age when he studied the prevalence and risk factors of breathing discomfort among general population of Arar City-Saudi Arabia.

In the present study there was statistically significant difference between study group and control group in relation to respiratory rate after intervention, this can be attributed to efficacy of the nursing care in returning respiratory rate to be within normal range after intervention. This is in the line with **(Campbell, 2018)** who reported that patients who received mechanical ventilation expected to have less breathing discomfort. Also in the line with **(Kelly et al., 2017)** who reported that tachypnea is one of clinical signs of breathing discomfort.

Arterial blood gas test is gives indications about ventilation and gas exchange. It is important to analyze and assess arterial blood gases to predict any respiratory disorder. Arterial blood gas measure partial pressure of oxygen giving information about oxygenation **(Castro & Michael, 2020).**

The current study show statistical significant difference between study group and control group in relation to arterial blood gases (decreased PH, decreased PCO_2 & decreased SaO_2), this can be attributed to respiratory acidosis which caused by the respiratory diseases that cause CO_2 retention and decreased oxygen saturation, this is in the line with **(Burri et al., 2011)** who reported that acute respiratory and cardiac diseases have common finding of arterial blood gases as increase of $PaCO_2$, decresed oxygen tension**.** Also agree with **(Ali et al., 2016)** who reported that arterial blood gases improved with PCV-VG mode when he studied pressure controlled ventilation-volume guaranteed (PCV-VG) mode versus synchronized intermittent mandatory ventilation mode(SIMV) in patients with chronic obstructive pulmonary disease (COPD) complaining of respiratory failure.

In addition to the burden that breathing discomfort represents for the patients, it is also a marker of a worse prognosis and has both early and late bad outcomes. Indeed, in patients with respiratory or cardiac disorders, breathing discomfort is strongly associated with reduced life expectancy **(Decavèle et al., 2019).**

The present study show that there was highly significant statistical difference between study group and control group in relation to length of stay, duration on mechanical and mortality rate, this can be attributed to the effectiveness of nursing care for study group, this is in the line with **Pesola1 & Ahsan1, (2016)** who reported that dyspnea is strong predictor of mortality and associated with high mortality rates.

The current study reported that more than half percent of control group experienced weaning failure versus one third in the study group with high statistical

significance difference between both groups, this is can be attributed to effectiveness of nursing care in improving patient outcomes in study group and reoccurrence of breathing discomfort after starting weaning in control group, this is in the line with **(Schriger, 2011)** who reported that tachypnea with mechanical ventilation is a significant predictor of weaning failure.

Conclusion

There was high statistically significant difference between study group and control group in relation to vital signs, ABG and patient outcomes after implementing the nursing care as they were effective in relieving breathing discomfort among the mechanically ventilated patients and effective in improving outcomes.

Recommendations

- Applying breathing discomfort evaluation as a routine care for all patient in ICUs
- Providing nursing intervention protocol about breathing discomfort for intensive care units
- Providing nursing educational program for nurses about nursing care for relieving breathing discomfort.
- Re-apply this research in all intensive care units using Arabic language booklet about nursing care appropriate for relieving breathing discomfort.

References

- **Abouzeid, W., (2018):** Effect of Implementing A Clinical Pathway Directed Care on the Frequency of Complication Related Traumatic Brain Injury. Assiut Scientific Nursing Journal, 6(13), 143–154. https://doi.org/10.21608/asnj.2018.58988
- **Ali, A., El Wahsh, R., Agha, M., & Tawadroos, B., (2016):** Pressure regulated volume controlled ventilation versus synchronized intermittent mandatory ventilation in COPD patients suffering from acute respiratory failure. Egyptian Journal of Chest Diseases and Tuberculosis, 65(1), 121–125. https://doi.org/10.1016/j.ejcdt.2015.08.004
- **AmriP, zahra Mirshabani S., Hossein Ardehali, S., (2016)**: weaning the patient from the mechanical ventilator: A Review Article,Arch Crit Care Med,Archives of critical care medicine,1(4):e8363
- **Aziz, E., Ebrahim, A., Mohammed, M., & Mohamed, M., (2018):** Factors affecting extubation outcomes after using semi - quantitative cough strength scale Keywords : Semi-Quantitative Cough Strength Score (Scss), Extubation Outcome & Mechanically. April, 20–28.
- **Binks, A., Rrt, S., & Riker, R., (2017)**: ICU Clinicians Underestimate Breathing discomfort in Ventilated Subjects. 150–155. https://doi.org/10.4187/respcare.04927
- **Burri, E., Potocki, M., Drexler, B., Schuetz, P., Mebazaa, A., Ahlfeld, U., Balmelli, C., Heinisch, C., Noveanu, M., Breidthardt, T., Schaub, N., Reichlin, T., & Mueller, C., (2011)**: Value of arterial blood gas analysis in patients with acute dyspnea : an observational study. Critical Care, 15(3), R145. https://doi.org/10.1186/cc10268
- **Campbell, B., (2018a)**: C Omfort At the E Nd of. 27(4), 264–269.
- **Castro, D., Keenaghan, M., Arterial blood gas, (updated 2020 Mas 21)**. In: statpearls publishing; 2020 jan-. available from: https:// www.nbci.nlm.nih.gov/NBK536919/
- **Corcioli, A., Pessoa-Santos, B., Takara, G., Lorenzo, V., & Jamami, M., (2017)**: Reported dyspnea and fatigue using different scales during the physical effort in COPD. Fisioterapia Em Movimento, 30(2), 207–217. https://doi.org/10.1590/1980-5918.030.002.ao01
- **Decavèle, M., Similowski, T., & Demoule, A., (2019)**: Detection and management of dyspnea in mechanically ventilated patients. Current Opinion in Critical Care, 25(1), 86–94. https://doi.org/10.1097/MCC.0000000000000574
- **Gamal, N., Hariedy, E., Youssef, W., Aly, M., & Mervat, M., (2015):** Chest Physiotherapy and Recruitment Maneuvers : Effects on Lung Mechanics and Pulmonary Complications among Mechanically Ventilated Patients with Acute Lung Injury. 4(4), 17–32. https://doi.org/10.9790/1959-04421732
- **Gupta, C., & Gupta, H., (2018)**: Physiotherapy for Respiratory Conditions. Adv Nursing Patient Care Int J 2018, 1(1): 180003. 1(1), 1–8.
- **Kelly, A., Keijzers, G., Klim, S., Graham, C., Craig, S., Kuan, W., Sen, Jones, P., Holdgate, A., Lawoko, C., Laribi, S., Cowell, D., Jain, N., De Villecourt, T., Lee, K., Chalkley, D., Lozzi, L., Asha, S., Duffy, M., Watkins, G., & Russell, K., (2017)**: An Observational Study of Dyspnea in Emergency Departments: The Asia, Australia, and New Zealand Dyspnea in Emergency Departments Study (AANZDEM). Academic Emergency Medicine, 24(3), 328–336. https://doi.org/10.1111/acem.13118
- **Mabkhoot, A., & Israa Abed, M., (2018).** Prevalence and Risk Factors of Dyspnea among General Population of Arar City, Kingdom Saudi Arabia. The Egyptian Journal of Hospital Medicine, 72(2), 3930–3934. https://doi.org/10.21608/ejhm.2018.9072
- **Mezidi, M., & Guérin, C., (2018):** Effects of patient positioning on respiratory mechanics in

mechanically ventilated ICU patients. 6(19). https://doi.org/10.21037/atm.2018.05.50

- **Number, V., Number, R., Interval, R., By, A., By, A., Facilitator, C., & Intranet, O., (2020)**. Guideline for suctioning.
- **Pesola1 & Ahsan1, Dyspnea as an Independent Predictor of Mortality, Clin Respir J., (2016):** March; 10(2): 142–152. doi:10.1111/crj.12191
- **Schriger, D., (2011):** Approach to the Patient with Abnormal Vital Signs. Goldman's Cecil Medicine: Twenty Fourth Edition, 1(Chapter 98), 27–30. https://doi.org/10.1016/B978-1-4377-1604-7.00007-5
- **Shadvar, K., Baastani, F., Mahmoodpoor, A., & Bilehjani, E., (2013)**: Evaluation of the prevalence and risk factors of delirium in cardiac surgery ICU. Journal of Cardiovascular and Thoracic Research, 5(4), 157–15761. https://doi.org/10.5681/jcvtr.2013.034
- **Vicent, L., Manuel, J., Olarte, N., Puente-maestu, L., Oliva, A., López, J., Postigo, A., Martín, I., Luna, R., Fernández-avilés, F., & Martínez-sellés, M., (2017)**: Degree of dyspnoea at admission and discharge in patients with heart failure and respiratory diseases. 1–9. https://doi.org/10.1186/s12904-017-0208-x