

Effect of Nursing Intervention on Patient's Breathing with Chronic Obstructive Pulmonary Disease by Using Prone Position versus Semi Recumbent Position

Hanan Sobeih Sobeih¹, Neamatallah Goma Ahmad¹, Soheir Tawfek Ahmad¹ and Gehan Mohamed El-Asaal²

¹Medical Surgical Nursing Dept., Faculty of Nursing- Ain Shams University

²Chest Diseases Dept - Faculty of Medicine-Ain Shams University

Soheir2010@windowslive.com

Abstract: An integral part of treatment, for patient with chronic obstructive Pulmonary disease (COPD), involves recommending optimal patient positioning for activity and rest to relieve shortness of breath and dyspnea. Aim: To evaluate the effect of nursing intervention on patient's breathing with chronic obstructive pulmonary disease by using prone position versus semi recumbent position. Design: A quasi experimental design was used in carrying out this study. Setting: This study was conducted in chest units and pulmonary function research unit affiliated to Ain Shams University Hospital, Sample: A purposive sample included all adult patients (45) in from both sexes having three stages of COPD and 12 nurses working with COPD patients. Tools: Two tools as regards studied patients 1- Interview questionnaire sheet (a)- Patient's demographic data, (b)- COPD questionnaire to assess level of COPD (mild, moderate or sever) (c)- Patient's complaint sheet to assess patient complaint in two positions, and d) Patient's assessment sheet. 2- Laboratory value sheet: It was used in two stages (a) In baseline position to assess level of COPD combined with patient assessment by measuring FEv1% (pulmonary function) (b) During prone position and semi recumbent position measuring FEv1% and arterial blood gases in the three stages of disease for seven days. Two tools of studied nurses: First tool- Nurse's questionnaire sheet divided into (a) Nurse's characteristics (b) Nurses' knowledge and Second tool: Prone position observation checklist to evaluate the level of nurse's performance Results: More than half of the studied patient were included in mild stage of COPD, but more than one fifth of them represented equally moderate, sever stages of disease according to Clinical COPD questionnaire and results of pulmonary function (FEv1%). There were statistically insignificant differences between prone position and baseline position as regards pulmonary function in moderate and sever stages of disease along the seven days, while there were statistically significant differences in mild stage of disease. There were statistically significant differences between two positions as regards arterial blood gases in the three stages of disease after seven days of prone position. There were a positive percentage change between two positions as regards patient's complaints in mild and moderate stages of disease except for sever stage. Patient's assessment by results indicated that there was a percentages change as regards their patient condition between two positions at the end of seventh day of prone position. Conclusion and recommendations: The result of the present study answered the researcher's hypotheses since the nursing intervention had statistically significant improvement in nurses' knowledge and performance and the prone position had statistically significant improvement in patient's breathing than baseline position. Patient's respiratory complaints were decreased percentage change in prone position versus in baseline patient's position. Continuous nursing instruction for the purpose of updating the knowledge and performance of nurses will help them in working with COPD.

[Hanan Sobeih Sobeih, Neamatallah Goma Ahmad, Soheir Tawfek Ahmad and Gehan Mohamed El-Asaal. **Effect of Nursing Intervention on Patient's Breathing with Chronic Obstructive Pulmonary Disease by Using Prone Position versus Semi Recumbent Position.** *J Am Sci* 2012;8(8):837-847]. (ISSN: 1545-1003). <http://www.jofamericanscience.org>. 125

Keyword: Breathing with Chronic Obstructive Pulmonary Disease.

1. Introduction

Nurses have a key role in caring for patients suffering from Chronic obstructive pulmonary disease (COPD), which is a progressive disease causing long-term suffering due to blocking or narrowing of the small airways and damage to air sacs in the lung and it is a major disease with significant impact. Several new developments have occurred in this field in the last few years. It is a major burden for societies with mortality rates increasing annually and it is estimated to affect 44 million people worldwide (**Journal of Evaluation in Clinical Practice 2010; and. Judith, 2012**).

In patients with different kinds of respiratory diseases, the effects of postural changes on lung function and gas exchange are of interest and clinical significance, lying positions are those usually assumed during sever disease, thus it is of advantage to know the effect of postural changes capacity, not only in healthy subjects, but especially in a patient with chronic obstructive pulmonary disease such as sitting and prone position. (**Claudio et al.,2009**)

The prone position improves gas exchange in many patients with COPD the beneficial effects of the prone position on lung function were first postulated in 1974 demonstrated in patients with the COPD a few

years later and confirmed more recently in a number of institutions throughout the world. Investigating the mechanism by which this improvement might occur Richard and **Rolf (2012)** found that turning prone had limited effects on the distribution of regional perfusion but markedly improved dorsal lung ventilation.

The physiologic effects of changes in posture and position on normal respiratory function can facilitate their therapeutic application in the clinical setting. The COPD is an ideal condition for non invasive ventilation (non incubated patient), given the rapid reversibility with treatment and added support that can be provided by non invasive ventilation. Several considerations can enhance the likelihood of successful non invasive ventilation. In addition to these factors, the experience and expertise of front – line health care providers especially nursing and respiratory therapy staff, cannot be under estimated (**Fussier & Tiamor, 2010; and Nicola, 2010**).

The role of the nurse in caring for patients with COPD is, to a large extent, dependent on her area of work. Many nurses will have few contacts with these patients, while those in primary care and in respiratory wards will have frequent contacts. Although medical interventions are limited, nurses have a huge role in promoting healthy behavior in patients with COPD (**Judith, 2012**).

Good patient preparation is needed for accurate spirometry and, as it becomes a more routine test in both primary and secondary care, nurses working with COPD patients need to understand why and how it is carried out. Patients tend to dislike spirometry as it is very hard work and often induces coughing. A sympathetic approach is needed while ensuring that the patient blows to his/her maximum ability (**Nursing Diagnosis Nursing Care Plan for COPD, 2012**).

Justification of the Problem:

The first trial to know the effect of positioning for patients with respiratory problems in Egypt was carried out in the Main University Hospital in Alexandria in 2000. The result of this study revealed that the prone position is the best position (**Soliman & Taha, 2000**). As well many recent international studies, reinforced the suggestion of a beneficial effect of early continuous prone positioning on survival patient rate with COPD through improving lung function. The COPD is a seriously disabling disease with the potential for major complications and is often eventually fatal. Inadequate knowledge and poor adherence to practice guidelines negatively impact the care of patient with COPD, so the critical care nurse plays a crucial role to prepare patient in prone position, and assess, and observe COPD patient during pronation (**Ann & Doris, 2010**).

Aim of the Study:

The aim of this study was to evaluate the effect of nursing intervention on patient's breathing with chronic obstructive pulmonary disease by using prone position versus semi recumbent position.

Hypotheses:

- The level of nurses' knowledge and their performance about patient's pronation with COPD will increase significantly after nursing instruction.
- The prone position will have statistically significant change than baseline position (semi recumbent) related to COPD patient's breathing.
- Decrease in patient's respiratory complaints will be significant in prone position versus in baseline position.

2. Subjects and Methods:

Design:

A quasi experimental design was used to conduct this study.

Setting: The study was carried out at Chest Units and Pulmonary Function Research Unit in Ain Shams University Hospital.

Sample:

A purposive sample including:

- 1- All adult patients (45) from both sexes were categorized under the following criteria: Independent patients (fully conscious) and having three level of COPD (mild, moderate or severe) .While the exclusive criteria involved, patient dependent on mechanical ventilation, patient had abdominal surgery and patient with spinal instability.
- 2- All available nurses working with COPD patients (12) in the Chest Unit and Pulmonary Function Research Unit were included in the current study.

Tools of data collection:

I - For studied patients: Two tools were used:

1- Interview questionnaire sheet:

It was designated by the researchers after reviewing of the related literature and consulting experts. It includes:

- a) Patients demographic data as; age, sex, level of education, patient smoker/ nonsmoker, and O₂ therapy.
- b) COPD questionnaire : This sheet adopted from **Van et al. (2009)** and filled in by the researchers it was used to assess patient's level of COPD. This sheet is divided into three parts as follows:

Part 1: Feel of breathing:

- Short of breath at rest, short of breath while doing physical activities, concerned about getting a cold or breathing getting worse and depressed (down) because of breathing problems.

Part 2: Coughing:

- Patient's produce phlegm (sputum).

Scoring system

Each item was scored as follows:

Never=0, Hardly ever = 1, A few time = 2, Several times = 3, Many times=4, Great many times=5, Almost all the times=6.

Part 3: Activities associated with breathing problems it included:

Strenuous physical activities (such as climbing stairs, hurrying, doing sports), moderate physical activities (such as walking, housework carrying things).

Scoring system:

Each item was scored as follows: Not limited at all = 0, Very slightly limited = 1, slightly limited = 2, Moderately limited = 3, Very limited = 4, Extremely limited = 5, Totally limited/or unable to do=6. Determined COPD level were as follows: Mild from 0-2 scores, Moderate from 3-4 scores, and Sever from 5-6 scores.

Patient respiratory complain sheet: It was adopted from **Paul et al.(2011)** and modified by the researchers, to assess patient complaint in prone and semi recumbent position after 3rd, 5th days and 7th days. It included six items, persistent cough, cough/sputum, shallow breathing, wheezing, peripheral cyanosis, (lips, nails, earlobe), and fatigue.

Scoring system:

Each item was scored as follows: No=zero, mild (occasional) =1, moderate (frequent or tolerable) =2, and sever (frequent & intolerable)=3

d- Patient's assessment sheet: It was designed by the researchers after reviewing of related literature and consulting three medical surgical nursing experts and chest consulting. **Guided by Stephen (2009)** it was in filled by the studied nurses according the following questions were answered by their observation towards patients, by using "yes/No" to assess patient's condition of COPD at the end of seventh day, between semi recumbent and prone position as follows: decrease cough at night, decrease sputum amount, quiet breathing, belly breathing, sleep calm, dependence on others and improve general condition.

2- Laboratory value sheet: Adopted from the COPD International (2010), it was used in two stages:

- (a) To assess level of COPD combined with patient assessment by measuring FEV1% (pulmonary function) in baseline position.
- (b) To measure FEV1% and arterial blood gases (pH, PaCO₂, PaO₂, and O₂ saturation) during prone and semi recumbent position (baseline), maneuver was performed 3 times in each position for one week (third, fifth, and seventh day).

II- tools For studied nurses two tools were used:

1- Nurses' questionnaire sheet: It involved:

- (a) Studied nurses' characteristics such as; age, qualification and years of experience.
- (b) Nurses' knowledge: Designed by the researchers after reviewing of related literature and guided by consulting three medical surgical nursing experts, it was used to assess the level of nurses' knowledge. Scoring system: The scoring system was for correct answer=1, while incorrect=zero. The total satisfactory level of their knowledge $\geq 70\%$; while the unsatisfactory level of knowledge was $< 70\%$ about normal laboratory results of lung function, signs and symptoms and level of COBD, types of patient's position and characteristics of each position.

2- : Prone position observation's checklist:

It was used to evaluate the level of nurses' performance it was adopted from **Reignier et al. (2005) and Moon (2012)** as regards patient's procedure (prone position) preparation of patients in both positions (prone & semi recumbent) and prone position technique. The level of nurses performance pre and post nursing instruction was competent $\geq 80\%$ while it was considered incompetent level of performance $< 80\%$ according to done correctly=1 while not done=zero.

Content validity and reliability:

Validity test was done by three experts from Medical Surgical Nursing specialty and others from chest consultants. Reliability test was done on a sample of 10 subjects "test-re-test results" revealed that all items of the prone position observation checklist were significantly correlation coefficient and has above the significant level (R=0.8) and knowledge questionnaire sheet had acceptable reliability (alpha coefficients ranged from 0.70 to 0.76).

Ethical considerations and human rights:

Approval was given by hospital's administrators prior to study commencement. An informed signed consent was obtained from each patient participating in the study. Patients were informed to have the right to withdraw from the study at any time without giving any reason. The researchers explained the objective and aim of the study to subjects who were assured about the confidentiality of papers and records that will be safely treated and that they will only be used for the purpose of the study and their benefit. A written informed consent was also, obtained from nurses who agreed to participate in this study.

Pilot study:

A pilot study was carried out on 10% of the total study sample to test the clarity and practicability of the tools in addition to the subjects and settings. Subjects who shared in the pilot study were later included in the main study sample as no radical modifications were needed on the study tools.

Field work:

- Approval was taken by official letter issued from the Faculty of Nursing Ain Shams University to the Head of Chest Departments before starting application of study plan.
- Tools were reviewed by 3 experts from Faculty of Nursing and 3 specialties of chest diseases.
- Reliability were done before starting of data collection and nursing instruction was designed based on analysis of the actual patients' and nurses' needs.
- The researchers were available 3 days/week at morning and afternoon shifts and the study data were collected during the period from September 2011 to May 2012.

Nursing intervention construction was divided into 3 phases:**1-Preparatory phase (for nurses & patients): (pre-intervention):**

Time meeting for each one with the researcher took from 30 to 45 minutes to explain the purpose of the study and their role in this study, either individually or in groups according to their mitigating circumstances. In this phase, the nurses were trained by the researchers through nurses' instructions for 3 times/week for 3 weeks to help in patient turning. Pre-test was done to assess the nurse's level of knowledge and performance in doing changes from baseline position to prone position. The instructions were about importance of position changes, how to turn the patient in the proper way, how to maintain body alignment of the patient also how to observe and report signs and symptoms of breathing problems. Lectures discussion, demonstration and re-demonstration were used to implement the nursing instructions by the researchers.

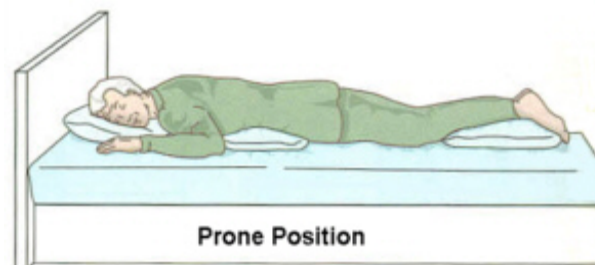
In the preparatory phase was the researchers assessing the studied patients during baseline position (semi recumbent) to determine stage of patient disease according to the following:

A-Patient assessment sheet score as follows: 0-2 mild stage, 3-4 moderate stage and from 5 to 6 score severe stage of disease.

B-Pulmonary function results according to the spirometry measures (FEV1%) were represented. The ratio between forced capacity volume (FCV) and forced expiratory volume in on second (FEV1) was used to determine the level of COPD. According to the results of FEV1% >80% was included in mild stage, 50-79% was included in the moderate, and 30-49% was included in the severe stage of disease these were guided by **Spyros et al. (2010)**, and chest consultants.

2- Intervention phase:

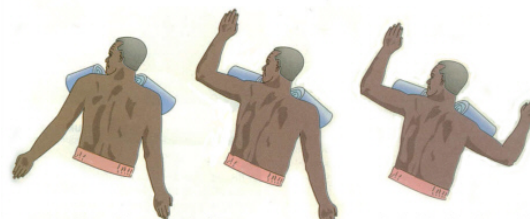
This phase was prepared to compare between patient's two positions (prone & semi recumbent) in the three stages of disease (mild, moderate or severe) and classified into four parts as follows:

Part (1): Preparation of patient in prone position:

(nurse's role of pronation)

-To explain procedure to the patient and aim of this position then start with the bed flat and the patient lying on the abdomen with head turned to either side, spine straight and legs extended.

1. Place a small pillow under the head so that it extends to the patient's shoulders and five to six inches beyond the face.
2. Place a small pillow under the abdomen. This relieves pressure on the back and reduces pressure against a female patient's breasts. An alternate method is to roll a towel and place it under the shoulders.



3. Place a pillow under the arms to reach from the elbow to the wrists. The shoulders and elbows may be flexed or extended, whichever is more comfortable for the patient.
4. Place a pillow under the lower legs to prevent pressure on the toes. The patient may be moved down in the bed before starting the procedure, so that the feet extend over the end of the mattress. This allows the foot to assume a normal standing position guided by **Reignier et al. (2005)** and **Moon (2012)**.

Part (2): Measuring pulmonary function in two positions (Prone & Semi recumbent)

The patient was placed in prone position from 15-20 minutes and measuring FEV1% and ABGs then repositioning of patient to baseline position (semi recumbent) and repeated the previous measuring. Maneuver was performed 3 times in each position for one week by the trained nurse (3rd, 5th & 7th day) as

regards FEV₁% and ABGS involved pH, PaCO₂, PaO₂ & O₂ saturation and laboratory data were recorded to compare results between two positions. The previous procedure was done according to patient attendance and sufficient rest in between the tests.

A-Comparison between two positions as regards patient's respiratory complaints:

According to the physical and readiness of each patient, the researchers collected data about patient's respiratory complaints in prone position for 20-30 minutes and repositioning of patient to baseline position and repeated the same questions. The same data were recorded in the third, fifth, and seventh days to compare patient complaints in the three level of COPD during two positions.

B- Patients assessment at the end of seventh day of prone position:

Patient's assessment were recorded by the studied nurses about their observation with "yes/No" as regards of their patients' condition during baseline position and at the end of seventh day from prone position. Nurses were also informed to be in contact with the researchers through telephone call for any question or needed guidance.

3- Evaluation phase:

In this phase the researchers evaluated studied groups according hypotheses and was divided into 2 parts:

Part (1) For studied patients as follows:

Through nurses assessment by using the same tools as regards patient's condition at the end of seventh day and results of patients' complaints in prone and semi recumbent position pre and post intervention.

Part (2) For studied nurses as follows:

Evaluate the level of nurses knowledge satisfactory or unsatisfactory pre and post nursing intervention also to evaluate level of their performance (competent & incompetent) as regards patient's pronation through observation checklist (prone position) pre and post nursing intervention by using the same tools.

Statistical analysis:

Data were presented using numbers, percentages, means and standard deviations, and t-test. Level of significance was threshold at 0.05.

3. Results

Table (1) shows the demographic characteristics of studied nurses. Results revealed that their mean of age was 29.6 ±6.6 years. Three quarters of them (75%) have diploma level. Years of experience for two thirds of them was 10 and more years (66.7%).

Table (2) displays the level of studied nurses' knowledge. There was statistically significant difference between the level of studied nurses pre and post nursing intervention as regards normal laboratory

results of lung function, signs and symptoms, level of COBD, types of patient's position and characteristics of each position (t-test=9.04 at $p<0.01$).

Table (3) displays the level of studied nurses' performance. There was statistically significant difference between the level of studied nurses pre and post nursing intervention as regards their performance about, explain procedure for patient, patient preparation and prone position technique (t-test=10.67 at $p<0.01$).

Table (4) presents the bio- socio demographic characteristics of the studied patients. Results revealed that the mean age of patients was 47.2±7.0 years, 68.9% were male gender and 60% have low of educational level. As well, 84.4% were smokers and treated with O₂ therapy were 77.8%.

Table (5) displays the level of COPD patient's stages according to level of COPD questionnaire and pulmonary function results. Fifty five point six percent (55.6%) were included in mild stage of disease, while an equal percentage 22.2% represented the moderate and sever stages of disease.

Table (6): shows comparison between baseline position (semi recumbent) and prone position for seven days (3rd day, 5th day & 7th day) in the three stages of disease (mild, moderate, sever), as regards pulmonary function (FEV₁%). There was no statistically significant differences between baseline position and prone position a long the seven days as regards FEV₁% in moderate stage of disease, (t₁=1.8, t₂=1.5 & t₃=1.9 at $p>0.05$). As well in sever stage of disease (t₁=1.0, t₂=0.9 & t₃=0.3 at $p>0.05$). However in mild stage of disease, there was a statistically significant difference between baseline position and prone position at the end of seventh day ($p<0.05$). There were statistically significant differences among three stages of disease, as regards O₂ saturation, paO₂, paCO₂ and HCO₃. In addition, were statistically significant differences in the three stages of disease as regards pH, but in sever stage of disease a significant difference was noticed in the seven the day, (t₁=0.1, t₂=1.1, t₃=2.1 at $p<0.05$).

Table (7) shows the results of percentage change between baseline (semi recumbent) position and prone position for seven days (3rd, 5th & 7th) in the three stages of disease as regards patient respiratory complaints. There was a statistically significant difference between the two positions as regards decreased complaint of persistent cough in moderate from 90% at baseline to 30% after 7 days and sever stages from 100% to 70%; decrease complaint of cough/sputum from 100% to 40% and 50% respectively after 7 days in mild and moderate stages, as well, a decrease complaint of shallow breathing from 100% at baseline to 40% and 40%, in mild and moderate stages but the same complaint was present in sever stage (100%). As regards peripheral cyanosis complaint it decreased

from 50% at baseline to 30% in moderate stage after 7 days, but there was no change in severe stage (80%). As well there was a statistically significant difference as regards fatigue in the three levels of disease from 100% in baseline to 48%, 50% and 80% respectively after 7days

Table (8): displays patient's assessment by nurses' observation as regards patient's condition between two positions at the end of seventh day of prone position. Decreased percentages were detected as regards cough at night and belly breathing from 100% and 82.2% respectively at baseline to 33.3%, after 7 days, decreased amount of sputum and dependence on others from 100%and 88.9% respectively at baseline to 55.6 % after 7 days, while increased percentages were noticed as regards quiet breathing and sleep calm from 0.00% at baseline to 37.8% after 7 days and improving general condition from 0% at baseline to 31.1% after 7 days.

Table (1): Demographic characteristics of the studied nurses (n=12)

Variables	No	%
Age:		41.7
20-	5	
25-	4	33.3
30+	3	25.0
Mean \pm SD	29.6 \pm 6.6	
Qualification:		
Diploma	9	75
Diploma with specialty	3	25
Years of experience:		
5-<10	4	33.3
10 +	8	66.7

Table (2): Level of nurses' knowledge pre and post nursing intervention (n=12)

Variables	Satisfactory level of knowledge		t-test
	pre-intervention	Post-intervention	
	Mean \pm SD	Mean \pm SD	
-Laboratory results -Signs &symptoms of COPD - Level of COPD -Types of patient position -Characteristics of patient position	27.2 \pm 18.0	39.2 \pm 17.5	9.04

Significant at $P<0.01$

Table (3) : Level of nurses' performance pre and post nursing intervention (n=12)

Variables	Competent level of performance		t-test
	Pre- intervention	Post-intervention	
	X \pm SD	X \pm SD	
-Explain procedure -Patient preparation -Prone position technique	42.1 \pm 16.0	29.4 \pm 14.9	10.67

Significant at $P<0.01$

Table (4): Bio- Socio demographic characteristics of the studied patients. (n=45).

Items	No	%
Age:		
<40	7	15.6
40-	21	46.7
50-<60	17	37.7
Mean \pm SD	47.2 \pm 7.0	
Sex:		
Male	31	68.9
Female	14	31.1
Educational level:		
University level	9	20.0
Secondary level	9	20.0
Read &write	27	60.0
Smoker	38	84.4
Nonsmoker	7	15.6
O ₂ therapy		
Yes	35	77.8
No	10	22.2

Table (5): Level of COPD among studied group according to clinical COPD questionnaire and pulmonary function in baseline position (FEV1%) (n=45)

Parameter	Level of COPD		
	Mild	Moderate	Severe
Questionnaire score	0-2	3-4	5-6
FEV1%	>80%	50-79%	30-49%
Number	25	10	10
Percentage	55.6%	22.2%	22.2%

Table (6): Baseline position (semi recumbent) and prone position for 7days as regards pulmonary function after 25-30minutes (n=45)

Variables	Between baseline &prone position in3rd day	Between baseline &prone position in5th day	Between baseline &prone position in7th day
	T1	T2	T3
FEV1%			
G1(mild)	1.9*	1.9*	2.2
G2(moderate.)	1.8*	1.5*	1.9*
G3(sever)	1.0*	0.9*	0.3*
O ₂ saturation			
G1(mild)	11.3	40.9	56.0
G2(moderate.)	15.7	33.6	47.4
G3(sever)	3.8	15.5	26.7
PaO ₂			
G1(mild)	78.0	84.0	134
G2(moderate.)	19.3	34.5	90.0
G3(sever)	20.5	30.0	40.5
PaCO ₂			
G1(mild)	19.2	21.5	28.3
G2(moderate.)	7.5	11.0	13.3
G3(sever)	18.7	22.2	19.6

*Insignificant at $P>0.05$ Significant at $p<0.05$

Table (6) Cont. Baseline position (semi recumbent) and prone position for 7 days as regards pulmonary function after 15-20 minutes.(n=45)

Variables	T1	T2	T3
HCO ₃			
G1(mild)	3.7	16.2	30.0
G2(moderate.)	3.3	3.7	30.0
G3(sever)	4.2	10.0	27.0
pH			
G1(mild)	2.6	2.9	3.8
G2(moderate.)	1.3*	2.5	3.2
G3(sever)	0.1*	1.1*	2.1

*Insignificant at $P>0.05$ Significant at $p<0.05$ T1=between baseline &prone position in 3rd day

T2=between baseline &prone position in 5thday

T3=between baseline& prone position int7th day

Table (7): Patient's respiratory complaints in baseline (semi recumbent)and prone position at the end of seventh day (n=45)

Variables	Baseline After 30 minutes			Prone position After 30minutes			For seven days								
	M	Mod	S	M	Mod	S	3 rd day			5thday			after7 day		
							M	Mod	S	M	Mod	S	M	Mod	S
	%			%			%			%			%		
Persistent cough	0	90	100	0	70	90	0	70	70	0	50	60	0	30	70
Cough/phlegm	100	100	100	84	90	100	64	90	100	52	80	100	40	50	100
Shallow breathing	100	100	100	76	90	100	64	70	100	52	50	90	40	40	100
Peripheral cyanosis	0	50	80	0	50	100	0	50	80	0	30	80	0	30	80
Wheezing	68	90	100	60	70	100	52	50	100	52	50	90	40	40	90
Fatigue	100	100	100	80	80	100	64	70	90	48	50	80	48	50	80

G1: Mild stage of disease (n=25)

Mild =1 score Moderate =2 score Sever =3 score

G2: Moderate stage of disease (n=10)

G3 : Sever stage of disease(n=10)

Table (8): Patient's' assessment by nurses' observation as regards their conditions at the end seventh day in baseline and prone position (n=45)

Variables	Baseline				At the end of seventh day of prone position			
	yes		No		yes		No	
	no	%	no	%	no	%	no	%
Decrease cough at night	0	0.0	45	100	30	66.7	15	33.3
Decrease sputum amount	0	0.0	45	100	20	44.4	25	55.6
Quiet breathing	0	0.0	45	100	17	37.8	28	62.2
Belly breathing	37	82.2	8	17.8	30	66.7	15	33.3
Sleep calm	0	0.0	45	100	17	37.8	28	62.2
Dependence on others	40	88.9	5	11.1	20	44.4	25	55.6
Improving general condition	0	0.0	45	100	14	31.1	31	68.9

4. Discussion:

The goal of chronic obstructive pulmonary disease treatment is to control symptoms to a degree that allows people with the disease to breath easier and live as normally and actively as possible for as long as possible. Some nurses will be actively involved in helping diagnose COPD by carrying out spirometry and reversibility testing, while others, particularly in secondary care, will be less involved in this diagnostic process (Reignier 2005;and Nicola, 2010). The current study aimed to evaluate the effect of nursing intervention on patient's breathing with chronic obstructive pulmonary disease by using prone position versus semi recumbent position.

In the present study, finding related to demographic characteristics of studied nurses revealed that, three quarters of them have diploma level and years of experience for two thirds of them were between 10 years and more. In their very recent study, Blegen et al. (2012) reported that it is generally believed that more experienced nurses provide higher-quality of patient's care. The current study results indicated that years of experience only were not enough to provide quality of patient care but nurses may be in need for support by nursing instructions.

As regards the level of knowledge and performance of the studied nurses pre-nursing intervention they couldn't gain a passing level, while post instruction, all of them were having a satisfactory level of knowledge and competent level of performance. In the similar studies Amir et al. (2011) emphasized that the practice guideline on diagnosis and management of stable chronic obstructive pulmonary disease is intended for nurses who working with COPD patients.

The current results may indicated that the first hypothesis of this study was achieved. The studied nurses also became ready to share in the intervention phase.

In the same issue, the studied nurses were having the competent level about their role of pronation technique according prone position checklist evaluation sheet and after nursing instruction. This result was congruent with Soliman and Taha (2000), who reported that in their study the trained nurses

were made available to help patient with respiratory problems in turning during different positions which included left, right and prone positions. The current result reflects the importance of nurses' training during preparatory phase.

In the present study, findings related to patients demographic data revealed that, their mean age were 47.2 ± 7.0 years. More than two thirds of the study sample was males and the majority was smokers. This finding was incongruent with Juan et al. (2007) and Faustino et al. (2008), who emphasized that women are more susceptible to develop airway obstructive pulmonary disease compared to men for the same number cigarettes smoked. The COPD is usually diagnosed in middle age and it can happen younger in life. Three fifths of this studied sample has low level of education. In this respect, Fussier and Tiamor (2010), reported that low level of education can negatively affect lung function, independently of smoking, underlying reasons include poor housing condition. Following demographic data recording, more than three quarters of the study sample were treated by O₂ therapy. This result indicated that the prone position technique may decrease the patient's needs for O₂ therapy.

In the same line, this study findings revealed different levels of COPD among the studied group; mild, moderate and sever were present according to the "clinical COPD questionnaire" and the pulmonary function test result of FEV₁%. Stephen (2009), and the COPD International (2010), were in agreement with these study findings and stated that COPD patients can range from mild to sever according to severity of illness associated with spirometry measures, FEV₁ mild >80%, moderate 50-79% and sever 30-49 %. On the other hand, oxygenation, the basic standards for evaluating the severity of COPD has primarily been by spirometry, also known as the pulmonary function test. Pulmonary function test with an FEV₁ results of >80% of predicted stage 1 mild, 50-80% of predicted stage 2 moderate, and 30-50% of predicted stage 3 sever.

The current results showed insignificant differences between the two positions after one week from prone position for measurement of spirometric

value (FEV1%) in moderate and severe stages of disease, while there was a statistically significant difference between the two positions as regards FEV1% in mild stage of disease, also there were statistically significant differences between the two positions in the three levels of disease as regards PaCO₂, PaO₂, HCO₃ and pH. In another study conducted by *Reignier (2005) and Paolo et al. (2010)* they stated that pulmonary function testing is affected by patient positioning and disease severity, also they added that, changing from the sitting to supine or prone position result in statistically significant change in respiratory pattern. These findings may reflect the positive effect of pronation on COPD patients breathing in the current study.

On the other hand, *Mentzelopoulos et al. (2005)*, identified that notably, the pronation-induced decrease in additional lung resistance was maximized relatively in their study, which explains the significant PaCO₂ reduction. *Spyros et al. (2010) and Valter et al. (2010)* added that the gas exchange response to a first prone position session can predict outcome in hypoxemic acute respiratory failure. In the same issue, *Kopterides (2009) and Spyros et al. (2010)* reported that, prone positioning has been adopted as a strategy to improve oxygenation in patient with acute respiratory distress syndrome and patient with hypoxemic respiratory failure. Moreover, their studies reinforced the suggestion of a beneficial effect of early continuous prone positioning on survival patient rate.

In the current study all the studied patients were independent of ventilator. In their studies *Claudio et al. (2009) and Valter et al. (2010)* emphasized that the physiological changes associated with prone position in non intubated patient may be even more favorable than in intubated patient, lung volume and gas exchange, and lung elasticity causes the distribution of gas, blood and tissue to be influenced by gravitational forces. The characteristics of the studied patients may help the researchers to evaluate the effect of prone position on COPD patient breathing without interference of other medical support.

Concerning patients respiratory complaints, *Stephen (2009)* reported that COPD usually causes no or mild symptoms at first, as the disease progresses, symptoms usually worsen. The most common symptoms include, coughing and spitting up phlegm, wheezing and shortness of breath with activity or even at rest and fatigue. In this study, the patient's complaints with different signs and symptoms of COPD according stages of disease (mild, moderate & severe), indicated a significant difference noticed between the two positions in mild stage, and slight improvement in moderate stage, but no change were noticed in severe stage of disease, except for decreased cough at night and decreased fatigue. These results reflect the importance of pronation to relieve

patient complaints, however patients in severe stage of disease are in need for other medical support. Previously, *Mentzelopoulos et al. (2005)* concluded that pronation facilitated inspiratory peripheral airway-reopening, but non significant reduction and secretion drainage was improved during the first pronation session. They added that, prone positioning of severely hyper inflated COPD patient reduces lung lower inflection point pressure and increase upper inflection point volume.

As regards patient's assessment by nurses' observation under study, percentages changes were noticed as regards decrease of cough at night, decrease sputum amount, decrease belly breathing and decrease dependence on others. Patient's improvement was also observed in quiet breathing, quiet breathing and improved general condition. From the part of the nurses these results are congruent with that of *Tom (2010)* who emphasized that, nurses play an important role in many of the aspects of care identified in the report, including the importance of ongoing management of COPD patient's breathing, quiet breathing and improved general condition. This result may support the researcher's hypothesis about positive effect of prone position on patient breathing with COPD due to long contact of nurses with their patients.

The COPD International (2010) added that, nurses have to assess patients for hypoxemia/hypoxia and administer appropriate oxygen therapy for individuals for all levels of dyspnea. On the other hand, the *Journal of Evaluation in Clinical Practice (2010)* reported that, the other assessments of COPD patient include; vital signs, chest wall movement, and shape/abnormalities, presence of peripheral edema, presence of cough/ sputum, and level of consciousness. It also mentioned that nurses should also be able to detect stable and unstable dyspnea.

From the researchers, point of view prone position technique is not easy to apply due to that, preparing for the technique requires careful management and needs medical supplies support. Although there was a statistically significant difference as regards ABGs measuring, but no progress was noticed in patient's breathing or in improving their general condition in severe stage of disease.

Conclusion:

According to the findings of the current study and the researchers' hypotheses:

- 1) Nurses' knowledge and performance about patient's pronation with COPD were increasing significantly after nursing instruction more than before it.

- 2) Prone position was have statistically significant change than baseline position related to COPD patient's breathing (lung function & ABG_s).
- 3) Patient's respiratory complaints was decreasing significantly in prone position versus in baseline position.

Recommendations:

A-For nurses:

Continuous nursing instruction for the purpose of updating the knowledge and performance of nurses will help them in working with COPD to promote their professional skills.

- Periodic evaluations of nurse's knowledge and performance as regards different nursing procedures in chest units must be carried out in order to obtain data which determine the level of knowledge and performance in order to exclude low level nurses before giving them direct patient care responsibilities.

For patients:

Further studies are needed to elucidate the effect of different positioning on COPD patient's breathing.

This study should be carried out on larger numbers of subjects and different geographical areas for evidence of results and generalization.

Corresponding author

Soheir Tawfek Ahemad

Medical Surgical Nursing Dept., Faculty of Nursing-
Ain Shams University

Soheir2010@windowslive.com

References

- Amir, Q., Timothy, J., W., Steven, E. W. & Nicola, A. H. (2011): Diagnosis and management of stable chronic obstructive pulmonary disease: A clinical practice guideline. *Ann Intern Med.*; 155(3): 179-191.
- Ann, B.Z., & Doris, H. (2010): The asthma COPD nurses' experience of educating patients with chronic obstructive pulmonary disease in primary health care. *Journal of Caring Sciences*; 24(1):147-155.
- Blegen, M.,A.,Vaughn, T.,E.,& Goode, C.J.(2012): Nurse experience and education: effect on quality of care, School of Nursing, University of Colorado Health Science Center, Denver, Colorado, USA. *J Nurs Adm.*;31(1):33-9.
- Claudio, T., Vitoria, C., Angelo, P. & Paolo, V. (2009): Effect of postural variations on carbon monoxide diffusing capacity in healthy subjects and patients with chronic obstructive pulmonary disease, Rome, Italy, *Respire* ; 77:51-57.
- COPD International (2010): Available at: <http://international.com/library/stages.htm>
- Faustino, A., & Marino, C., & Perucci, C.A. (2008): The impact on risk-factor analysis of different

mortality outcomes in COPD patients. *Eur. Respir J*; 32:629-636.

Fussier, H.E., & Tiamor, D.S. (2010): Should prone positioning routinely used for lung protection during mechanical ventilation? *Respir Care*; 55(1):88-9.

Journal of Evaluation in Clinical Practice (2010): In hospital management of COPD exacerbations: A systemic review of the literature with regard to adherence to international guidelines, 15 (6):1101-1110.

Juan, P.T., Arantza, C., Ciro, C., & Javier, Z. (2007): Gender and chronic obstructive pulmonary disease in high –risk smokers.*Respiratory*;73:306-310.

Judith ,M.A. (2012): Nursing care and implications for nursing, North Peterborough Respiratory National Respiratory Training Centre, Warwick,89(37): p43.

Kopterides, P.S. (2009): Prone positioning in hypoxemic respiratory failure :Meta-analysis of randomized controlled trials. Athens, Greece, *J Crit Care*; 24(1):89-100.

Mentzelopoulos, S.D., Roussos, H., & Zakynthinos, S.G. (2005): Prone position improve expiratory airway mechanics in sever chronic bronchitis. *Eur Respire J*; 25(2):25-68.

Moon, D.A.(2012) :Health and wellness positioning the patient care giver information. Available at :<http://www.moondragon.org/health/disorders/patientpositions.html>.Retrived on 18-7-2012.

Nicola, A.H. (2010): COPD, sponsored by the American College of Chest Physicians. Boehringer: Ingelheim.

Nursing Diagnosis(2012): Nursing care plan for chronic obstructive pulmonary disease(COPD). Available at: <http://cncplan.blogspot.com/2012/01/nursing-diagnosis-nursing-care-plan-for.html>. Retrived on 12-5-2012.

Paolo, T., Federico, P., & Luciana, G. (2010): Prone positioning in patients with acute respiratory distress syndrome-Reply. *JAMA*; 9:832-833.

Paul, W., David, P., & Thys, M.(2011):Role of clinical questionnaires in optimizing everyday care of chronic obstructive pulmonary disease. *Int J Chron Obstruct Pulmon Dis.*; 6; 289–296. Available at: Com-AstraZeneca.

Richard, K. A., & Rolf, H. D. (2012): The prone position eliminates compression of the lungs by the heart. *Am. J. Respir. Crit. Care Med*; 161(5): 1660-1665

Reignier, J. (2005): Prone position: Can we move from better oxygenation to better survival. *Crit Car Med.*, 33(2):361-367.

Reignier, J., Lejeune, O., Renard, B., & Lebert,S.A. (2005): Short-term effects of prone position in

- chronic obstructive pulmonary disease patients with severe acute and acute hypoxemic and hyperbaric respiratory failure. *Intensive Care Med*; 31(8):1012-1013.
- Soliman, S., & Taha, N.(2000): Effect of position changes on oxygenation and respiratory mechanics in mechanically ventilation patient's with respiratory problems. Master Degree of Critical Care Nursing, Faculty of Nursing, University of Alexandria, pp. 38-41.
- Spyros, D.M., Spyros, G.Z., Charris, R., Maria, J.T. & Argyris, S.M. (2010): Prone position improves lung mechanical behavior and enhances gas exchange efficiency in mechanically ventilated chronic obstructive pulmonary disease patients. Athens, Greece: pp. 15-18.
- Stephen, R. (2009): Patient information: Chronic obstructive pulmonary disease .Available at <http://COPD.about.com?forum>.
- Tom, M. (2010): Nurses role key in identifying undiagnosed COPD. Available at carerepublic.Com
- Valter, C., Christensen, A.M., & Tollund, C. (2010): Response to the prone position in spontaneously breathing patients with hypoxemic respiratory failure. *Journal Compilation Scandinavia. Foundation*; 47(4):416-418.
- Van, D.M., et al. (2009): Clinical COPD Questionnaire Now, COPD. Available at [Com-AstraZeneca web](http://Com-AstraZeneca.com)

7/25/2012