Comparative Study Of Critical Nurses' Knowledge And Practice Before And After Education Program About Acute Exacerbation Of Chronic Obstructive Pulmonary Disease

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Abstract: *Back ground: AECOPD is complication of COPD presented by worsening of symptoms which needs planned protocol of care and practice achieved early from the time of ICU admission till discharge. Many CCNs have not enough knowledge and practice about management liens of AECOPD patients; especially newly graduate nurses and those under training in ICU as internship nurses. Aim of study: To Evaluate nurses' knowledge and practice before and after education program about AECOPD. Design: A quasi-experimental. Setting: chest ICU at Cardiothoracic Hospital, Minia City and chest ICU at University Hospital, Assiut City, Egypt. Subject: Convenient sample of 60 nurses divided in two groups (30 registered nurses & 30 internship nurses). Results: before the education program both groups had lower knowledge about AECOPD as clinical manifestations, diagnosis, nursing management and rehabilitation. But after the education program, internship nurses had higher knowledge about previous mentioned items (83.33%), (93.33%) & (80%) than registered nurses (26.66%),(66.66%) & (66.66%). Also patients assigned to the internship nurses group after the education program had lower dyspnea level (0.87 + 0.97) than those assigned to nurses' group (1.67 + 1.24) which means higher performance of internship nurses than ICU registered nurses. Conclusion: CCNs and internship needs continuing education and training about the various critical cases as AECOP to strengthen their role to plan and deliver more strategies to improve the quality of life of AECOPD patients.*
Key words: Critical nurses, Knowledge, education program, Exacerbation, and COPD

I.   Introduction

Chronic obstructive pulmonary disease (COPD) is inflammatory lung disease characterized by airflow limitation which is not fully reversible. COPD is the fourth leading cause of death in the world but projected to be the 3rd leading cause of death by 2020 (1). About 3.17 million people died of COPD by the year of 2015 accounting for 6% of all deaths globally(2). COPD burden is projected to increase because of continued exposure to risk factors and aging population (3).

Acute exacerbation of COPD (AECOPD) is complication of COPD presented with worsening of dyspnea, cough, fatigue, chest congestion, sputum production and/or sleep disturbance (4). Exacerbation diagnosed by declining lung function as measured by peak expiratory flow (PEF), forced Expiratory volume (FEV1), decreased quality of life, and increased mortality (5).

AECOPD requires extensive nursing management involves immediate care for noninvasive mechanical ventilation (MV) support, oxygen administrations till improvement of hypoxemia and pulmonary rehabilitation program (PR). The PR program has been shown to provide significant clinical benefits during and immediately after an acute exacerbation(6). PR involves chest physiotherapy, use of incentive spirometry, nutrition counseling, strategies for conserving energy, physical exercise training. PR programs aims to slowing breathing rate, reducing patient's effort, improving physical functions which in turn affect patients activity of daily living and leads to decrease ICU readmission rates (7).

Critical care nursing (CCN) is a profession that requires specified knowledge and skills that will be applied in a variety of critical units. Ensuring adequate preparation for the newly graduated CCNs needs a particular frame of theoretical knowledge and understanding of how this knowledge is applied in practice while caring for critical ill patients (8). CCNs role in intensive care units (ICU) includes not only patient management but also, rehabilitation, education and complications reduction (9).

Many newly graduated CCN have not enough knowledge about critical condition as AECOPD its clinical manifestations, diagnostic measures, emergency management and PR (10). The critical care nursing role in AECOPD is becoming increasingly important and is characterized by assuming a leading role in the

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management and rehabilitation of them and continuity of care. Nurses should be involved in the care of AECOPD at all stages, from the time if ICU admission to provision of end-of-life care. Although an increasing number of studies have suggested that nurse-led consultations and interventions for the management of AECOPD have the potential to impact positively on the health and quality of life of critical ill patients(11).

Aim of the study

To evaluate critical care nurses' knowledge and practice before and after education program about acute exacerbation of chronic obstructive pulmonary disease (AECOPD)

Significant of the study

AECOPD is the critical complications of people with COPD, they experience between one and four exacerbations per year. Acute exacerbation usually occurs as a result of viral infection, most often rhinovirus. Bacterial infection is less common cause of exacerbation. Air pollution also one of its causes (12). AECOPD associated with worsening of the signs and symptoms leading to poor outcome. Mortality rates following repeated exacerbations tend to be higher especially in ICU (13).

Nursing role in management of AECOPD patients around the world has been characterized by a holistic approach towards disease management and concerned not only with medication administration but also recognizing risk factors and providing knowledgeable nursing care especially for those under mechanical ventilator support(14). The nursing care protocol should include PR program as performance of breathing exercise, gradual increasing in the physical activity and using incentive spirometry which were neglected in many ICU (15).

The AECOPD is increased in the developing countries as Egypt because of increased environmental pollution and smoking (16). It was observed that CCNs in our ICU had low level of knowledge and practice about clinical manifestation and emergency management of AECOPD patients which reflected on internship nurses performance. The application of PR as chest physiotherapy and use of spirometry, were neglected at all by nurses and the internship, which cause poor patient outcomes and increasing mortality rates (17).

II. Research hypothesis

The current study hypothesized that: 1. Implementing education program will improve CCNs' and internship nurses' knowledge and practice about the management of AECOPD patients. 2. Improving both CCNs' and the internship nurses' knowledge and practice will reduce dyspnea level in AECOPD patients.

III. Methods

3.1 Design
A quasi-experimental design used to fulfill the study (pre/ post-test design).
3.2 Setting
The study was conducted at both chest ICUs of Cardiothoracic Hospitals in Minia City and chest ICUs of Assiut University Hospital in Assiut City, Egypt.

3.3 Subject
- Convenient sample of 60 nurses were divided randomly into two groups (30 newly graduated registered nurse and 30 internship nursing students while their ICU training at the previously mentioned setting). The included internship nurses were involved after spending at least one month at the ICU. The nursing groups agreed to participate in the study didn't receive any education programs about management of AECOPD patients.
-A purposive sample of 60 patients with AECOPD were selected randomly to receive care from the two groups of the nurses according to certain inclusion criteria as follow: Adult patients, from both genders with different education levels, free from other chronic diseases.

3.4 Tools of study: Three tools were used for data collection.
Tool one: Nurses knowledge assessment questionnaire
Structured multiple choice questionnaire (pre/posttest) was developed by the researcher after reviewing the related literatures (17), (18) to evaluate knowledge level of CCNs and the internship nurses about AECOPD. This tool included two parts: **Part I:** Participants' socio-demographic information as name, age , sex and education level, working years at ICUs
Part II: Structured multiple choice questionnaire about AECOPD, the questions were developed to test the following items: 1.Definition, risk factors & causes of AECOPD (5 questions). 2. Clinical manifestations (2

questions). 3. Classification and diagnoses (3 questions) 4. Management and réhabilitation program (10 questions).

- **The questionnaire scorings system:** each correct answer scored of 1 and the wrong one scored zero.
- **Tool two: Nursing performance check list adopted from (19)**
- This tool consisted of implementing chest physiotherapeutic exercises for AECOPD patients: 1. Breathing and coughing exercise (total score 10), Chest percussion (total score 10), chest vibration (total score 10) and Use of incentive spiromerty (total score 20).
- **Scoring system of the nursing performance check list was:** correctly done was scored (1), in-correctly done was scored (0)

Tool three: patient assessment sheet
This tool was developed by the researcher. It includes the following two parts:
Part one: patient's demographic data as (age, sex, residence, level of education , occupation, etc).
Part two: patients' clinical data including AECOPD classification according to GOLD 2017adopted from (20).
Part three: The Modified Medical Research Council Dyspnea Scale (MMRC) adopted from (21). Dyspnea Scale uses a simple grading system to assess a patient's dyspnea level and shortness of breath. The MMRC dyspnea scale, scoring ranges from (0 =patient has breathless with strenuous exercise to, 4= patient has breathless to leave the house or breathless when dressing.
The study tools was tested by a jury of five specialist in the critical care nursing and adult nursing in Assiut University (No 2) and Minia university (No 2) and head nurse in Assiut university hospital (No 1)

3.5 Pilot study
A pilot study was carried out on 10% of nurses whom did not included in the study to test the applicability of the study and to test clarity of the designed questionnaire. As well as to estimate the time needed for each question. The internal consistency of AECOPD questionnaire achieved significance (P < .001) and Cronbach's alpha coefficient of 0.86.

3.6 Ethical considerations
- The research approval was obtained from the faculty of nursing research ethics committee before initiating the study. The researcher clarified the purpose and aim of the study to both nurses groups and critical ill patients included in the study. Oral consent was obtained from nurses and patients to ensure willingness to engage in the study. The researcher maintained anonymity and confidentiality of subjects' data. Nurses and patients were informed that they are allowed to withdraw from the study at any time without penalty.

- **Construction of the education program:**
    The researcher developed education program based on the previous assessment of CCNs and internship nurses knowledge and skills, available resources and review of relevant literature related to COPD and its exacerbation.

3.7 Procedures:
The study was conducted from July 2017 to January 2018 on three phases:
3.7.1 Preparatory phase
- Permission from the hospital responsible authorities to conduct the study was obtained after explanation of the aim of the study.
- Permission was obtained from nurses for voluntary participation.
- The local ethical committee approved the study.

Learning environment:
The education program was conducted in the selected ICUs at their hospitals.
 Education methods:
- PowerPoint presentation and booklet which developed in English by the researcher based on reviewing the related literature**.**
- Videos about steps of breathing and coughing exercise (diaphragmatic breathing, pursed lip breathing and coughing exercise) chest percussion and vibration and the use of incentive spirometric device.

3.7.2 Implementation phase:
Before the education program
1) Arranging the subgroup: For better understanding and performance, the total sample was divided into 6 subgroups included 10 nurses from both groups (CCN and internship nurses) each session.

2) A pre-test questionnaire was used at beginning of study to assess their knowledge level before beginning the education program and to be used as base line data with the post-test.

3) Assessment of the nursing performance from both groups were observed by the researcher once before implementation of education program. This was done for the following procedures (breathing and coughing exercise, chest percussion, chest vibration and patient education to use incentive spirometric) to be used as base line data for latter comparison with future posttest. Each procedure was taken 10 minutes of implementation for every patient.

4) Divide the education program into different sections

During the education program

- The researcher developed a booklet in English language including the following contents: anatomical function of respiratory system, AECOPD definition, causes, clinical manifestations, complications, diagnostic procedures, and the nursing management protocol including oxygenation, nursing management during MV support, chest physiotherapy, breathing exercise, physical exercise, use of spirometry, conserving energy, controlling dyspnea, nutrition, preventing disease exacerbation and managing sleep disturbances problems.

- The booklet was handed for every nurse in both groups and the contents of the booklet were explained over 5 sessions within 2 hours for every session. The first education session included: the nature of the disease. The second one was about nursing management protocol, the third about saving energy and decreasing dyspnea severity. The fourth education sessions regarding preventing disease exacerbation, nutrition exercise and sleep difficulty control. Fifth one about chest physiotherapy technique and the use of incentive spirometry. Nurses were allowed to ask questions in case of misunderstanding while listening and expressing interest for them.

3.7.3 Evaluation phase

- After the education program was delivered, all tools including (part two in tool one, tool two and three) were refilled in again after three months. Evaluation of the effect of education program on critical care nurses and internship nurses knowledge was done by comparing the results of the pre and post questionnaire.
- Evaluation of the effect of education program on CCNs and internship nurses practice was done by using tool two (performance check list).
- Evaluating the effect of applying the education program on reducing patient's dyspnea level was done using tool three.

IV Results

Table (1): Percentage distribution of nurses' knowledge about AECOPD before and after the education program.

Items	Nurses Staff (30)		P. value	Internship Nurses (30)		P. value
	Pre-test correct	**Post test correct**		**Pre-test correct**	**Post test correct**	
The major risk factor for developing AECOPD	28 (93.33%)	28 (93.33%)	1.0	28(93.33%)	28(93.33%)	1.0
the characteristics of Chronic Obstructive Pulmonary Disease (COPD) and the exacerbation	9 (30%)	26(86.66%)	0.001*	10(33.33%)	28(93.33%)	0.001*
Comorbidities that increase exacerbation.	6 (20%)	22(73.33%)	0.001*	8(26.66%)	27(90%)	0.001*
Hereditary risk factor of COPD	15(50%)	22(73.33%)	0.063	15(50)	28(93.33%)	0.001*
Two subgroups of COPD.	19 (63.33%)	25(83.33%)	0.08	13(43.33%)	28(93.33%)	0.001*

Table 1: shows lower knowledge level of both groups (nurses' staff and internship nurses) about characteristics of COPD and the exacerbation (30%), (33.33%) at the pre- test. which increased in both groups after receiving the education program to (86.66%) and (93.33%). It was observed that (50%) of both groups had low knowledge about the hereditary risk factors of COPD at the pre-test but at the post test this percentage increased to (73.33%) in the nurses group and higher in the internship group(93.33%).

Table (2): Percentage distribution of both groups knowledge about clinical manifestation and classification of AECOPD

Item	Nurses Staff		P. value	Internship Nurses		P. value
	Pre-test correct	Post test correct		Pre-test correct	Post test correct	
Periods of abrupt worsening of symptoms during AECOPD	9 (30%)	27(90%)	0.000*	15(50%)	28(93.33%)	0.001**
Clinical manifestation of AECOPD	7(23.33%)	8(26.66%)	0.766	4(13.33%)	25(83.33%)	0.001**
The findings should the nurse expect to observe while assessing AECOPD patients.	1(3.33%)	14(46.66%)	0.000*	6(20%)	27(90%)	0.001**
The FEV_1 in mild COPD	3(10%)	3(10%)	1.0	8(26.66%)	27(90%)	0.001**
The FEV_1 in severe COPD	9(30%)	13(43.33%)	0.284	5(16.66%)	28(93.33%)	0.001**

Table 2 shows that CCNs had low level of knowledge regarding the AECOPD manifestations (23.33%), and classification of sever COPD (30%). It was observed that less than half of them had knowledge improvement about the same items (26.66%), and (43.33%). But the internship nurses group had also low knowledge about the same mentioned items at the pre-test (13.33%), and (16.66%) respectively which was significantly improved after receiving the education program to be (83.33%), and (93.33%).

Table (3): frequency distribution of nurses' and internship knowledge percentage about management of AECOPD before and after education program.

Items	Nurses Staff		P. value	Internship Nurses		P. value
	Pre-test Correct	Post test correct		Pre-test correct	Post test correct	
Spirometry measurements used for diagnosis of AECOPD	4(13.33%)	27(90%)	0.000*	2(6.66%)	27(90%)	0.001**
The abbreviation of FVC	1(3.33%)	2(6.66%)	0.55	3(10%)	27(90%)	0.001**
Emergency interventions of AECOPD.	18(60%)	26(86.66%)	0.02*	15(50%)	26(86.66%)	0.002**
Method of oxygen therapy during acute exacerbation.	4(13.33%)	25(83.33%)	0.000*	13(43.33%)	25(83.33%)	0.001
What causes the manifestations of the disease?	4(13.33%)	20(66.66)	0.000*	5(16.66%)	27(90%)	<0.001**
The nurse's priority intervention of AECOPD.	7(23.33%)	20(66.66)	0.001*	11(36.66%)	28(93.33%)	0.000
The finding that evaluates that nursing interventions to promote airway clearance in a patient admitted with AECOPD.	12(40%)	21(70%)	0.020*	9(30%)	28(93.33%)	0.000
The mechanism that pursed lip breathing will assist respiration in AECOPD.	10(33.33%)	24(80%)	0.001	9(30%)	27(90%)	0.000
Which suitable chest training for AECOPD patients	8(26.66%)	16(53.33%)	0.035	9(30%)	28(93.33%)	0.000
Which statement is the patient most likely to say about activity tolerance?	8(26.66%)	18(60%)	0.009	9(30%)	27(90%)	0.000
Activity levels with a 61-year-old patient with COPD.	5(16.66%)	24(80%)	0.000	8(26.66)	28(93.33%)	0.000
Education regarding the use of an ipratropium inhaler.	10(33.33%)	20(66.66%)	0.010	8(26.66%)	28(93.33%)	0.000
The most appropriate position to assist a patient with AECOPD who is having difficulty breathing.	5(16.66%)	22(73.33%)	0.000	10(33.33%)	27(90%)	0.000
The patient complains of shortness of breath. What is the most appropriate first nursing action?	11(36.66%)	17(56.66%)	0.121	18(60%)	28(93.33%)	0.002
Precaution during applying chest physiotherapy for AECOPD patients at ICU.	11(36.66%)	20(66.66%)	0.020	6(20%)	24(80%)	0.000

Table 3 shows that more than half of CCNs (60%) and half of the internship nurses (50%) had knowledge at the pretest about the emergency interventions of AECOPD. Both group's knowledge increased after the education program to (86.66%). both nurses and internship groups had low knowledge level about mechanism of pursed

lip breathing, (33,3%) and (30%) which was improved to (80%) and (90%) respectively. Both nurses' knowledge level about the suitable chest training for AECOPD before the education program (26.66%) and (30%) respectively which was improved to (53.33%) for the CCNs and (93.33%) for internship nurses. Both groups had low knowledge (36.66%), (20%) respectively before the education program about precaution during applying chest physiotherapy at ICU which increased to about half (66.66%) for the nurses group and more than half (80%) for the internship group.

Table (4): Knowledge comparison between both nursing groups about AECOPD Definition, risk factors & causes.

Items	Pre-test		P. value	Post-test		P. value
	Nurses Staff	**Internship Nurses**		**Nurses Staff**	**Internship Nurses**	
	Correct	**Correct**		**Correct**	**Correct**	
The major risk factor for developing AECOPD	25 (83.33%)	28(93.33%)	0.228	28 (93.33%)	28 (93.33%)	1.0
the characteristics of Chronic Obstructive Pulmonary Disease (COPD)	9 (30%)	10(33.33%)	0.781	26 (86.66%)	28 (93.33%)	0.389
Comorbidities that increase exacerbation.	6 (20%)	8 (26.66%)	0.542	22 (73.33%)	27(90%)	0.095
Hereditary risk factor of COPD	15 (50%)	15 (50%)	1.0	22 (73.33%)	28 (93.33%)	0.038
Two subgroups of COPD.	19 (63.33%)	13 (43.33%)	0.121	25 (83.33%)	28 (93.33%)	0.228

Table 4: shows internship nurses' knowledge level was increased (90%) more than the nurses' staff (73.33%) at the post test about the comorbidities that increase AECOPD. Also the knowledge about the hereditary risk factor of AECOPD was higher (93.33%) the intern ship than in nurses' staff (73.33%) at the post test. There were statistical significant differences between both groups percentage at the post test in the previous mentioned items, presented by P value (0.095) and (0.038) respectively.

Table (5): Analysis of variance nurses' versus internship ' knowledge related to clinical manifestation and classification of AECOPD.

Items	Pre-test		P. value	Post-test		P. value
	Nurses staff	**Internship Nurses**		**Nurses Staff**	**Internship Nurses**	
	correct	**Correct**		**correct**	**correct**	
Periods of abrupt worsening of symptoms during AECOPD	9(30%)	15(50%)	0.114	27(90%)	28(93.33%)	0.64
Clinical manifestation of AECOPD	7(23.33%)	4(13.33%)	0.317	8(26.66%)	25(83.33%)	0.000
The findings should the nurse expect to observe while assessing AECOPD patients.	1(3.33%)	6(20%)	0.044	14(46.66%)	27(90%)	0.000
The FEV$_1$ in mild COPD	3(10%)	8(26.66%)	0.095	3(10%)	27(90%)	0.000
The FEV$_1$ in severe COPD	9(30%)	5(16.66%)	0.222	13(43.33%)	28(93.33%)	0.000

Table 5 shows that both groups (nurses' staff and internship nurses) had lower knowledge (23.33%), (13.33%) about clinical manifestation of AECOPD at the pretest. But after receiving the education program the internship group improved more than the nurses group (83.33%), (26.66%). There was statistical significant difference between both groups at the post test presented by P value (0.000). About the classification of sever COPD, it was observed that nurses staff had lower level of improvement in their knowledge (43.33%) at the post test than the internship nurses (93.33%).

Table (6): Percentage distribution of nurses' versus internship ' knowledge about management of AECOPD.

Items	Pre-test		P. value	Post-test		P. value
	Nurses	**Internship students**		**Nurses**	**Internship students**	
	correct	**Correct**		**correct**	**correct**	
Spirometry measurements used for diagnosis of AECOPD	4(13.33%)	2(6.6%)	0.389	27(90%)	27(90%)	1.0

The abbreviation of FVC	1(3.33%)	3(10%)	0.640	2(6.6%)	27(90%)	0.000
The key interventions of AECOPD.	18(60%)	15(50%)	0.436	26(86.66)	26(86.66%)	1.0
Method of oxygen therapy during acute exacerbation.	4(13.33%)	13(43.33%)	0.010	25(83.33%)	25(83.33%)	1.0
What causes the manifestations of the disease?	4(13.33%)	5(16.66%)	0.718	20(66.66%)	27(90%)	0.028
The nurse's priority intervention of AECOPD.	7(23.33%)	11(36.66%)	0.260	20(66.66%)	28(93.33%)	0.010
The finding that evaluates that nursing interventions to promote airway clearance in a patient admitted with AECOPD.	12(40%)	9(30%)	0.417	21(70%)	28(93.33%)	0.020
The mechanism that pursed lip breathing will assist respiration in AECOPD	10(33.33%)	9(30%)	0.781	24(80%)	27(90%)	0.278
Complication of AECOPD that present with jugular venous distension and pedal oedema.	8(26.66%)	9(30%)	0.774	16(53.33%)	28(93.33%)	0.000
Which statement is the client most likely to say about activity tolerance?	8(26.66%)	9(30%)	0.774	18(60%)	27(90%)	0.007
Activity levels with a 61-year-old patient with AECOPD.	5(16.66%)	8(26.66%)	0.347	24(80%)	28(93.33%)	0.129
Education regarding the use of an ipratropium inhaler.	10(33.33%)	8(26.66%)	0.573	20(66.66%)	28(93.33%)	0.010
The most appropriate position to assist a patient with AECOPD) who is having difficulty breathing.	5(16.66%)	10(33.33%)	0.136	22(73.33%)	27(90%)	0.095
The patient complains of shortness of breath. What is the most appropriate first nursing action?	11(36.66%)	18(60%)	0.071	17(56.66%)	28(93.33%)	0.001
Precaution during administering oxygen to a patient with AECOPD with the potential for carbon dioxide narcosis.	11(36.66%)	6(20%)	0.240	20(66.66%)	24(80%)	0.243

Table 6 shows lower knowledge level at the per test for both groups about the diagnosis and management of AECOPD. It was observed that more than half (66.66%) of the nurses group and a higher percentage of the internship group (93.33%) had correct knowledge about priority nursing intervention AECOPD at the pretest. Also about half of the nurses staff group (53.33%) and (93.33%) of the internship group had correct answer about complication of AECOPD. At the post test about half of the nurses staff group (56.66%) had correct answer about the first nursing action that will relieve shortness of breath in AECOPD but a higher percentage of the intern ship group (93.33%) had correct answer about the same item.

Table (7) Analysis of variance between both groups performance of chest physiotherapy exercise for AECOPD patients (N=30)

Variable	Nurses staff patient group			Internship Nurses patient group		
	Before	After	P	Before	After	P
	Mean$\pm$ SD	Mean$\pm$ SD		Mean$\pm$ SD	Mean$\pm$ SD	
Deep breathing and Coughing exercise	3.03$\pm$ 1.65	8.70$\pm$0.91	0.000**	2.43$\pm$ 1.47	9.73$\pm$**0.63**	0.000**
Chest Percussion	3.03$\pm$ 1.24	8.87$\pm$ 0.97	0.000**	1.97$\pm$ 1.77	9.53$\pm$ **0.77**	0.000**
Chest Vibration	2.37$\pm$ 0.96	8.53$\pm$ 0.68	0.000**	1.60$\pm$1.40	9.27$\pm$ **0.86**	0.000**
Use of incentive Spiro metric device	8.40$\pm$ 2.48	18.10$\pm$1.21	0.000**	4.23$\pm$3.99	19.30$\pm$ **0.70**	0.000**

Table 7: shows that both groups of nurses had lower Mean ± SD of applying chest physiotherapy exercises and education about the use of incentive spirometric before the education program. The performance of both nurses groups was improved after receiving the education program. There were statistical significant difference between both groups presented by (P value 0.000**). Also after receiving the education program it was observed that internship nurses had higher mean ± SD (9.73$\pm$**0.63**, 9.53$\pm$ **0.77**, 9.27$\pm$ **0.86**) of applying chest physiotherapy than nurses staff (8.70$\pm$0.91, 8.87$\pm$ 0.97 and 8.53$\pm$ 0.68).

Table (8) Comparison between nurses and internship performance after the education program related to chest physiotherapy exercise for AECOPD (N=60)

Items	Nurses staff patient group	Internship patient group	P
	Mean+ SD	Mean+ SD	
Deep breathing and coughing exercise	8.70 + 0.91	9.73+0.63	0.000**
Chest percussion	8.87+ 0.97	9.53+ 0.77	0.000**
Chest Vibration	8.53+0.68	9.27+ 0.86	0.000**
Use of incentive Spiro metric device	18.10 +1.21	19.30+ 0.70	0.000**

Table 8: Shows the internship nurses mean score+ SD of performing breathing and coughing exercise, Chest percussion and vibration were higher than the nurses staff performance also there were statistical significant difference between them presented by P value (0.000**) in all the three items. Also patient with internship group had mean+ SD of using the incentive Spiro metric device higher (19.30+ 0.70) than that patients with nurses group (18.10 +1.21) and there were statistical significant difference between them presented by P value (0.000**).

Table (9) Demographic characteristics of ECOPD patient's groups whom cared with the nurses and internship participant

Item		Patient with Nurses group		Patient with Internship group	
		No.	%	No.	%
Gender	Male	17	56.7	16	53.3
	Female	13	43.3	14	46.7
Age	30-40 years	10	33.3	10	33.3
	41-51 years	16	53.3	17	56
	< 52 years	4	13.3	3	10
education level	Illiterate	10	33.3	10	33.3
	Read and write	10	33.3	9	30
	Secondary school	8	26.7	7	23.3
	University	2	6.7	4	13.3
Marital status	Single	8	26.7	9	30
	Married	9	30	7	23.3
	Divorced	8	26.7	7	23.3
	Widow	5	16.7	7	23.3
Type of job	Unemployed	6	20	9	30
	employ	7	23.3	6	20
	farmer	8	26.7	8	26.7
	Others	9	30	7	23.3
Residence	Urban	18	60	17	56.7
	rural	12	40	13	43.3
AECOPD classification according to GOLD 2017.	Gold 3	16	53.3	15	50
	Gold 4	14	46.7	15	50

Table 9: This table shows that more than half of both groups were male (56.7, 53.3). About half of both groups were in their middle age between (41-51years). More than half of both groups were from the urban area. About half of both patients groups were diagnosed as AECOPD baised on GOLD 2017 classification, which found (53.3%) & (50%) were in Gold 3 and the rest of both groups (46.7%) and (50%) were Gold 4.

Table (10): Frequency distribution of MMRC among AECOPD patients cared with both study groups after the education program (N=60)

MMRC	Nurses Staff		Internship Nurses		T	P
	(N=30)		(N=30)			
	N	%	N	%	2.77	0.007**
Dyspnea only with strenuous exercise (0)	6	20	12	40		
Dyspnea when hurrying or walking (1)	9	30	13	43.3		
Walks slower than people of the same age(2)	6	20	3	10		
Stops for breath after walking 100 yards (3)	7	23.3	1	3.3		
Too dyspnea to leave house (4)	2	6.7	1	3.3		
Mean + SD	1.67 + 1.24		0.87 + 0.97			

Table 10: shows the effect of the education program on reducing dyspnea level during patients care. It was observed significant reduction in the dyspnea level among those whom received chest physiotherapy and

spirometric device training after the education program from both groups of nurses. But patients signed to the internship group of nurses had a higher percentage (40%) of "only dyspnea with strenuous exercise" and " Dyspnea when hurrying or walking" (43.3%) than group of patients assigned to CCNs group (20%) and (30%). Also there was statistical significant difference between both groups presented by (P value 0.007).

V Discussion

AECOPD is a common problem in CCUs, presented with sever dyspnea, fatigue and exercise intolerance. AECOPD considered a serious event due to the risk of chronic respiratory failure and extra respiratory systemic organ disorder. AECOPD negatively impact health status, and negatively affect disease progression (22). CCNs play an essential role in the achievement of positive health care outcomes especially for AECOPD. AECOPD patients' needs comprehensive planned protocol of care and practice to be provided and followed up at ICU till discharge in order to minimize the negative impact of current exacerbation symptoms on subsequent patient's complication and improving patient's quality of life(23).

A growing body of evidence suggests that lowering knowledge and training of CCNs negatively affect critical ill patients' outcomes, and potentially compromises the safety of them (24). Challenges facing the newly graduate nurses (NGNs) whom assigned to CCUs and those under training (internship) in the same units are comparable internationally **(Birks, et a., 2017)** stated that many graduated nurses had not enough competence in applying their knowledge or bioscience related to patient's care, and had difficulties in assessing the patient's physiological changes and potential outcomes (8).

In ICU there are many categories providing patient care, as doctors, nurses, chest physiotherapists and internship students whom receive their training in ICU. CCNs should be will knowledgeable and clinically competent to transfer their knowledge and practice safely to patients, and all other ICU categories especially internship students and newly graduated nurses(24). But if CCN have not enough knowledge nor skills the results will be zero knowledge and practice and low level of patient outcomes and sometimes increase patient harm (25).

The present study showed a comparison between knowledge and practice of CCNs' and internship students *(before the end of their training rotation in the chest ICU)* before and after an education program about the management of AECOPD. The present study showed that both groups whom assigned to patient care in our ICU had low level of knowledge and practice about AECOPD as (definition, causes and risk factors, characteristics and Comorbidities). The present study was in line with **(Nienke, N., et al 2017)** whom mentioned that COPD patient care providers as well as patients themselves answer about two third of 34 knowledge statements about COPD correct. So, both patients and their nurses seem to have an incomplete knowledge about COPD and general health status. Therefore, education about general health and COPD management should be provided for all nurses and their patients(26).

Both groups knowledge level was significantly improved about the definition and causes of COPD exacerbation. The present study was in line with **(Saddon, M., 2017)** who shows that there were highly significant differences in the study group between pre-and posttests in overall main domains related to nurse's knowledge about definition and risk factors of COPD (27). In addition, another study conducted by **(de Castro, et al., 2015)** who reported that most of the respondents had satisfactory knowledge of COPD and mentioned smoking as a risk factor. Both groups had also lower knowledge about clinical manifestation and classification of AECOPD before the education program which statistically improved after it. **(de Castro et al., 2015)** also mentioned that COPD symptom known by the greatest proportion of users (70.6%) was dyspnea, compared with only 2.7% for cough and 2.3% for expectoration(28).

It was also observed that knowledge of both groups was significant improved about diagnosis and management of AECOPD. The improvement of nurse's knowledge was reflected on their performance which was assessed after the education program. It was observed a significant improvement in the performance of internship and CCNs related to patient care, application of chest physiotherapy and providing patient training about the use of incentive spiromerty. The present result was in line with (**Russell, K., et al., 2016)** whom stated that effective supervision can assist nursing staff and also nurses students to determine their learning needs in order to develop their knowledge and performance. Also The research confirmed application of successful program, to provide learning opportunities for all health professionals in Western Australia in order to improve their quality of care (29).

The present study also mentioned that performance of registered nurses before the education program were slightly higher than the performance of internship students but these results were dramatically changed after the education program to a highly improvement of internship nurses performance than registered nurses during applying the chest physiotherapeutic exercise,. These findings could be explained that the registered nurses whom usually in contact with the patients in the ICU had lack of interest that should acquire them to increase their knowledge and performance more than the internship students. These results correlate with **(Mohamed, D. et al., 2017)** who mentioned highly statistically significant differences between mean scores of

the pre and posttests regarding to diaphragmatic breathing, pursed lip breathing, coughing exercise, use of inhaler, and total practice of ICU nurses (30).

After the education program both groups knowledge and performance was significantly improved, this improvement reflected on patients' outcomes. Patients cared by both groups received high quality of nursing care including chest physiotherapy and respiratory muscle training using spirometric device, nutritional and physical care counseling. This program has its effect on reducing patient's dyspnea and fatigue level as measured by the MMRC. This study was in line with **(Theodorakopoulou, et al., 2017)** whom stated that providing COPD patients with at rest education program and rehabilitation leads to significant reduction in dyspnea and fatigue as measured by the MMRC and the 6minute walk test (6MWT) (31).

Another study conducted by (**Ko, F.W.S., et al., 2014**) whom included 185 AECOPD patients were received care protocol included pulmonary rehabilitation program by CCNs. This care program is effective in improving patient's health status, decreasing length of hospital stay and decreasing ICU readmissions rates (32).

Also patients whom cared by internship nurses group showed significant reduction in MMRC score than those assigned to the nursing group. The findings of this trial were in line with **(Mohamed D et al., 2017.)** who stated statistically significant difference between levels of dyspnea for COPD patients' pre and post implementation of COPD care protocol (30). Also (**Abdel Halim, H.A., et al., 2016**) stated in a study included 30 patients in acute exacerbation, There was a significant difference regarding MMRC before and after nursing application of chest physiotherapy and airway clearance technique (33). (**Ana, F., et al., 2017**) stated that therapeutic patient education proposed as a method used for reducing exacerbations, improving health related quality of life (HRQOL) and dyspnea level as measured by MMRC(34).

Regarding to the patients, the current study showed that, more than half of the studied subjects were lived in urban areas. This is in accordance with **(Damaris, et al.,2012)** who reported that near to two thirds (65%) of the study subjects lived in urban areas (35). This result shows that the crowdedness, pollution and poor houses ventilation that those patients lived in are risk factors for developing the disease. But the same finding is contradicted with that of **(Badway et al.,2016)** who stated that one quarter of their study subjects were living in urban and three quarters were living in rural areas(36).

About half of the studied patients samples were categorized in Gold 3 and the rest were in Gold 4 according to the GOLD 2017. This result was in line with (20) which stated that most exacerbation cases that requiring ICU admission and treatment with antibiotics and/or systemic corticosteroids were significantly higher for those between GOLD 3 and GOLD 4. Also the present study was in line with **(Esmaeel,H.M., et al 2017)** whom mentioned that COPD patients on GOLD 2 and 4 were presented with high symptom while Group 3 and 4 were at risk for increased exacerbation rate (37).

Finlay CCNs role in the management of AECOPD patients in ICU needs continuing monitoring and education in order to reach the highest standard of patient care, reducing ICU length of stay and hospital readmission (38). **(Geravandi, S., et al.,2018)** stated that CCNs continuing education can improve CCN's management quality if implemented and designed based on nursing needs in CCUs and proper principles. CCNs due to longtime relationship with patients and nursing staff in 24 hours and the assignment of multiple roles have excellent position in evaluating their patient needs and performing clinical educator roles for those under training in critical units (39).

VI Conclusion

CCNs and internship students in ICU needs continuing education about the different management guidelines for critical cases in order to be up-to-date with the new knowledge and skills that will improve their quality of care in ICU. CCNs and internship education and training will strengthen their role to plan and deliver more strategies to improve the quality of life of critical ill patients as AECOPD.

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