Effect of Clinical Practice Guideline on Therapeutic Outcomes and Treatment Expenditures of COPD Patients

Siriporn Burapadaja[1*], Prapatsorn Konkaew[2], Pariya Tuntipathananandh[1] and Jaratbhan Sanguansermsri[1]

[1] *Department of Pharmaceutical Care, Faculty of Pharmacy, Chiang Mai University, Chiang Mai 50200, Thailand*

[2] *Pharmacy Department, Rongkwang Hospital, Prae 54140, Thailand*

* *Corresponding author. E-mail: siriporn@pharmacy.cmu.ac.th*

ABSTRACT

Chronic obstructive pulmonary disease (COPD), characterized by respiratory limitation and progressive lung failure, is a major cause of morbidity and mortality and a costly disease worldwide including Thailand. Thus it is necessary to properly manage this disease. Intervention of clinical practice guideline (CPG) is a recommendation for COPD patients. This study aimed to determine the effect of CPG, developed by patient care team of a community hospital in Prae province, Thailand, on therapeutic outcomes and treatment expenditures of COPD in-patients. A retrospective study was undertaken on a sample selected from COPD in-patients in pre-CPG and CPG period. Data of patients collected from patient records were their characteristics, therapeutic outcomes and treatment expenditures. Therapeutic outcomes included these occurrences: 1) exacerbation during hospital admission, 2) return to emergency room within 72 hours after discharge and 3) readmission within 28 days after discharge. Treatment expenditures contained the hospital charges for these items: room, medicine and medical supply, medical service and laboratory test. Based on pre-CPG and CPG group of sample, results showed significant decreases in exacerbation, return and readmission from 10.9% to 2.3%, 7.8% to 0% and 27.9% to 10.2% respectively. Treatment expenditures of the two groups were not statistically different. In conclusion, CPG could directly give better therapeutic outcomes and indirectly provide favorable treatment expenditures. Thus, this CPG should be pursued for COPD patients.

Key words: Chronic obstructive pulmonary disease (COPD), Clinical practice guideline (CPG), Therapeutic outcomes, Treatment expenditures

INTRODUCTION

Among the major causes of death, chronic obstructive pulmonary disease (COPD) ranks fourth and its prevalence is expected to increase in the next decades (Rutschmann et al., 2004). It was estimated that around 14 million people in the world had COPD and about 500,000 of them were hospitalized (Dewan et al., 2000). COPD plays the primary role on lung and the secondary one on muscle and circulation, resulting in complicated health problems. Moreover, its tertiary effect associates with the interaction of patients and their

environment (Pauwels et al., 2001). Additionally, expenditure on treatment and maintenance of symptoms is costly (Ward et al., 2000). COPD is thus a burden disease, leading to a low quality of life. Therefore it is necessary to provide careful management to COPD patients.

The characteristics of COPD involve the airflow limitation, respiratory distress and progressive lung failure. COPD severity is classified into four stages according to the degree of airflow obstruction (Pauwels et al., 2001). Acute exacerbation is a dangerous event usually occurring in severe to very severe stages. Though there is no certain definition of exacerbation, this event is often characterized by these symptoms: increase in cough and sputum production, sputum changes from normal to purulence and aggravating dyspnea (Wouters, 2005). Acute exacerbation could lead to respiratory failure and might cause death. Thus exacerbation is the life-threatening symptom that should be prevented.

When confronting with severe to very severe stages, COPD patients are usually hospitalized (Ucgun et al., 2005). Patterns of health care among these patients could be varied and had no control due to various factors, such as type of doctor (specialist or general practitioner), experience of doctor and hospital facility (Garcia-Aymerich et al., 2005). As a result, several treatment guidelines were developed to provide a standard and appropriate health care for COPD patients (Buist, 2002; Pharnareth et al., 2002; Sinuff and Keenan, 2004). Although several CPGs had been implemented, most of them often failed to exhibit their clinical impact (Smith et al., 2003). However, most guidelines aim to prevent and control the worsening symptoms that could occur, especially acute exacerbation, the symptom that could decline lung function (Zoia et al., 2005).

In Thailand, an estimate of COPD prevalence was 2,075 cases per 100,000 populations and COPD caused around 33.5 deaths per 100,000 populations in 1998. The COPD prevalence is expected to increase to 7,035 cases per 100, 000 populations in 2010 (Chuprapawan, 2000). Similar to other countries in the world, COPD is also a major cause of death and a burden disease in Thailand. As well, clinical practice guideline (CPG) is recommended to hospital professionals to perform.

An increase of COPD patients from 314 cases in 2001 to 383 in 2002 was found at a community hospital in Prae province, Thailand. According to the hospital registration in 2003, the number of COPD in-patients was in the third rank, surpassed only by diarrhea and hypertension, and its treatment expenditure was in the first rank. This hospital was concerned with these numbers and realized the variability in COPD treatment among doctors who were general practitioners. Additionally, it was evident that there were gaps in knowledge and treatment for COPD patients among physicians (Rutschmann et al., 2004). Therefore, patient care team of this hospital, including doctors, pharmacists, nurses and related personnel, agreed to set a clinical practice guideline for COPD patients (Table 1) to provide better therapeutic outcomes and reduce the treatment expenditures. The patient care team began this CPG at the hospital in July 2003. After using CPG, the team wanted to assess its effectiveness. Thus the objective of this study was to determine the effect of CPG on therapeutic outcomes and treatment expenditures of COPD in-patients. This study hypothesized that CPG would give better therapeutic outcomes and yield more favorable treatment expenditures for COPD patients.

Table 1. Clinical Practice Guideline for COPD developed by a community hospital.

	Day 1	Day 1	Day 2	Day 3
Location	ER ½–1 hr	Ward	Ward	Ward
Assess/	• PE • V/S	• PE • V/S q 4 hr	• PE • V/S q 4 hr	• V/S as usual
Lab	• ±CXR • ±CBC • ±EKG (Doctor evaluate)	-	-	-
Treatment	• ±O_2 canula 1–3 LPM • ±Intubation (refer in case of severe acute exacerbation and conscious change)	• ±O_2 canula 1–3 LPM	• ±O_2 canula • Breathing exercise	-
Medication	• ±Berodual NB q 20- 30 min, 1–3 dose • ±B_2 agonist sc • ±Aminop IV • Steroid IV if no response to primary treatment • Antibiotic if severe exacerbation	• Berodual NB prn • ±Aminop IV/oral • ±Steroid IV/oral • ±Antibiotic IV/oral	• Berodual NB prn • ±Brochodil ator oral (B_2 agonist, xanthine derivati) • ±B_2 agonist MDI • ±Prednisolo ne oral	• H/M • ±Bronchodilat or oral (B_2 agonist, xanthine derivative) • ±B_2 agonist MDI • ±Continuous prednisolone oral, 1 wk
Activity	Bed rest	Bed rest	Bed rest	As tolerate
Nutrition	-	Regular diet	Regular diet	Regular diet
Teaching	-	Breathing, providing pamphlet	MDI usage	Review METHOD
Planning/ Discharge	If improve after NB, O_2, then D/C	METHOD COPD	If better, plan D/C	If not better, reevaluate

MATERIALS AND METHOD

Study design and sample

This retrospective study was undertaken during September 2004–February 2005 at a community hospital in Prae province, Thailand. The sample collected from COPD in-patients of the hospital was divided into two groups based on the investigation periods, i.e., pre-CPG period (July 2002–December 2002) and CPG period (July 2003–December 2003). Data were compared to determine the effect of CPG on therapeutic outcomes and treatment expenditures of COPD patients.

Data collection

The sources of data were medical records, charge records, admission records and patient history records. Data were classified as patient characteristics, therapeutic outcomes

and treatment expenditures.

Covered in patient characteristics were demographics and health history of patients. While therapeutic outcomes, including three occurrences related to the symptoms of COPD, were 1) exacerbation during hospital admission, 2) return to hospital emergency room (ER) within 72 hours after hospital discharge and 3) hospital readmission within 28 days after hospital discharge. Treatment expenditures were determined from the hospital charges for room, medicine and medical supply, medical service and laboratory test.

Data analysis

This study used descriptive statistics, t-test and Z-test to analyze the data at the significant level of 0.05.

RESULTS

Patient characteristics

The numbers of samples in pre-CPG and CPG group were 129 and 88 respectively. Patient characteristics of both groups were not different (Table 2). These data indicated that the two groups were similar, so their therapeutic outcomes and treatment expenditures could be compared.

Table 2. Patient characteristics based on sample groups.

	Pre-CPG group (n=129)		CPG group (n=88)		P
	Mean	SD	Mean	SD	
Age	67.09	8.75	69.51	8.36	0.145
Admission day	3.27	1.84	3.25	2.40	0.497
	Frequency	%	Frequency	%	
Gender					0.221
Male	68	52.7	51	58.0	
Female	61	47.3	37	42.0	
Education					0.496
No	60	46.5	41	46.6	
Yes	69	53.5	47	53.4	
Occupation					0.316
No	89	69.0	58	65.9	
Yes	40	31.0	30	34.1	
Income (Baht)					0.480
<2000	95	73.6	65	73.9	
>2000	34	26.4	23	26.1	
Smoking					0.079
No	16	12.4	17	19.3	
Yes	113	87.6	71	80.7	
Alcohol drinking					0.406
No	89	69.0	63	70.5	
Yes	47	36.4	26	29.5	

	Pre-CPG group (n=129)		CPG group (n=88)		P
	Mean	SD	Mean	SD	
COPD diagnosed (yr)					0.144
1–5	82	63.6	62	70.5	
>5	47	36.4	26	29.5	
Disease patients had					0.149
1 disease	76	58.9	58	65.9	
>1 disease	53	41.1	30	34.1	

Therapeutic outcomes

Based on pre-CPG and CPG group, percentages of exacerbation during hospital admission occurring in both groups were 10.9% and 2.3% respectively. Similarly, percentages of return to emergency room within 72 hours after hospital discharge were 7.8% and 0% respectively. Hospital readmissions within 28 days after hospital discharge were 27.9% and 10.2% respectively. All decreases in these occurrences were significantly different. Lower occurrences of exacerbation, return to ER and readmission during using CPG indicated better therapeutic outcomes. Thus, this result supported the hypothesis that CPG could give better therapeutic outcomes. Occurrences of therapeutic outcomes are presented in Table 3.

Table 3. Occurrences of therapeutic outcomes based on sample groups.

Occurrences	Pre-CPG group (n=129)		CPG group (n=88)		P
	Frequency	%	Frequency	%	
Exacerbation	14	10.9	2	2.3	0.008
Yes					
No	115	89.1	86	97.7	
Return to ER					
Yes	10	7.8	0	0	0.004
No	119	92.2	88	100	
Readmission					
Yes	36	27.9	9	10.2	0.002
No	93	72.1	79	89.8	

Treatment expenditures

Based on pre-CPG and CPG group, the average charges for room were 483 Baht and 450 Baht respectively while those for medicine and medical supply were 930 Baht and 1,012 Baht. For medical services, the charges were 461 Baht and 514 Baht. These charges were not different. In contrast, the charges for laboratory test were 110 Baht and 234 Baht which were significantly different. However, the total charges of 1,989 Baht and 2,206 Baht were not different. CPG could not reduce the treatment expenditures on an admission. All charges are shown in Table 4.

Table 4. Treatment expenditures on various charges based on sample groups.

Charges for (Baht)	Pre-CPG group (n=122)		CPG group (n=88)		P
	Range	Mean (SD)	Range	Mean (SD)	
Room	147–1,617	483.16 (272.05)	140–1,820	450.22 (318.72)	0.415
Medicine/medical supply	113–4,718	930.72 (793.79)	150–6,223	1,012.72 (984.46)	0.489
Medical service	21–2,089	461.10 (363.42)	60–2,720	514.03 (477.59)	0.356
Laboratory test	0–1,659	110.61 (243.69)	0–1,850	234.43 (307.56)	0.002
Total expenditure	458–7,385	1,989.01 (1,268.23)	448–9,423	2,206.07 (1,692.22)	0.308

DISCUSSIONS

Therapeutic outcomes

This CPG focused mainly on physical examination, vital sign assessment, laboratory test (chest x-ray, complete blood cell count and electrocardiography), medication and teaching patients in order to carefully evaluate the symptoms, severity and complication. High body temperature could be a clue of infection. Edema might occur due to heart failure. Chest x-ray and complete blood cell count could confirm infection. As well, chest x-ray could be used to diagnose COPD and distinguish COPD from other lung diseases such as asthma. More red blood cells might imply oxygen insufficiency. Thus, long term oxygen therapy was necessary. Electrocardiogram could be a tool to distinguish COPD from other heart diseases and to identify other complications. After these careful examinations, proper and reasonable non-medication and/or medication treatments were given to COPD in-patients. Patterns of medication were described clearly step by step according to disease severity to alleviate symptoms and to prevent medicine complication, such as tachycardia from bronchodilators and gastric bleeding from corticosteroids. In addition to patient care team, self-care at home of COPD patients is also important and recommended to alleviate their disease and improve quality of life (Murphy et al., 2005). Therefore, CPG specified that the team had to teach some practice and give useful and necessary information to patients in order that they could extend these practice and information to their homes. Teaching on pursed-lip breathing and metered dose inhaler using were described in CPG. Based on Thai Institute for Hospital Development and Accreditation 2002, "METHOD" model was used to educate patients how to manage their COPD and live cautiously. This model concerned with these issues: Medication, Environment and economic, Treatment, Health, Out-patient referral and Diet.

Respiratory infection is believed to be an important factor that could cause acute exacerbation (Wouters, 2004). CPG concerned with such infection and attempted to treat it as fast as possible. As a result, a decrease in acute exacerbation during admission from 10.9% to 2.3% was found after using CPG. Likewise, a reduction in return to ER within 72 hours from 7.8% to 0% could be due to careful diagnosis on COPD and complication and appropriate

COPD treatment. Teaching skill on using metered-dose inhaler and educating could help patients perform effective self-care, resulting in less-worsening COPD symptoms. Thus, readmission within 28 days decreased from 27.9% to 10.2% (cf. Table 3).

Treatment expenditures

Most charges were not different in both groups. Only the charge for laboratory tests was greater after using CPG. This was because CPG specified the laboratory tests in order to diagnose COPD, to separate COPD from other related diseases and to find complications. The tests could provide a correct diagnosis of COPD leading to a proper treatment. However, total treatment expenditures of patients for an admission were not different. Though CPG could not directly reduce treatment expenditures for each admission, it could indirectly decrease it by lowering the number of return to ER and readmission. Less number of return to ER and readmission would mean less treatment expenditures. It was found that expenditure on COPD would be higher if severity of disease increased (Hilleman et al., 2000; Hakpornsawan et al., 2001, Negro et al., 2003). This suggested that disease severity affected treatment expenditures. CPG could not directly but could indirectly decrease treatment expenditure because it could reduce disease severity. As a result, CPG could give a favorable effect on treatment expenditures.

Suggestion

Besides clinical and economical outcomes, patient outcome is also important because most COPD patients suffer from their disease. Any intervention provided to patients should concern with their quality of life too. Thus, future research should cover and determine patient outcome.

CONCLUSION

COPD is a top-five worldwide and burden disease that needs special attention and health care. Several COPD treatment guidelines have been developed to manage this disease. Since there are various factors associated with COPD patients, the hospital of this study found it necessary to set a specific CPG corresponding to hospital and community. It was evident that CPG of this hospital could directly yield better therapeutic outcomes and indirectly give favorable treatment expenditures. Therefore, this CPG should be pursued in order that COPD patients would get maximum benefit from it. However, it might be revised to obtain greater outcomes.

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