

Comparing end-of-life care in hospitalized patients with chronic obstructive pulmonary disease with and without palliative care in Taiwan

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Background: We investigated the difference of clinical practice pattern between end-stage chronic obstructive pulmonary disease (COPD) patients with and without palliative care at the end of life in Taiwan. **Materials and Methods:** A total of 91 COPD patients who died in an acute care hospital were enrolled from one community teaching hospital in northern Taiwan between September 1, 2007 and December 31, 2009. The patients were divided into palliative ($n = 17$) and non-palliative care ($n = 74$) groups. Demographics and medical care data obtained through retrospective review of medical records were analyzed to determine significant between-group differences. **Results:** There were no between-group differences in intensive care unit (ICU) utilization, duration of ICU stay, duration of ventilator usage, invasive diagnostic procedures, invasive treatments, medications, and total medical cost. Patients in the palliative group had longer hospital stays (median 26 days vs. 11 days, $P < 0.01$) and higher rate of do-not-resuscitate orders (100% vs. 51%, $P < 0.001$), but lower rates of ICU mortality (73% vs. 41%, $P = 0.026$), invasive ventilation (57% vs. 29%, $P = 0.04$), cardiopulmonary resuscitation (12% vs. 51%, $P < 0.001$), and daily medical cost (250 US dollars vs. 444 US dollars, $P < 0.001$). **Conclusion:** Palliative care was underutilized and referral was delayed for COPD patients. COPD patients are polysymptomatic approaching the end of life and this characteristic should be taken into account in providing appropriate end-of-life care in the same way as for cancer patients. Palliative care for COPD patients is urgently needed in Taiwan and should be promoted.

Key words: Chronic obstructive pulmonary disease, end-of-life, palliative care

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common disease and a major cause of death worldwide. It is the fourth main cause of death behind cardiac disease, cancer, and cerebrovascular disease in the United States, with a disease-related death incidence of 43.2 per 100,000 population.^[1] The death rate due to other diseases has declined gradually in recent years, but that due to COPD has continued to rise. COPD will become the third main cause of death globally in 2020 according to the World Health Organization (WHO).^[2]

In Taiwan, COPD was the seventh main cause of death in 2007; the incidence of COPD-related death was around 22.2 per 100,000 population. The prevalence of COPD among individuals over 40 years old was 2.9%. For people over 70 years old, the prevalence rate peaked at 8.8% in 1998 and reached a plateau thereafter.^[3]

COPD is an irreversible disease associated with progressive decrease in effective lung volume. The final years for COPD patients are marred by progressive functional decline, poor quality of life, and oxygen dependency.^[4] Patients die mostly from acute exacerbation of COPD/lung infection, respiratory failure, and complications secondary to other comorbidities.^[5] The risk of hospitalization increases with age. Patients over 80 years old had the highest risk of hospitalization (14.2 times that of patients aged 40-49 years).^[3] To improve the quality of life of patients with COPD, palliative care was added to the standard clinical management of COPD in Western countries at the beginning of the 21st century.^[6-8]

Palliative care is a treatment designed to relieve the symptoms caused by cancer and other diseases, and is centered on the patient and the patient's family to optimize quality of life by anticipating and reducing suffering.^[9] Palliative care often addresses the physical, intellectual, emotional, social, and spiritual needs of the

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patient, and is broader than hospice care, which usually focuses on the dying person and her/his family.^[10]

Palliative care was introduced in Taiwan more than two decades ago, and most recipients were cancer patients. Non-cancer patients, including patients with COPD, have been covered for palliative care by health insurance since September 2009. Access to palliative care for patients with COPD remains very limited. Additional information regarding end-of-life palliative care is needed to promote the practice of palliative care and educate patients, family, and medical staff on its use in COPD. The purpose of this article was to investigate the difference of clinical practice pattern between COPD patients with palliative care and without at the end of life at an acute care teaching hospital in northern Taiwan.

MATERIALS AND METHODS

This was a retrospective medical record review of patients who had died in Saint Paul's Hospital (Taoyuan, Taiwan) between September 1, 2007 and December 31, 2009. Saint Paul's Hospital is an acute care hospital that has a multidisciplinary team that provides palliative care for hospitalized patients with end-stage disease. All patients were under the care of a primary care physician and a palliative care team consisting of physicians, specialist nurses, social workers, Catholic chaplains, and volunteers. The study was approved by the Institutional Review Board (IRB) of the hospital.

Study patients and assessments

Eligible patients were ≥ 18 years of age, had diagnosed COPD (ICD-9 codes 491.x, 492.x, and 493.x) by pulmonary function test or clinicians' judgments, and were admitted to the hospital for acute care. COPD patients were determined to be terminal during their hospital stay if they met any of the following criteria: (1) Respiratory failure post-intubation; (2) persistent hypoxia ($\text{PaO}_2 < 60$ or O_2 saturation $< 90\%$), tachycardia (heart rate > 100 beats per minute), or tachypnea (respiratory rate $> 20/\text{min}$) after O_2 therapy; (3) unstable hemodynamics with hypotension (SBP < 90 mmHg); or (4) cachexia with chronic malnutrition status. These enrollment criteria were comparable with Global Initiative for Obstructive Lung Disease (GOLD) criteria^[11] stage III or stage IV. Patients were under the care of a primary care physician. For those patients who were later referred to palliative care, they were either referred by primary care physician's decision or actively recruited by the palliative care team if a Do Not Resuscitate (DNR) consent form had been signed after hospitalization. To ensure adequate time to assess patients' distressing symptoms, patients who remained in the Emergency Department, diagnosed with cancer, or admitted for < 24 h were excluded from the study.

Data collected included demographics, results of pulmonary function test within last 1 year, hospital medical care,

symptoms and medical costs during hospitalization. Hospital medical care included days of hospitalization, days in the intensive care unit, ventilator usage, number of invasive procedures or treatments, medications, the record of signed DNR consents, and the record of hospice care referral. Symptoms were recorded daily by the same specialist nurse who initially evaluated the patients and were chosen based on prior findings.^[12-14] All patients were followed till death. Total medical costs were retrospectively calculated from reimbursement received from the Bureau of National Health Insurance during the time patient was hospitalized.

Statistical analysis

Patients were divided into those who did not receive palliative care (non-palliative group) and those who received palliative care (palliative group) to identify differences related to end-of-life palliative care in patients with COPD. All the data were analyzed using SPSS 17.0 statistical software (SPSS Inc., Chicago, IL, USA). Differences between subpopulations were tested using the Chi-square test ($\alpha = 0.05$). Differences at $P < 0.05$ were considered significant.

RESULTS

Patient demographic and disease characteristics

Totally, 91 patients [median age, 82.1 years (55-97); man:woman ratio, 3:1] were enrolled in the study. Their basic demographic characteristics are summarized in Table 1. The average number of comorbidities per patient was 2.3 (0-7). The top three comorbidities were hypertension (38%), chronic kidney disease (38%), and congestive heart failure (33%). The leading reasons for admission were acute exacerbation of COPD/lung infection (60%), heart disease (20%), and non-pulmonary infection (16%).

Seventeen of the 91 patients (18%) received palliative care. There was no between-group difference in age, gender, forced expiratory volume in 1 s (FEV1), and main reason for admission. Patients in the non-palliative group had a higher prevalence of cerebrovascular disease and liver cirrhosis; there were no between-group differences in other comorbidities.

Medical care utilization

The median hospital stay was 16 days (1-61) for all patients. The median intensive care unit (ICU) stay was 8 days (1-42) for all 73 patients (80%) admitted to ICU. The median duration of ventilator support was 5 days (0-42). Sixty-one patients (67%) died in ICU finally [Table 2].

Over one-third of patients had received computed tomography (CT) examinations and around 10% of patients had received bronchoscopy or panendoscopy. The most common invasive procedures were feeding tube placement (93%), Foley catheter insertion (86%), and invasive ventilation (52%). Fifty-nine patients (65%) had signed DNR consent

Table 1: Basic demographic data

Demographic characteristics	All patients (N=91)	Non-palliative (n=74)	Palliative (n=17)	P value ^a
Median age in years (range)	82.1 (55-97)	81.9 (55-97)	83.8 (66-92)	0.88
Man gender (%)	73.6	75.7	58.8	0.14
Median FEV1% (range)	30.5 (15-79) (n=71)	37 (15-79) (n=55)	29 (19-52) (n=16)	0.24
Comorbidity (%)				
Hypertension	38	38	41	0.47
Diabetes mellitus	27	28	24	0.86
Cardiovascular disease	26	26	29	0.63
Cerebrovascular disease	23	27	6	0.01*
Atrial fibrillation	19	18	24	0.75
Congestive heart failure	33	32	35	0.95
Chronic kidney disease	38	36	47	0.67
Liver cirrhosis	4	5	0	0.045*
Old pulmonary tuberculosis	18	16	29	0.54
Mean no. of comorbidities (range)	2.3 (0-7)	2.3 (0-7)	2.4 (0-7)	0.87
Main cause of admission (%)				
COPD AE/lung infection	60	59	65	0.47
Heart disease	20	19	24	0.84
Infection other than lung	16	17	11	0.97
Renal failure	2.2	2.7	0	0.16
Stroke	1.1	1	0	0.31

FEV1=Forced expiratory volume in 1 s; COPD AE=Chronic obstructive pulmonary disease with acute exacerbation; ^aP value refers to level of significance in comparing non-palliative care patients (n=74) and palliative care patients (n=17)

Table 2: Medical care utilization in COPD patients

Medical care utilization (%)	All patients (N=91)	Non-palliative (n=74)	Palliative (n=17)	P value ^a
Median hospital stay in days (range)	16 (1-61)	11 (1-61)	26 (4-60)	0.01*
ICU utilization	80	82	71	0.12
Median duration of ICU stay in days (range)	8 (1-42)	7 (1-42)	12 (1-24)	0.89
Median duration of ventilator usage in days (range)	5 (0-42)	6 (0-42)	2 (0-24)	0.25
Deaths in ICU	67	73	41	0.026*
Invasive examinations				
Computed tomography	35	38	24	0.18
Bronchoscopy	9	8	12	0.84
Panendoscopy	11	11	12	0.97
Invasive procedures				
Feeding tube	93	95	88	0.51
Foley catheter	86	88	76	0.11
Noninvasive ventilator	23	22	29	0.41
Invasive ventilation	52	57	29	0.04*
Tracheostomy	30	31	24	0.37
Arterial line	30	30	29	0.77
Partial parenteral nutrition	7	7	6	0.81
Blood transfusion	45	42	59	0.42
Medication records				
Antibiotics	91	91	94	0.51
Sedatives	29	28	29	0.79
Steroids	66	64	76	0.69
Inotropics	74	76	65	0.17
NSAIDs	13	14	12	0.72
Opioids	11	12	6	0.29
Cardiopulmonary resuscitation	44	51	12	<0.001*
Signed a DNR consent form	65	57	100	<0.001*

ICU=Intensive care unit; NSAIDs=Nonsteroid anti-inflammatory drugs; DNR=Do not resuscitate; ^aP value refers to level of significance in comparing non-palliative care patients (n=74) and palliative care patients (n=17); COPD=Chronic obstructive pulmonary disease

forms, but 40 patients (44%) had been given cardiopulmonary resuscitation (CPR) at the end of life. The most common

medications prescribed were antibiotics (91%), inotropic agents (74%), and parenteral or oral steroids (66%). Around

13% and 11% of patients received regular doses of nonsteroid anti-inflammatory drugs (NSAIDs) and opioids, respectively.

Analysis of end-of-life care revealed that the median hospital stay was longer in the palliative group (26 vs. 11 days for the non-palliative group) [Figure 1]. There was a noticeably lower death rate in ICU in the palliative group (41% vs. 73% for the non-palliative group), but no between-group difference in the rate of ICU care, length of ICU stay, and ventilator usage.

There was no between-group difference in the rate of invasive diagnostic procedures, invasive treatment, and medication usage. However, the frequency of invasive ventilation was higher in the non-palliative group (57% vs. 29%, $P = 0.04$).

Patients in the palliative group had significantly higher rate of signing DNR consent forms (100% vs. 57%, $P < 0.001$) and lower CPR rate (12% vs. 51%, $P < 0.001$) when compared to patients in the non-palliative group.

Palliative care utilization and patient's symptoms prevalence

Seventeen out of 91 patients (18%) had received palliative end-of-life care. The median time from admission to palliative care referral and median duration of palliative care was 19 days (0-56 days) and 6 days (2-33 days), respectively. In the 15 patients (88%) where palliative care was requested by family members, the major reason for palliative care referral was unwillingness to let the patient suffer (59%) and acceptance of the possibility that palliative care might be beneficial (29%). Two patients (12%) requested palliative care themselves because they were unwilling to suffer any longer. None was referred by their primary care physician.

Totally, 20 different symptoms in 17 patients were noted in the daily records maintained by specialist palliative care nurses, with an average of 10.6 (4-15) per patient. The most prevalent symptoms were breathlessness (100%), fatigue (94%), fever (88%), mental change (82%), and general edema (82%) [Figure 2].

Impact of palliative care on reimbursement

Patients who were referred to palliative care spent more days in the medical care than non-referred patients. The total medical cost was similar between those given and not given palliative care; however, the mean daily cost was significantly lower for patients referred to palliative care because of longer time in medical care ($P \leq 0.001$) [Table 3].

DISCUSSION

This study describes the basic characteristics of COPD patients at the end of life at an acute care teaching

hospital in northern Taiwan. They were predominantly men (man: woman ratio, 3:1), elderly, and suffered from multiple comorbidities, mainly hypertension, congestive heart failure, or chronic kidney disease. The main reasons for admission were acute exacerbation of COPD/lung infection or complications of other chronic comorbidities. The characteristics of our patients in the present study differed from those of patients with advanced cancer in other studies on end-of-life care in Taiwan.^[13,14] Cancer patients were younger (mean age, around 65 years),

Table 3: Reimbursement from national health insurance between patients with and without palliative care

	No palliative care ^a	Palliative care ^a	P value
COPD			
Hospitalized days	11.0 (1, 61)	26 (4, 60)	<0.01*
Total cost (USD)	3918 (324, 21867)	4509 (1583, 17033)	0.12
Mean daily cost (USD)	444 (118, 1479)	250 (128, 446)	<0.001*

USD=United states dollar; *Indicates a significant difference between groups was observed; ^avalues indicate median (range)

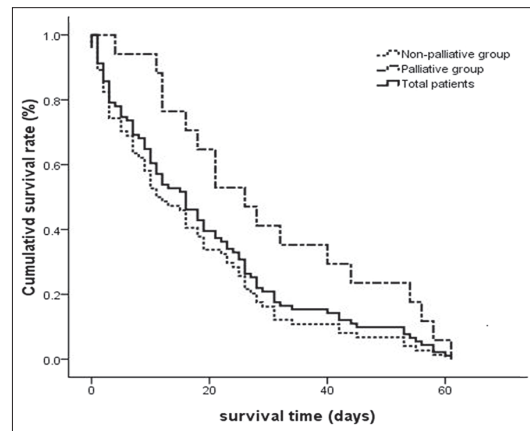


Figure 1: Cumulative survival rates of all patients ($N = 91$), patients in the palliative group ($n = 17$), and patients in the non-palliative group ($n = 74$)

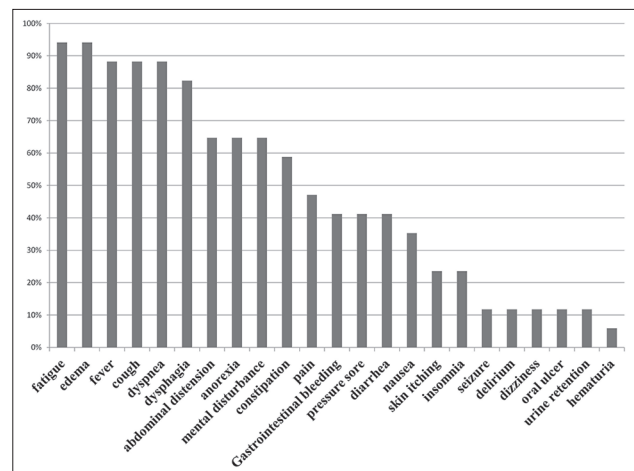


Figure 2: Symptoms' characteristics and their prevalent rate in patients under palliative care ($n = 17$)

had fewer comorbidities, and were admitted mainly for treatment of cancer and its related complications. These differences made it more difficult to predict the medical care needs of COPD patients based on the needs of cancer patients. It is easier to predict the prognosis of cancer based on disease stage than it is for the prognosis of COPD. Outcomes in COPD patients are more difficult to predict because comorbidities are more numerous and the reasons for disease progression vary.

Our data showed that more than two-thirds of patients had received feeding tubes, Foley catheters, antibiotics, inotropic agents, and steroids during hospitalization. Even though 65% of patients had signed a DNR consent, 44% of patients had been given CPR. These data show that the goal of care was to prolong life rather than relieve symptoms. Around 80% of patients in this study had been admitted to ICU, and 67% of the patients finally died in ICU. The data are almost eightfold higher than those for cancer patients who received ICU care at the end of life in Taiwan.^[15] As many deaths occur in ICU, deficiencies in end-of-life care in this setting require particular attention. Medical staff trained to use end-of-life care tools can reduce the use of burdensome treatments.^[16]

There were no between-group differences in length of ICU stay, duration of ventilator usage, rate of invasive diagnostic procedures, and frequency of invasive procedures and medications in this study. A possible explanation is late referral of patients. The median hospital stay for all patients was 16 days, while the median number of days from admission to palliative referral was 19 in the palliative group. Palliative care was requested in all patients by either the patients themselves or family members, and the main reason was unwillingness to suffer. In patients referred to palliative care, invasive procedures with limited effect were frequently performed after admission. These may account for the longer median hospital stay in the palliative group in this study. The patients in the palliative group also had a higher DNR consent rate (100% vs. 57%), lower rate of death in ICU (41% vs. 73%), and lower rate of CPR (12% vs. 51%) partially due to the greater knowledge of palliative care services by patients and family members and partially reflecting the possible benefit of palliative care.

Palliative care patients were polysymptomatic. Each patient had an average of 10.6 different symptoms in agreement with other studies on COPD (which reported around 7.1-14 symptoms).^[17-20] The prevalence of these symptoms was similar in our patients and in patients with other chronic illnesses and advanced cancer.^[17,18,21-24] It confirmed that cancer and non-cancer patients follow a “common pathway” to death.^[24] Because the prevalence of symptoms is similar for cancer and non-cancer patients, the need for symptom relief should be the same.

Breathlessness and pain are probably the most noticeable symptoms in dying COPD patients^[25] and occur in around 56-97% and 21-78% of these patients, respectively.^[17,18,20-23,25] Optimal symptom control requires early identification, continuous reassessment, communication, and appropriate medications. In our study, all patients in the palliative group had breathlessness and 47% had pain. Assuming the same prevalence rate in all 91 patients, NSAIDs and opioids were prescribed regularly in only 13% and 11%, respectively, reflecting that pain in COPD patients in Taiwan was underrecognized, underassessed, and undertreated. COPD patients at the end of life need not only to prolong life but also to have access to hospice care. Encouraging medical staff to use hospice for end-of-life care in COPD patients is necessary and urgent in Taiwan.

Several studies comparing end-of-life care in COPD patients and lung cancer patients have found that clinical symptoms are the same in COPD patients and lung cancer patients, but COPD patients receive more invasive treatment, fewer medications to relieve symptoms, and have less access to palliative care.^[21-23,25] There are two barriers to accessing hospice services. One is life expectancy is difficult to predict^[26] and the other is the failure by physicians and patients to recognize that COPD is a terminal disease.^[27] COPD progresses slowly. Most patients remain in stable condition until acute exacerbation occurs. The challenge is timing the hospice intervention to meet the current needs of the patient.^[28] The Body mass index, airway Obstruction, Dyspnea, and Exercise capacity (BODE) index^[29] and Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT) criteria^[30] have both been used to predict survival in advanced COPD patients. Patients with the highest BODE index had a 30-40% 2-year mortality, and the 6-month mortality rate was 40% for patients who met all SUPPORT criteria.^[31] The National Hospice and Palliative Care Organization (NPHCO) referral guidelines^[32] have been suggested as hospice care referral criteria in COPD patients in Taiwan. However, parameters recommended by the guidelines were insensitive and not useful for predicting life expectancy at the time of acute exacerbation in COPD patients, and therefore were of limited benefit.^[33]

Accurate prediction of a 6-month survival time – the standard window of time for referral to hospice care – in patients with nonmalignant disease is difficult, and leads patients and family to hesitate about requesting hospice care. This may be a missed opportunity for patients to receive proper evaluation of symptoms and to be referred to hospice for comprehensive, appropriate end-of-life care, which is an important reason behind having a better understanding of prevalent symptoms in end-stage noncancer patients in Taiwan. COPD prognosis is difficult to determine with many patients dying of exacerbations or comorbidities, making

it difficult to determine when a referral to hospice care is appropriate.^[6] Because predicting lifespan is difficult in COPD patients, the timing of palliative care should depend on their need rather than their predicted survival.^[25] Surveys have shown repeatedly that most patients with COPD and other chronic illnesses anticipate their own death and welcome frank discussions and guidance from their physicians.^[6,7] However, physicians tend to overestimate the life expectancy and underestimate the needs of patients with advanced stage non-malignant illnesses.^[34] Medical staff should discuss living will and hospice needs with COPD patients at the point that the patient needs hospitalization but before any invasive procedure is performed to resolve an acute complication, such as exacerbation of COPD/lung infection or stroke.

To the best of our knowledge, this article is the first to evaluate the pattern of end-of-life care and prevalence of symptoms presenting in terminal COPD patients in Taiwan. Notably, this study confirmed that COPD patients at the end of life are polysymptomatic. These patients received too many medical care aims of prolong life, received too little symptom relief management, and had too little access to palliative care. Hospice offers a comprehensive multidisciplinary approach to relieving the distress of any terminal disease and can support their families both before and after the patient dies. We believe that COPD patients in Taiwan need and have the right to receive the same kind of palliative care as cancer patients receive in Taiwan.

This study had some limitations. First, this study was a single-site study with a small sample size and selection bias. Therefore, the study result was unable to represent the characteristics to the whole population. Multi-site studies on a large scale are needed to verify if these findings can be generalized to the whole health-care system in Taiwan. Second, in order to ensure the accuracy of the clinical symptom records, we used only the records of patients who had received palliative care; therefore, the symptoms we recorded are not representative of those of all COPD patients at the end of life. Finally, 60% patients were admitted to hospital because of acute exacerbation of COPD and 67% of all the patients died in ICU after admission. In addition, all of the recruited patients died after admission, and the data of the proportion of people admitted with an exacerbation of COPD who die and the proportion of those admitted to ICU who do not survive are not available in our study. The result of this study may be biased in patients' selection.

CONCLUSION

Palliative care was underutilized and referral was delayed for COPD patients. COPD patients are polysymptomatic approaching the end of life and this characteristic should be

taken into account in providing appropriate end-of-life care in the same way as for cancer patients. Palliative care for COPD patients is urgently needed in Taiwan and should be promoted.

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