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Original Article

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Decision and Practice of End-of-Life Care in Lung Disease Patients with Physicians Orders for Life Sustaining Treatment

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Purpose: The purpose of this study was to analyze end-of-life care practices in lung disease patients with physician orders for life-sustaining treatment (POLSTs). **Methods:** We retrospectively analyzed data from medical records regarding the end-of-life care practices of POLST decisions for patients with lung disease hospitalized at a tertiary hospital in Seoul, South Korea. Data were collected from January 1 to June 30, 2021. **Results:** Of 300 total patients, 198 had lung cancer (66.0%) and 102 had non-malignant lung diseases (34.0%). A POLST was written for 187 patients (62.3%), and an advance directive was written for 20 patients (6.7%). Subsequent treatments were hemodialysis in 13 patients (4.3%), surgery in 3 patients (1.0%), and cardiopulmonary cerebral resuscitation in 1 patient (0.3%). Among cancer patients, chemotherapy was performed in 11 patients (3.7%), targeted therapy in 11 patients (3.7%), immunotherapy in 6 patients (2.0%), and radiation therapy in 13 patients (4.3%). Depending on the type of lung disease, types of treatment differed, including hemodialysis, ventilators, bilevel positive airway pressure, high-flow nasal cannulas, nebulizers, enteral nutrition, central line, inotropic agents, and opioids. **Conclusion:** Although the goals of hospice care are the same whether a patient has lung cancer or a non-malignant lung disease, because the characteristics of the respective diseases differ, end-of-life care practices and hospice approaches must be considered differently.

Key Words: Terminal care, Hospice care, Advance care planning, Personal autonomy, Lung diseases

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INTRODUCTION

1. Background

As medical developments lengthen the human lifespan, substantial interest has emerged in improving quality of life (QoL) and quality of death [1]. In order to respect patients' self-determination amid the dying process and to protect their human dignity and values, the Act on Hospice and Palliative Care and Decisions on Life-Sustaining Treatment for Patients at the End of Life (hereinafter referred to as the Act on Decisions on Life-Sustaining Treatment) has been enforced since February 2018 [2]. For patients in either of two groups—those with cancer, AIDS, chronic respiratory disease, or liver cirrhosis, and ter-

minally ill patients with no possibility of fundamental recovery despite active treatment—who are expected to die within several months due to gradual exacerbation of symptoms [2], meaningless medical interventions are limited and unnecessary pain is minimized to offer them a comfortable end of life [3].

Although the scope of hospice and palliative care has been expanded to patients with terminal non-malignant diseases, some patients with such diseases may live for a long time after diagnosis, and distinguishing between the terminal stage and the dying process may be difficult as their condition repeatedly improves and deteriorates [4,5]. Other patients might not receive proper hospice and palliative care, due to the common occurrence of a sudden transition to the dying process [3,6]. In addition, due to misunderstandings and misperceptions of hospice and palliative care for terminal non-malignant diseases, patients and their families may interpret hospice care as withdrawal of treatment, and healthcare providers may be insufficiently informed as well [3]. However, the physical and psychosocial needs, symptom burden, and function decline of patients with non-malignant chronic lung disease resemble those of lung cancer patients [7,8]. In both types of cases, the goals of hospice and palliative care involve relieving the physical symptoms of patients and their families [9], improving QoL through emotional, social, and spiritual support, and reducing pain [4].

Lung diseases, including lung cancer, chronic obstructive pulmonary disease (COPD), pulmonary hypertension, and interstitial lung disease (ILD), have a high risk of death and a negative influence on patients' daily functions and QoL, due to issues such as dyspnea and depression [6]. In particular, patients with COPD often need palliative care due to physical symptoms such as uncontrolled dyspnea and fatigue, as well as emotional, social, and functional problems such as depression and anxiety [4]. They receive more diagnostic tests than lung cancer patients, but less symptomatic treatment and fewer palliative care services [10,11]. In addition, although the number of hospitalizations was smaller than for lung cancer patients within 6 months from death, the probability of intensive care unit admission was 2 times higher for COPD patients than for lung cancer patients, and the probability of remaining hospitalized for more than 2 weeks was 5 times higher [12]; furthermore, their daily activities and physical, social, and emotional functions were significantly worse [11]. Since patients with severe lung disease and their caregivers feel the same physical, emotional, spiritual, and financial burden as cancer patients, early palliative care is required when planning treatment [6], and proactive interest and management are necessary.

It is desirable for terminally ill patients to make and document their own decisions about life-sustaining treatment. However, a retrospective study of 334 patients who gave informed consent for life-sustaining treatment reported that only 26.0% of the participants were patients who had filled out the form directly, whereas in 53.3% of cases, the form had been completed by parents or guardians, other family members, or physicians [13]. Advance directives (ADs) for life-sustaining treatment and hospice care are documented directly by individuals aged 19 years or older, whereas physician orders for life-sustaining treatment (POLSTs) are written by attending physicians to record the intentions of terminally ill patients [2]. A study of 71,327 people receiving life-sustaining treatment found that 32.3% had patient-written POLSTs [14], showing that decisions about life-sustaining treatment were made mostly by families or attending physicians, not the patients themselves. This result is thought to reflect the cultural taboo that limits direct discussion of death at a patient's bedside [15], as well as situations in clinical settings when patients cannot make decisions unaided due to the rapid exacerbation of their condition, including deterioration of consciousness.

In a qualitative study of terminal cancer patients, decisions on life-sustaining treatment were expressed in categories of "having complicated feelings," "making choices to protect everyone," "accepting and preparing for death," "feeling distress," "pursuing spiritual wellbeing," and "evaluating a new system." That is, it was confirmed that terminal cancer patients had complicated feelings and worries about their families ahead of death, but they accepted their fate and felt peaceful because of their decisions about life-sustaining treatment. However, although they appreciated the implementation of a system for life-sustaining treatment, they also described the system's drawbacks, such as lack of accessibility or explanation [16]. A study on elderly patients with terminal chronic cardiopulmonary disease reported that initial decisions on life-sustaining treatment were reversed an average of 5 days after each deci-

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sion [17]. These results confirm that information about life-sustaining treatment is insufficient, as is the amount of time allowed for making decisions. Therefore, it is important to offer terminally ill patients and their families timely explanations of the dying process in accurate detail so that they can make decisions on life-sustaining treatment themselves.

Life-sustaining treatment is a medical practice that only prolongs the duration of the dying process, without effects upon the patient's ongoing treatment. Such treatment was formerly defined as cardiopulmonary resuscitation (CPR), use of a ventilator, hemodialysis, and anticancer drug administration; with the 2019 amendment it has expanded to extracorporeal life support, blood transfusion, inotropic agent administration, and other treatments that the attending physician may choose to withhold or withdraw [18]. Among patients with lung diseases, those with COPD have a high burden of symptoms and low QoL, similar to cancer patients, but they tend to receive fewer hospice and palliative care services and less drug therapy, and more life-sustaining treatment than cancer patients [19].

Therefore, the purpose of this study was to identify the POLST-related characteristics of patients with lung diseases, including both lung cancer and non-malignant lung diseases such as COPD, and to analyze the practices of life-sustaining treatment, including the treatment and progress of patients after their POLSTs were written. Through this, the study aimed to provide evidence for implementing a decision-making system for life-sustaining treatment according to the characteristics of patients with lung cancer and non-malignant lung diseases.

2. Purpose

The purpose of this study was to identify the practices of life-sustaining treatment of patients with lung disease who wrote POLSTs. The specific purposes were as follows:

First, to identify the characteristics of study participants who wrote POLSTs.

Second, to investigate post-POLST treatment status according to participants' diseases.

Third, to investigate post-POLST treatment progress according to participants' diseases.

METHODS

1. Study design

This was a retrospective study to identify the practices of life-sustaining treatment for patients with lung disease who wrote POLSTs.

2. Participants

The participants of this study were patients with lung disease who wrote POLSTs between January 1 and June 20, 2021, selected from patients hospitalized in the oncology department and a pulmonary ward at a tertiary hospital in Seoul, South Korea. Qualifying lung diseases included lung cancer, pneumonia, COPD, sepsis, ILD, pulmonary embolism, asthma, pulmonary edema, pulmonary hypertension, rheumatoid lung disease, and bronchitis. Among 313 confirmed patients, 13 had insufficient records, and data were analyzed for a total of 300 patients.

3. Study tools

1) General and POLST-related characteristics

As general characteristics, sex, age, education, religion, marital status, diagnosis, comorbidities, and cancer stage were investigated. Terminal lung diseases were classified into lung cancer and non-malignant lung diseases, including pneumonia, COPD, sepsis, ILD, pulmonary embolism, asthma, pulmonary edema, pulmonary hypertension, rheumatoid lung disease, and bronchitis.

Characteristics related to writing POLSTs included the role of the POLST decision-maker, the patient's level of consciousness, their performance status as defined by the Eastern Cooperative Oncology Group (ECOG), and whether ADs were written. POLST decision-makers were divided into patients and their family members, and their level of consciousness was categorized as alert, drowsy, confused, or unresponsive. The ECOG performance status was divided into 6 grades (0~5): grade 0, asymptomatic and capable of normal activities; grade 1, symptomatic but ambulatory and able to do light work; grade 2, symptomatic, with less than 50% of the day spent in a bed or chair and in need of occasional nursing care; grade 3, symptomatic, with 50% or more of the day spent in a bed or

chair, nursing required; grade 4, immobile and bedbound; and grade 5, death [20].

2) Treatment after writing POLST

For treatment status after a POLST was written, treatment types, respiratory devices, methods of nutrition, invasive procedures, transfusion types, and medication were investigated. Types of treatment included cardiopulmonary cerebral resuscitation (CPCR), hemodialysis, surgery, chemotherapy (cytotoxic therapy, targeted therapy, and immunotherapy), and radiation therapy. Respiratory devices were classified as ventilators, bilevel positive airway pressure (BIPAP), high-flow nasal cannulas (HFNC), and nebulizers, and methods of nutrition were divided into enteral and parenteral. Invasive procedures were divided into central line, peripherally inserted central catheter (PICC), pigtail catheter drainage (PCD), and percutaneous transhepatic biliary drainage (PTBD). Types of transfusion were divided into red blood cells (RBCs), fresh frozen plasma (FFP), platelet concentrate (PC), and others, and medications were divided into inotropic agents and opioids.

3) Progress after writing a POLST

After a POLST was written, life or death status, hospital readmission, emergency room visits, and referrals to other institutions including convalescent hospitals and hospice facilities were investigated. The period from writing a POLST to the time of death was also identified.

4. Data collection

Data were collected after approval by the institutional review board (IRB No. 2022-0397). From April 22 to May 8, 2022, researchers used case report forms to collect data retrospectively from electronic medical records that included POLSTs.

5. Data analysis

Data were analyzed using IBM SPSS 27.0 for Windows. The general characteristics of participants, POLST-related characteristics, treatment, and post-POLST progress were presented as frequency, percentage, mean, and standard deviation. Differences among these characteristics were analyzed using the chi-square test, Fisher exact test, and independent t-test.

Table 1. Patients' Characteristics (N=300).

Characteristics	n (%) or M±SD
Sex	
Male	206 (68.7)
Female	94 (31.3)
Age (yr)	70.35±10.80
<60	37 (12.3)
60~69	104 (34.7)
70~79	94 (31.3)
≥80	65 (21.7)
Education	
≤Middle school	104 (34.7)
High school	106 (35.3)
≥College	90 (30.0)
Religion	
Yes	163 (54.3)
No	137 (45.7)
Marital state	
Married	293 (97.7)
Unmarried	7 (2.3)
Diagnosis	
Lung cancer	198 (66.0)
Pneumonia	35 (11.7)
COPD	31 (10.3)
Sepsis	9 (3.0)
Interstitial lung disease	8 (2.7)
Pulmonary embolism	5 (1.7)
Asthma	4 (1.3)
Pulmonary edema	4 (1.3)
Pulmonary hypertension	3 (1.0)
Rheumatoid lung disease	2 (0.7)
Bronchitis	1 (0.3)
Comorbidities	
Yes	265 (88.3)
No	35 (11.7)
Cancer stage	
Yes (stage Ⅳ)	198 (66.0)
No	102 (34.0)
POLST decision-maker	
Patient	187 (62.3)
Family member	113 (37.7)
Level of consciousness	
Alert	202 (67.3)
Drowsy	21 (7.0)
Confused	44 (14.7)
Unresponsive	33 (11.0)
ECOG	
1	17 (5.7)
2	65 (21.7)
3	79 (26.3)
4	139 (46.3)
Advance directives	
Yes	20 (6.7)
No	280 (93.3)

COPD: chronic obstructive pulmonary disease, POLST: physician orders for life sustaining treatment, ECOG: eastern cooperative oncology group.

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RESULTS

1. Participants' general characteristics and POLST-related characteristics

Among the 300 total participants, there were 206 men (68.7%), the mean age was 70.35 years old, and the largest category by age was patients aged 60-69 years (n=104, 34.7%). Most participants had completed high school (n=106, 35.3%), had no religion (n=137, 45.7%), and were married (n=293, 97.7%). The most frequent diagnosis was lung cancer (n=198, 66.0%), followed by pneumonia (n=35, 11.7%), COPD (n=31, 10.3%), sepsis (n=9, 3.0%), ILD (n=8, 2.7%), pulmonary embolism (n=5, 1.7%), asthma (n=4, 1.3%), pulmonary edema (4, 1.3%), pulmonary hypertension (n=3, 1.0%), rheumatoid lung disease (n=2, 0.7%), and bronchitis (n=1, 0.3%). The majority of participants (n=265, 88.3%) had comorbidities, and all patients with cancer had stage Ⅳ.

More than half of the POLST decision-makers were patients (n=187, 62.3%); 202 patients (67.3%) were alert, while 139 patients (46.3%) were in ECOG grade 4. Only 6.7% of participants (n=20) wrote Ads (Table 1).

2. Differences among general characteristics and POLST-writing characteristics according to participants' diseases

There was no significant difference in general characteristics (sex, age, education, religion, marital status, and comorbidities) and POLST-related characteristics (role of POLST decision-maker, patient's level of consciousness, ECOG performance status, and whether ADs had been written) between patients with lung cancer and those with non-malignant lung diseases (Table 2).

3. Treatment after writing POLSTs according to the type of lung disease

Regarding treatment after writing POLSTs, among the 13 patients (4.3%) who received dialysis, two patients (1.0%) had lung cancer and 11 patients (10.8%) had a non-malignant lung disease. Surgery was conducted in three lung cancer patients (1.5%), and CPCR was performed in only one lung cancer patient (0.5%). Eleven lung cancer patients (5.6%) received chemotherapy, another 11 (5.6%) received targeted therapy, six (3.0%) received immunotherapy, and 13 (6.6%) received radiation therapy. Regarding respiratory devices, among 116 patients (38.7%) who used HFNC, 64 patients (32.3%) had

Table 2. Comparison of Patients Characteristics according to the Type of Lung Disease (N=300).

Characteristics	Lung cancer (n=198)	Non-malignant lung disease (n=102)	χ^2 or t	P
	n (%)	n (%)		
Sex				
Male	133 (67.2)	73 (71.6)	0.61	0.437
Female	65 (32.8)	29 (28.4)		
Age (yr)	69.57±10.80	71.86±10.68	-1.75	0.081
<60	29 (14.6)	8 (7.8)	4.34	0.227
60~69	70 (35.4)	34 (33.3)		
70~79	56 (28.3)	38 (37.3)		
≥80	43 (21.7)	22 (21.6)		
Education				
≤Middle school	67 (33.8)	37 (36.3)	1.09	0.581
High school	74 (37.4)	32 (31.4)		
≥College	57 (28.8)	33 (32.4)		
Religion				
Yes	112 (56.6)	51 (50.0)	1.17	0.279
No	86 (43.4)	51 (50.0)		
Marital state				
Married	193 (97.5)	100 (98.0)	-	1.000*
Unmarried	5 (2.5)	2 (2.0)		
Comorbidities				
Yes	171 (86.4)	94 (92.2)	-	0.184*
No	27 (13.6)	8 (7.8)		
POLST decision-maker				
Patient	131 (66.2)	56 (54.9)	3.64	0.057
Family member	67 (33.8)	46 (45.1)		
Level of consciousness				
Alert	133 (67.2)	69 (67.6)	1.94	0.585
Drowsy	14 (7.1)	7 (6.9)		
Confused	32 (16.2)	12 (11.8)		
Unresponsive	19 (9.6)	14 (13.7)		
ECOG				
1	9 (4.5)	8 (7.8)	3.99	0.262
2	48 (24.2)	17 (16.7)		
3	54 (27.3)	25 (24.5)		
4	87 (43.9)	52 (51.0)		
Advance directives				
Yes	13 (6.6)	7 (6.9)	0.01	0.922
No	185 (93.4)	95 (93.1)		

*Fisher's exact test.
POLST: physician orders for life sustaining treatment, ECOG: eastern cooperative oncology group.

lung cancer and 52 patients (51.0%) had non-malignant lung diseases. Among 48 patients (16.0%) who used a nebulizer, 21 patients (10.6%) had lung cancer and 27 patients (26.5%) had non-malignant lung diseases. Among 29 patients (9.7%) who used a ventilator, 12 patients (6.1%) had lung cancer and 17 patients (16.7%) had non-malignant lung diseases. Among 16 patients (5.3%) who used BIPAP, 6 patients (3.0%) had lung cancer and 10 patients (9.8%) had non-malignant lung diseases. Regarding methods of nutrition, among 205 patients (68.3%) who received parenteral nutrition, 133 patients (67.2%) had lung cancer and 72 patients (70.6%) had non-malignant lung diseases. Regarding invasive procedures, among 71 patients (23.7%) who received a PICC, 48 patients (24.2%) had lung cancer and 23 patients (22.5%) had non-malignant lung diseases. Among 35 patients (11.7%) who received PCD, 28 patients (14.1%) had lung cancer and 7 patients (6.9%) had non-malignant lung diseases. Among 27 patients (9.0%) who received a central line, 13 patients (6.6%) had lung cancer and 14 patients (13.7%) had non-malignant lung diseases. Among 4 patients (1.3%) who underwent PTBD, 2 patients (1.0%) had

Table 3. Treatment Status after Physician Orders for Life-Sustaining Treatment (N=300).

Characteristics	Total	Lung cancer (n=198)	Non-malignant lung disease (n=102)	χ^2 or t	P
	n (%)	n (%)	n (%)		
Treatment					
CPCR	1 (0.3)	1 (0.5)	0 (0.0)	-	1.000*
Hemodialysis	13 (4.3)	2 (1.0)	11 (10.8)	-	<0.001*
Surgery	3 (1.0)	3 (1.5)	0 (0.0)	-	0.212*
Chemotherapy	11 (3.7)	11 (5.6)	-		
Targeted therapy	11 (3.7)	11 (5.6)	-		
Immunotherapy	6 (2.0)	6 (3.0)	-		
Radiation therapy	13 (4.3)	13 (6.6)	-		
Respiratory device					
Ventilator	29 (9.7)	12 (6.1)	17 (16.7)	8.67	0.003
BIPAP	16 (5.3)	6 (3.0)	10 (9.8)	6.12	0.013
HFNC	116 (38.7)	64 (32.3)	52 (51.0)	9.88	0.002
Nebulizer	48 (16.0)	21 (10.6)	27 (26.5)	12.61	<0.001
Nutrition					
Enteral nutrition	30 (10.0)	13 (6.6)	17 (16.7)	7.63	0.006
Parenteral nutrition	205 (68.3)	133 (67.2)	72 (70.6)	0.36	0.547
Invasive procedure					
Central line	27 (9.0)	13 (6.6)	14 (13.7)	4.21	0.040
PICC	71 (23.7)	48 (24.2)	23 (22.5)	0.11	0.744
PCD	35 (11.7)	28 (14.1)	7 (6.9)	3.46	0.063
PTBD	4 (1.3)	2 (1.0)	2 (2.0)	-	0.607*
Transfusion					
RBC	36 (12.0)	22 (11.1)	14 (13.7)	0.44	0.509
FFP	13 (4.3)	7 (3.5)	6 (5.9)	-	0.377*
PC	19 (6.3)	11 (5.6)	8 (7.8)	0.59	0.441
Others	4 (1.3)	2 (1.0)	2 (2.0)	-	0.607
Medication					
Inotropic agents	50 (16.7)	22 (11.1)	28 (27.5)	12.94	<0.001
Opioids	201 (67.0)	145 (73.2)	56 (54.9)	10.23	0.001

*Fisher's exact test.

CPCR: cardiopulmonary cerebral resuscitation, ECOG: eastern cooperative oncology group, BIPAP: bilevel positive airway pressure, HFNC: high flow Nasal cannular, PICC: peripherally inserted central catheter, PCD: percutaneous catheter drainage, PTBD: percutaneous transhepatic biliary drainage, RBC: red blood cell, FFP: fresh frozen plasma, PC: platelet concentrate.

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lung cancer and 2 patients (2.0%) had non-malignant lung diseases. Regarding types of transfusion, among 36 patients (12.0%) who received RBCs, 22 patients (11.1%) had lung cancer and 14 patients (13.7%) had non-malignant lung diseases. Among 19 patients (6.3%) who received PC, 11 patients (5.6%) had lung cancer and 8 patients (7.8%) had non-malignant lung diseases. Among 13 patients (4.3%) who received FFP, 7 patients (3.5%) had lung cancer and 6 patients (5.9%) had non-malignant lung diseases. Regarding medication, among 201 patients (67.0%) who were administered opioids, 145 patients (73.2%) had lung cancer and 56 patients (54.9%) had non-malignant lung diseases. Among 50 patients (16.7%) who were administered inotropic agents, 22 patients (11.1%) had lung cancer and 28 patients (27.5%) had non-malignant lung diseases.

Significant differences were found between the two groups in hemodialysis ($P<0.001$) and the use of ventilators ($\chi^2=8.67$, $P=0.003$), BIPAP ($\chi^2=6.12$, $P=0.013$), HFNC ($\chi^2=9.88$, $P=0.002$), nebulizers ($\chi^2=12.61$, $P<0.001$), enteral nutrition ($\chi^2=7.63$, $P=0.006$), central lines ($\chi^2=4.21$, $P=0.040$), inotropic agents ($\chi^2=12.94$, $P<0.001$), and opioids ($\chi^2=10.23$, $P=0.001$) (Table 3).

4. Post-POLST progress according to the type of disease

Among 300 total patients, 206 (68.7%) died. The average period from writing a POLST to the time of death was 16.88 ±43.42 days (median, 5 days; range, less than 1 to 370 days). Excluding death, the types of follow-up visits were transfer to convalescent hospitals (n=42, 44.7%), followed by transfer to hospice facilities (n=19, 20.2%), readmission (n=13, 13.8%), and emergency room visits (n=13, 13.8%). There was no significant difference in progress after writing a POLST between the two groups (Table 4).

DISCUSSION

This study was conducted to analyze the practices of life-sustaining treatment for patients with lung disease at a tertiary hospital, after they had written POLSTs and after the decision system for life-sustaining treatment was implemented.

Although more than half (n=198, 66.0%) of the study participants had lung cancer, the current study's analysis of the subjects of life-sustaining treatment is meaningful because it includes patients with non-malignant lung diseases such as COPD, pneumonia, sepsis, interstitial lung disease, asthma, and pulmonary edema.

Table 4. Results of Life-Sustaining Treatment (N=300)*.

Characteristics	Total	Lung cancer (n=198)	Non-malignant lung disease (n=102)	χ^2 or t	P
	n (%) or M±SD median (range)	n (%) or M±SD median (range)	n (%) or M±SD median (range)		
Life or death status					
Survival	94 (31.3)	60 (30.3)	34 (33.3)	0.29	0.592
Death	206 (68.7)	138 (69.7)	68 (66.7)		
Days from POLST to death	16.88±43.32 5 (<1~370)	15.68±40.11 5 (<1~367)	19.32±49.44 4 (<1~370)	-0.57	0.572
Follow up (excluding death)					
Readmission	13 (13.8)	6 (10.0)	7 (20.6)	-	0.214*
ER	13 (13.8)	7 (11.7)	6 (17.6)	-	0.536*
Transfer to convalescent hospital	42 (44.7)	30 (50.0)	12 (35.3)	1.90	0.168
Transfer to hospice facility	19 (20.2)	11 (18.3)	8 (23.5)	0.36	0.547
Total	94 (100)	60 (63.8)	34 (38.2)		

*Fisher's exact test.
POLST: physician orders for life-sustaining treatment, ER: emergency room.

In this study, 187 patients (62.3%) wrote POLSTs themselves, of whom 131 patients (66.2%) had lung cancer and 56 patients (54.9%) had non-malignant lung diseases. In another study of 334 patients at a tertiary hospital who wrote informed-consent documents for life-sustaining treatment, 79 lung cancer patients (34.2%) and eight patients with non-malignant lung diseases (7.8%) made self-determinations [13]. This study showed a higher rate of self-determination in cancer patients than in non-cancer patients. According to the report of the National Agency for Management of Life-Sustaining Treatment, the proportion of self-determination in writing ADs and POLSTs has increased from 32.4% in 2018 to 40.9% in 2021 [21]. The basis of this result may be a study of residents before and after the enforcement of the Act on Decisions on Life-Sustaining Treatment, which reported that after the Act went into effect, the number of discussions of life-sustaining treatment between patients and their caregivers increased, and discussions began sooner [22]. In a study of 182 adult cancer patients, their attitudes toward ADs were found to be positive [23]. The current study's result of a higher rate of self-determination than in previous studies may be attributed to the coronavirus disease 2019 (COVID-19) pandemic. Participants in the current study made decisions on life-sustaining treatment during the COVID-19 pandemic, when medical institutions made family care difficult by restricting visits and partially limiting caregivers' participation on site due to concerns about infection. Accordingly, patient-centered decision-making, which explains patients' conditions directly and helps them to make decisions, may have increased and become more deliberate. However, the current study was a retrospective analysis of medical records and was limited in determining in detail how the POLST decision-maker was selected.

After the implementation of the decision system for life-sustaining treatment, the cumulative number of registered ADs had reached 1.16 million documents by 2021; 2.66% of individuals aged 19 years or older had registered, the highest number of ADs was found among people in their 70s, and that number was steadily increasing [21]. However, in this study, only 20 patients (6.7%) wrote ADs, which is a very low proportion. Anyone aged 19 years or older may write an AD on life-sustaining treatment and hospice care, in preparation for becoming a dying patient in the future [21]. Therefore, active publicity is needed for the general public, as well as for current patients.

Among cancer patients who had written POLSTs, 1 patient (0.5%) received CPCR, 2 patients (1.0%) underwent dialysis, and chemotherapy was partially performed. In an earlier study of the status of life-sustaining treatment for 482 cancer patients, similarly, dialysis was performed on a small number of patients (n=5, 1.0%) [24]. Among 386 terminally ill cancer patients with a median survival of 4 months, 216 (56%) received chemotherapy, and these patients had a high risk of death in an intensive care unit after receiving CPCR, mechanical ventilation, or both [25]. Based on this result, it was suggested that decreased use of chemotherapy and earlier access to hospice palliative care services for terminally ill cancer patients with a life expectancy of 6 months or less may improve the quality of end-of-life care [25].

Concerning respiratory devices, HFNC was used the most overall (n=116, 38.7%), and more often for cancer patients than patients with non-malignant lung diseases. By contrast, ventilators, BIPAP, and nebulizers were used more often for patients with non-malignant lung diseases than cancer patients. Patients with non-malignant lung disease complain primarily of dyspnea and fatigue, and for most patients, dyspnea is not relieved during the dying process [7]. As lung disease progresses, healthcare providers perform treatment that focuses on reduced lung function and oxygen supply [9]. Moreover, in more than a few cases, ventilation is applied in a clinical setting before a POLST could be written, due to sudden exacerbation of COPD [4]. In the current study, more than half of the patients received parenteral nutrition. Both enteral and parenteral nutrition have clinical benefits and may increase the survival rate in advanced cancer patients [26]. In the current study, a small number (n=30, 10%) of patients received enteral nutrition, similar to the results of Park [24], which suggests that enteral nutrition was less important in terminally ill patients. However, since enteral nutrition is superior to parenteral nutrition, symptom management to improve oral intake should be considered before initiating parenteral nutrition [26]. In addition, the peripheral vessels were used in most patients, since 27 patients (9.0%) received a central line and 71 patients (23.7%) received a PICC.

Some patients received transfusion, but there was no differ-

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ence according to the type of lung disease. Inotropic agents were administered more often in patients with non-malignant lung disease than in cancer patients; opioids were administered to more than half of patients overall (n=201, 67.0%), and more to cancer patients than to patients with non-malignant lung diseases, similar to the findings of Butler et al. [19]. Terminally ill cancer patients may experience symptoms including pain, dyspnea, delirium, restlessness, nausea, and vomiting, of which pain is the most common symptom. Symptom management is crucial for cancer patients to have a comfortable end of life, and the most frequently administered medication during their final hospitalization is opioids [27]. Pain-related distress is greater in cancer patients, whereas respiratory-related pain is greater in patients with non-malignant lung diseases [8]. In addition, since the main symptoms of patients with non-malignant lung diseases include dyspnea, cough, fatigue, and an increase in secretions [9], it is thought that treatment to relieve dyspnea should be prioritized. Nonetheless, because pain can gradually intensify even in patients with non-malignant lung diseases, symptom management requires the regular assessment of symptoms.

The average period from writing a POLST to the time of death was 16.88±43.32 days, with no statistically significant difference between cancer patients and patients with non-malignant lung diseases. In a study of terminally ill cancer patients who wrote do-not-resuscitate (DNR) orders before the implementation of the life-sustaining treatment system, the average period from DNR decision to death was 6.66±8.41 days [28], which indicates that POLSTs may be prepared earlier.

After discharge, 42 patients (44.7%) were transferred to convalescent hospitals, 19 (20.2%) were transferred to hospice facilities, 13 (13.8%) were readmitted, and 13 (13.8%) visited emergency rooms. The finding that about half of the discharged patients were transferred to convalescent hospitals reflects the fact that the current study was conducted at a tertiary hospital that operates consultative hospice care. The statistics of the National Hospice Center showed an increasing trend in the rate of hospice use from 7.3% in 2008 to 21.3% in 2020, compared to deaths from diseases covered by hospice care [29]. The trend was confirmed in this study, showing a similar rate of hospice use after discharge.

While most cancers allow the persistence of bodily functions for some time, then intensify rapidly near the end of a patient's life, non-malignant lung diseases commonly progress with recurrent episodes of exacerbation and recovery over many years [9]. As such, since the characteristics of patients with non-malignant lung diseases are different from those of cancer patients, different approaches to care should be determined. In the early stages of diagnosis, treatment should focus on a complete recovery. When the response to treatment is low and a poor prognosis is expected, palliative care should be increased and the provision of hospice care should be considered [4]. Furthermore, comprehensive support is required, including drug therapy for symptom relief, pulmonary rehabilitation, psychosocial support, nutritional support, and oxygen therapy [7].

This retrospective study based on medical records was limited in identifying details of the processes and reasons underlying decisions about life-sustaining treatment, and its generalizability is also limited since it collected and analyzed data from one hospital. Since non-malignant lung diseases include COPD, as well as some acute diseases such as sepsis and pulmonary embolism, caution is necessary in interpreting the results. In addition, since the practice of life-sustaining treatment was investigated only after POLSTs were written, it could not be confirmed whether the treatment was applied before and after a POLST or newly added. However, this study is meaningful in comprehensively investigating the practice of life-sustaining treatment for both non-malignant lung diseases and lung cancer after POLSTs were written. Based on these results, healthcare providers should take a stronger interest in life-sustaining treatment for patients with non-malignant diseases and strive to establish a comprehensive system.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Conception or design of the work: all authors. Data collection: YMO, YNK, SJH. Data analysis and interpretation: all authors. Drafting the article: YMO, JHK. Critical revision of the article: YMO, JHK. Final approval of the version to be published: all authors.

SUPPLEMENTARY MATERIALS

Supplementary materials can be found via https://doi.org/10.14475/jhpc.2023.26.1.7.

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