Healthcare Utilization and End-of-Life Care according to Types of Life-Sustaining Treatment Decisions for Cancer Patients

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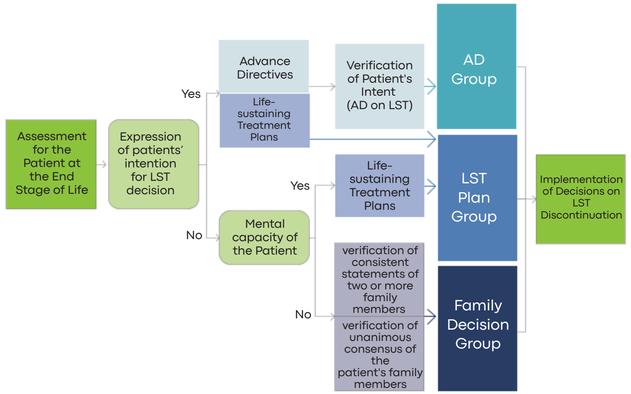
1. Purpose

In South Korea, terminally ill patients may formally document their preferences for hospice care and the discontinuation of life-sustaining treatment(LST). This is done either through an advance directive (AD) while the patient is still in good health, or via a life-sustaining treatment plan (LST Plan) during the terminal or end-of-life(EOL) stage.
When patients lose decision-making capacity, treatment may be withdrawn based on a unanimous decision among family members or consistent statements from at least two of them.

This study examines differences in healthcare utilization and EOL care among cancer patients according to the type of LST decision made.

Figure 1. Procedure of the decision on life-sustaining treatment



2. Methods

A retrospective study was conducted on 801 cancer patients who had deceased at Chonnam National University Hwasun Hospital between May 2022 and December 2023.

LST decisions were classified into three groups: AD, LST Plan, and family decision. Patient data were obtained from the hospital's Medical Records Department. The interrater reliability among data collectors was confirmed by a kappa coefficient of 0.81(κ= .81)

Differences in general and clinical characteristics, healthcare utilization, and EOL care were analyzed using the χ^2 test, Fisher's exact test, and Kruskal-Wallis test. Bonferroni correction was applied for post-hoc comparisons.

3. Results

The family decision group was characterized by older age, impaired consciousness at admission, hematologic and lymphatic malignancies, and a greater burden of comorbidities. This group also had the highest rate of death on the day of the LST decision, with 22% of patients dying on that day. During the final hospitalization, they exhibited the highest average daily medical cost and ICU utilization, along with the most frequent use of CPR, renal replacement therapy, chemotherapy, blood transfusion, vasopressors, surgery, and CT imaging. On the day of death, this group received the most intensive medical interventions, including mechanical ventilation, artificial nutrition, antibiotic administration, blood tests, arterial catheter maintenance, and ECG monitoring.

In contrast, the LST Plan group demonstrated the highest rates of hospice enrollment, structured EOL education, analgesic administration, and central venous catheter maintenance, reflecting a more palliative-focused approach. The AD group exhibited intermediate values across most indicators, which suggests systemic limitations and barriers to clinical implementation.

Notably, oral care—an essential component of EOL care—was most frequently provided in the family decision group. Additionally, more than half of all patients received artificial nutrition and antibiotics on the day of death. These findings emphasize the importance of establishing standardized and fundamental EOL care practices to support patient comfort during the dying process.

Table 1. General and Clinical Characteristics of Cancer Patients According to Types of Life-Sustaining Treatment Decisions

Variable		Total (N=801)	AD group (n=45)	LST Plan group (n=378)	Family decision group (n=378)	χ^2 or F (*p*)
		n(%) or M±SD or Midian [Q1-Q3]	n(%) or M±SD or Midian [Q1-Q3]	n(%) or M±SD or Midian [Q1-Q3]	n(%) or M±SD or Midian [Q1-Q3]	
Age(years)		68.14±11.22	69.31±8.4[a]	65.24±11.22[b]	70.90±10.77[c]	56.95 (<.001) b<c
Primary caregiver Type	Spouse	440(54.9)	25(55.5)	233(61.7)	182(48.1)	23.64 (<.001)
	Children	268(33.5)	12(26.7)	98(25.9)	158(41.8)	
	Others	93(11.6)	8(17.8)	47(12.4)	38(10.1)	
Consciousness state on admission	Alert	704(87.9)	41(91.1)	365(96.6)	298(78.8)	55.72 (<.001)
	Non-Alert	97(12.1)	4(8.9)	13(3.4)	80(21.2)	
Primary diagnosis	Gastrointestinal malignancy	365(45.6)	19(42.2)	245(64.7)	101(26.7)	165.41 (<.001)
	Respiratory malignancy	190(23.7)	5(11.1)	66(17.5)	119(31.5)	
	Hematologic and lymphatic malignancy	141(17.6)	9(20.0)	15(4.0)	117(31.0)	
	Others	105(13.1)	12(26.7)	52(13.8)	41(10.8)	
Number of comorbidities		1.92±1.80	1.36±1.19[a]	0.92±0.97[b]	3.00±1.88[c]	285.90 (<.001) b<c
Survival duration after LST decision (days)		7[3-21]	387[a] [164-581]	13[5-30][b]	3[2-6][c]	213.90 (<.001) c<b<a
	Death on the same day	92(11.5)	0(0)	9(2.4)	83(22.0)	220.27 (<.001)
	2-7days	341(42.6)	0(0)	126(33.3)	215(56.8)	
	8 days or more	368(45.9)	45(100)	243(64.3)	80(21.2)	

a,b,c: Kruskal-Wallis test with Bonferroni correction

Table 2. Healthcare Utilization and End-of-Life Care According to Types of Life-Sustaining Treatment Decisions

			Total (N=801)	AD group (n=45)	LST Plan group (n=378)	Family decision group (n=378)	χ^2 or F (*p*)
			n(%)or M±SD	n(%)or M±SD	n(%)or M±SD	n(%)or M±SD	
	Average daily medical cost (KRW)		665,308 [459,147-1,164,368]	589,743[a] [486,061-1,068,935]	491,510[b] [413,823-701,084]	1,055,835[c] [656,509-1,679,658]	215.45 (<.001) b<a<c
During final hospitalization	Hospice enrollment	Yes	365(45.6)	25(55.6)	266(70.4)	74(19.6)	198.51 (<.001)
	ICU admission	Yes	156(19.5)	2(4.4)	21(5.6)	133(35.2)	112.67 (<.001)
	Cardiopulmonary resuscitation (CPR)	Yes	18(2.2)	1(2.2)	2(0.5)	15(4.0)	10.18 (.006)
	Renal replacement therapy (RRT)	Yes	73(9.1)	5(11.1)	4(1.1)	64(16.9)	57.72 (<.001)
	Blood transfusion	Yes	496(61.9)	29(64.4)	209(55.3)	258(68.3)	13.60 (<.001)
	Vasopressor administration	Yes	269(33.6)	8(17.8)	65(17.2)	196(51.9)	107.11 (<.001)
	Chemotherapy	Yes	119(14.9)	7(15.6)	28(7.4)	84(22.2)	32.81 (<.001)
	Surgical intervention	Yes	39(4.9)	1(2.2)	12(3.2)	26(6.9)	6.32 (.042)
	Computed tomography (CT)	Yes	389(48.6)	24(53.3)	153(40.5)	212(56.1)	18.87 (<.001)
	Structured end-of-life education	Yes	326(40.7)	20(44.4)	263(69.6)	43(11.4)	265.54 (<.001)
On the day of death	Oxygen therapy	No	60(7.5)	5(11.1)	42(11.1)	13(3.4)	201.51 (<.001)
		Low-flow	351(43.8)	29(64.4)	236(62.4)	86(22.8)	
		High-flow	316(39.5)	9(20.0)	98(25.9)	209(55.3)	
		Mechanical ventilation	74(9.2)	2(4.5)	2(0.6)	70(18.5)	
	Artificial nutrition (enteral or parenteral)	Yes	461(57.6)	25(55.6)	168(44.4)	268(70.9)	54.22 (<.001)
	Analgesic administration	Yes	640(79.9)	36(80.0)	347(91.8)	257(68.0)	66.72 (<.001)
	Antibiotic administration	Yes	441(55.1)	22(48.9)	127(33.6)	292(77.2)	146.27 (<.001)
	Laboratory blood tests	Yes	331(41.3)	14(31.1)	63(16.7)	254(67.2)	201.06 (<.001)
	Central venous catheter maintenance	Yes	437(54.6)	24(53.3)	256(67.7)	157(41.5)	52.32 (<.001)
	Arterial catheter maintenance	Yes	218(27.2)	9(20.0)	40(10.6)	169(44.7)	112.38 (<.001)
	Electrocardiographic (ECG) monitoring	Yes	452(56.4)	14(31.1)	108(28.6)	330(87.3)	277.58 (<.001)
	Oral care	Yes	220(27.5)	5(11.1)	75(19.8)	140(37.0)	34.45 (<.001)

4. Conclusion

This study revealed that healthcare utilization and EOL care varied by the type of LST decision. The LST Plan group demonstrated a more patient-centered and palliative-focused approach, whereas the family decision group was more likely to receive aggressive interventions until death. The AD group showed intermediate levels across most indicators, reflecting limitations in clinical applicability.
These findings underscore the importance of early discussions regarding LST decisions, regular updates, and the implementation of advance care planning (ACP) systems to enhance communication. To improve the quality of EOL care, a universal care framework and a multidisciplinary approach are essential.