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Correlates of life-support treatment preferences among low-income home-based cancer management recipients

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ABSTRACT

Purpose: To examine the correlates of life-support treatment (LST) preferences from attitudes toward advance directives (ADs), perceived susceptibility, symptom frequency, symptom burden, and global health among low-income community-dwelling cancer management recipients, controlling for age, sex, education, and duration after cancer diagnosis.

Methods: A cross-sectional, correlational study design was used to assess LST preferences and correlates. Data were collected from low-income cancer survivors during nurses' home visits.

Results: Survivors who had mostly solid cancer participated ($N = 107$, mean age = 67.39 ± 11.57 years, 32.7% males). Hospice care was the most desired (66.4%), while aggressive treatments were less preferred: cardiopulmonary resuscitation (15.9%), ventilation support (15.0%), hemodialysis (18.7%), or chemotherapy (12.1%). Higher symptom frequency was associated with a greater likelihood of preferring all aggressive treatments (odds ratios = 1.44–1.75). In addition, longer cancer duration was associated with a greater likelihood of preferring ventilation support; females had a lesser likelihood of preferring hemodialysis and chemotherapy. Higher education was associated with a lesser likelihood of preferring chemotherapy. More positive attitudes ($B = 0.15$, $p = .001$) were associated with a greater likelihood of preferring hospice care, and greater symptom burden of pain ($B = -0.03$, $p = .047$) was associated with a lesser likelihood.

Conclusion: Results support the feasibility of incorporating ADs into cancer management among community-dwelling cancer survivors, with consideration of AD attitudes and symptom monitoring. An integration of AD discussion into the home visiting service could be a liaison for the quality and continuity of cancer survivorship care that guides and manages patients' survivorship issues.

1. Introduction

As cancer deaths continue to decrease, survival rates following cancer diagnoses are increasing today more rapidly than ever, largely due to the risk modification and therapeutic advances in early detection and treatment options (Pearlman, 2014; World Health Organization, 2018). Although five-year survival rates vary by types of cancer, the rates in liver, pancreas, and lung cancers have reached up to a 5% increase worldwide (Allemani et al., 2018). In South Korea, cancer survival has increased by 16.7% over the past decade i.e. from 54.0% (2001–2005) to 70.7% (2011–2015) (Jung et al., 2017; National Cancer Center, 2017). However, longer survivorship is often involved in a wide spectrum of survivorship issues, such as physical and psychosocial suffering and the financial burden of receiving treatment (Rowland and Bellizzi, 2014).

To reduce such burdens on cancer survivors, guidance for survivorship care recommend that care should be integrated into routine practices, focusing on the following domains: surveillance and screening for recurrence/new cancers, management of long-term and late cancer, treatment-related sequels, psychosocial issues, and coordination of care (Denlinger et al., 2016; Rowland and Bellizzi, 2014). Early integration of palliative discussions/symptom management into

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survivorship care can improve the quality and continuity of cancer survivorship care (Dy et al., 2017; Parikh et al., 2013), with the provision of care based on the survivor's autonomy as documented in an advance directive (AD) (O'Caoimh et al., 2017; Pérez et al., 2013). An AD is a written statement of an individual's end-of-life (EoL) treatment wishes in advance in case of his/her decisional incapacity, and the existing forms vary, such as a living will, durable power of attorney, or do not resuscitate order (NCI Dictionary of Cancer Terms, 2019). The improvement of patient outcomes with such a systematic approach has been well-documented, with specific benefits including lower resource utilization (Kavalieratos et al., 2016), patient and family satisfaction (Detering et al., 2010), and cost reduction (Dalal and Bruera, 2017). However, there is limited access to advance care planning (ACP) or ADs, which has often led patients with cancer to receive aggressive life-support treatments (LSTs) at the EoL that may interfere with timely palliative consultation or hospice referral (Cappell et al., 2018; Eckhert et al., 2017; Enguidanos and Ailshire, 2017; Narang et al., 2015). In South Korea, such a care remains suboptimal and is mostly applied to terminal cancer patients until a recently enforced Act for the relevant care (National Law Information Center, 2018). Since the enforced Act, an AD form is available for not only terminally ill people but also to general population to prepare and register one.

To facilitate the optimal use of an AD, identifying non-modifiable and/or modifiable factors affecting its utilization is important. Prior studies have reported several non-modifiable demographic factors challenging AD use, with lower utilization more common in patients who were younger or belonged to non-white races, and with less education or poor economic status (McDonald et al., 2017; Rao et al., 2014). Previous studies that examined modifiable factors associated with ACP or AD utilization, such as knowledge or attitudes, were conducted using samples largely from professionals, adults, or elderly people (Gao et al., 2015; Kermel-Schiffman and Werner, 2017; Zhang et al., 2015). Other modifiable factors may also affect optimal use of ACP or AD. For instance, perceived susceptibility to the possible experiences of adversities without an AD was associated with consideration about its importance for documentation (Sinclair et al., 2013). Moreover, perceived health was associated with knowledge about ACP in community-dwelling adults (Noh et al., 2018). In addition, symptom burden was associated with better EoL preparation in advanced cancer patients (Wentlandt et al., 2012).

However, the associations of these multiple modifiable factors with the specific life-sustaining treatments (LSTs) have rarely been examined among cancer survivors. To facilitate optimal use of ACP or AD, it is critical to identify modifiable factors associated with specific LSTs. In addition, poor socioeconomic status adversely influenced suboptimal use of ADs (McDonald et al., 2017; Rao et al., 2014), but factors associated with specific LSTs in low-income cancer survivors have been rarely examined. Therefore, the purpose of this study was to examine the preferences of LSTs (cardiopulmonary resuscitation [CPR], ventilation support, hemodialysis, chemotherapy, and hospice care) using the Korean Advance Directive (K-AD) questionnaire and the aforementioned modifiable correlates of each of the LST preferences. These included AD attitudes, perceived susceptibility to unexpected EoL experiences, symptom frequency, symptom burdens, and global health status among low-income, community-dwelling Korean cancer survivors who were home-based cancer management recipients.

2. Methods

2.1. Design and procedure

This was a secondary data analysis of a cross-sectional, correlational study that examined ADs and decisional conflicts associated with the medical decisions for EoL care in low-income cancer survivors who were home visiting service recipients. The research participants were recruited from the enrollees of a local home visiting health center from March to October 2017. The majority of the participants were older adults, living in the community with various cancers. Home visiting nurses who provided managing strategies for cancer survivorship issues conducted face-to-face administration of survey questionnaires, according to the study protocol during their home visits. The study protocol included specified explanations of the study's aims, ACP and ADs, and the administration method of the questionnaires. The Health Center director assisted visiting nurses to manage the data collection and adhere to the study protocol. Visiting nurses assisted participants in completing the questionnaires. The Institutional Review Board of the university approved this study protocol, and all participants signed written informed consent forms before data collection.

2.2. Participants

Cancer survivors participated in this study if they met the following criteria: (1) age ≥ 19 years, (2) financial qualification of the bottom 40% of median household income, and (3) time after the completion of cancer treatment < 5 years (Ministry of Health and Welfare, 2016). Participants were also required to be aware of their conditions and willing to talk about ACP and ADs. Exclusion criteria were: (1) having a neurological or psychiatric comorbidity, such as Alzheimer's disease, other dementias, or mental disorders that accompany severe cognitive impairment and consequently decisional incapability for medical care determined by visiting nurses or (2) having a terminal state that meets the criteria for hospice/palliative care.

2.3. Measures

Life-support treatments. Preferences of the LSTs were explored using treatment directives on the K-AD questionnaire, which consisted of three parts: EoL value, treatment directives, and proxy (Kim et al., 2013). Treatment directives include five LSTs (CPR, ventilation support, hemodialysis, chemotherapy, and hospice care). Participants were asked to indicate a preference on a dichotomous scale (1 = yes, 0 = no) for each treatment. Previously, feasibility of the K-AD questionnaire was reported from both clinical and community settings, with its administration to both cancer patients and their family caregivers (Kim et al., 2017b), and community-dwelling older people with chronic diseases (Kim et al., 2017a), respectively.

Attitudes toward ADs. Attitudes toward advance directives were assessed using the Advance Directive Attitude Survey (ADAS) (Nolan and Bruder, 1997). The ADAS consists of 16 items that capture the extent to which an individual has positive or negative views about ADs in terms of treatment options, their effects on treatment and family, and overall illness perception. Using the 4-point Likert response options (1 = strongly disagree, 4 = strongly agree), the possible total scores of the scale range from 16 to 64, with higher scores indicating more positive AD attitudes. Psychometric properties of the Korean version provided initial support for its reliability and validity [Unpublished work].

Perceived susceptibility. Perceived susceptibility was assessed using the modified version of the Perceived Susceptibility Scale (Ko and Lee, 2009). The scale consists of 5 items on a 7-point Likert response scale, with each item designed to capture personal susceptibility to the possible unexpected EoL experiences. The possible total scores range from 5 to 35, with higher scores indicating greater perceived importance about possible adverse experiences at the EoL period. Previous reports showed acceptable reliability, with Cronbach's alpha of 0.73 among older adults (Ko and Lee, 2009).

Global health status/quality of life (QOL) and symptom burdens. The European Organization for Research and Treatment of Cancer (EORTC) quality of life (QLQ)-C30 (Aaronson et al., 1993) includes multidimensional subscales such as a global health status, and three symptom scales and a number of single symptom items. Out of these, we used a global health status subscale/QOL and three symptom scales of fatigue, nausea/vomiting, and pain to assess symptom burdens in cancer survivors. The global health status consists of two items constructed on a 7-point Likert scale; the multi-item symptom burden scale, which reflects the symptom and also its effects on daily activities, included fatigue (3 items), nausea/vomiting (2 items), and pain (2 items), with each scale constructed on 4-point Likert response options. Following the EORTC scoring manual (Fayers et al., 2001), raw scores for each scale were transformed to a 0-to-100 scale, with high scores indicating high QOL and more symptom problems.

Symptom frequency. Authors derived 14 symptoms from the literature (Yarbro et al., 2015) that patients with cancer often experience. These included pain, sleep disturbance, anxiety, depressive symptoms, fatigue, poor appetite, diarrhea, constipation, nausea/vomiting, bleeding, weight loss, dizziness, skin problems, and hoarseness. We asked cancer survivors about these symptom experiences over the past week, using a dichotomous option (yes or no, indicating only the presence or absence of each symptom), to compute symptom frequency.

A standard form was developed by authors, and was used to extract demographic and disease information including age, sex, marital status, duration after cancer diagnosis, and type of cancer.

2.4. Data analyses

The Statistical Package for the Social Sciences for Windows (version 23.0) (SPSS Statistics 23.0, 2016) was used in statistical analyses for this study, with the level of significance set at a p-value < .05. Descriptive statistics were used to describe the sample characteristics and LST preferences in the K-AD model including frequency, percentage, mean, and standard deviation. Chi-square tests, t-tests, or ANOVA were conducted to compare demographic differences based on each LST, depending on the level of measurement of the variables. T-tests or Mann-Whitney U tests were also conducted to compare the levels of AD attitudes, perceived susceptibility to unexpected EoL experiences, and global health status according to each of the LSTs. Finally, a series of multiple logistic regression analyses with the backward approach were performed to identify correlates of each decision for LSTs. In this, age, sex, education, duration after cancer diagnosis, symptom frequency, attitudes, perceived susceptibility to unexpected EoL experiences, symptom burdens (fatigue, nausea/vomiting, and pain), and global health status/QOL were entered as predictors and each LST preference as the outcome. Odds ratios and confidence intervals (CIs) were also computed to examine the predictive values of these variables for each LST preference.

3. Results

A total of 107 cancer survivors participated in the study (age, 67.39 ± 11.57 years; range, 29–89 years) (Table 1). Of those, approximately half were 70 years old or older (48.6%). The sample predominantly consisted of females (67.3%), and approximately half were married (51.4%). One-third of participants had at least a high-school education (34.6%). Most patients had solid cancer of the gastrointestinal system (37.4%), followed by the breast (19.6%) or the liver/pancreas/biliary duct (8.4%). For approximately half of the cancer survivors, five years or more had passed since their cancer diagnosis (48.6%).

Only less than one-third of participants reported that they had heard of the ADs. An intention for a “do-not-resuscitate” order was found in 68.2%. Of the five LSTs, hospice care was preferred the most frequently (66.4%), while aggressive treatments such as CPR (15.9%), ventilation support (15.0%), hemodialysis (18.7%), or chemotherapy (12.1%) were less preferred.

Table 2 presents symptom frequency, symptom burdens, attitudes, perceived suitability, and global health status of the cancer survivors. A median score of symptom frequency was 1.0 with a range of 1.0–2.0). Symptom burdens associated with three common symptoms of fatigue, nausea/vomiting, and pain were 33.3, 0.0, and 16.7 on a 0-to-100 scale, indicating that cancer survivors experienced mild levels of symptom burdens. AD attitudes of cancer survivors were moderately high with a mean score of 47.75, while their perceptive susceptibility to unexpected EoL experience was also moderately high with a median score of 26.0. Overall, cancer survivors' health status was modest with a median score of 58.3.

Table 1
Demographic characteristics of cancer survivors (N = 107).

Characteristics	Variable Categories	n (%)	Mean ± SD (range)
Age (years)			67.39 ± 11.57 (29–89)
	< 70 years	55 (51.4)	
	≥70 years	52 (48.6)	
Sex	Male	35 (32.7)	
	Female	72 (67.3)	
Marital status	Married	55 (51.4)	
	Widowed/ divorced	47 (43.9)	
	Never married	5 (4.7)	
Employment status	Employed	18 (16.8)	
	Unemployed	83 (77.6)	
	Retired	6 (5.6)	
Educational level	None	19 (17.8)	
	Elementary	26 (24.3)	
	Middle high	25 (23.4)	
	High school	26 (24.3)	
	College or higher	11 (10.3)	
Family caregivers	Yes	65 (60.7)	
	No	42 (39.3)	
Caregiver relationships	NA	33 (30.8)	
	Spouse	41 (38.3)	
	Children	18 (16.8)	
	[a]Others	15 (14.0)	
[b]Body mass index			22.54 ± 3.63 (10.78–30.47)
Duration after cancer diagnosis (years)	< 18.50	12 (11.2)	
	18.50–24.99	69 (64.5)	
	≥25.00	25 (23.4)	
	< 1 year	7 (6.5)	
	1–3 years	26 (24.3)	
	3–5 years	22 (20.6)	
	> 5 years	52 (48.6)	
Type of cancer	Gastric/colon	40 (37.4)	
	Breast	21 (19.6)	
	Liver/biliary/ pancreas	9 (8.4)	
	Lung	7 (6.5)	
	Gynecology	5 (4.7)	
	Metastasis	6 (5.6)	
	Others	19 (17.8)	
Awareness of ADs	Yes	33 (30.8)	
DNR intention	Yes	73 (68.2)	

Abbreviation. NA, not available; ADs, advance directives; DNR, do not resuscitate.

Note. Normally distributed numerical variables are presented by mean ± standard deviation (range); non-normally distributed numerical variables are presented by median and 25%–75% quartiles (Q1-Q3).

[a] Others include friends, siblings, relatives, neighbors, volunteers, or professionals.

[b] One missing; three categories defined by the Korean Society for the Study of Obesity: < 18.5 for underweight, 18.5–24.9 for normal and overweight, and ≥25.0 for obesity.

3.1. Participant characteristics according to each decision for life-support treatment preferences

Among the aggressive treatment options, preference for CPR was higher in cancer survivors with longer time duration after diagnosis (≥5 years after cancer diagnosis) than those with less than 5-year

Table 2
Symptom frequency, symptom burdens, attitudes, perceived suitability, and global health status. Note. Normally distributed numerical variables are presented by mean ± standard deviation; non-normally distributed numerical variables are presented by median and 25%–75% quartiles (Q1-Q3).

Variables	Mean ± SD (range) Median (Q1 – Q3)
Symptom frequency	1.0 (1.0–2.0)
Fatigue	33.3 (22.2–55.6)
Nausea/vomiting	0.0 (0.0–16.7)
Pain	16.7 (0.0–33.3)
Attitudes	47.75 ± 6.00 (32.00–61.00)
Perceived suitability[a]	26.0 (20.0–33.0)
Global health status	58.3 (50.0–75.0)

[a] Perceived susceptibility refers to personal susceptibility to unexpected EoL experience.

(23.1% vs. 9.1%, p = .048). Preference for ventilation support was higher in male patients (25.7% vs. 9.7%, p = .030) and those with longer time duration after diagnosis (23.1% vs. 7.3%, p = .022) than their counterparts. Preference for hemodialysis was higher in male patients than in females (34.3% vs. 11.1%, p = .004). Preference for chemotherapy was higher in males (22.9% vs. 6.9%, p = = .018) and those with less than a high-school education (17.1% vs. 2.7%, p = .030) than in their counterparts. Preference for hospice care was higher in cancer survivors with less than 70 years of age than 70-year-old or older patients (76.4% vs. 55.8%, p = .024).

3.2. Differences in advance directive attitudes, perceived susceptibility, symptom burdens, and global health status according to each life-support treatment preference

Cancer survivors who preferred to receive CPR (mean = 44.53 vs. 48.36, p = .015) or ventilation support (mean = 44.81 vs. 48.26, p = .033) had more negative attitudes toward ADs than their counterparts of both aggressive treatments (Table 3). In contrast, cancer survivors who preferred to receive hospice care had more positive AD attitudes (mean = 49.25 vs. 44.78, p < .001) and higher levels of perceived importance about EoL care (perceived susceptibility) (median = 29.0 vs. 22.5, p = .020) than their counterparts. Global health status did not significantly differ by LST preferences.

3.3. Correlates of the preference for each life-support treatment

In a series of multiple logistic regression analyses with stepwise backward approaches (Table 4), while symptom frequency, sex, education, and/or duration after cancer diagnosis were associated with the preference for aggressive treatments, attitudes and symptom burdens were associated with the preference for hospice care. Cancer survivors with a higher number of symptoms were more likely to prefer all aggressive treatments: the odds ratio (ORs) for CPR was 1.44 (B = 0.37, p = .029), while for ventilation support it was 1.56 (B = 0.44, p = .015), for hemodialysis it was 1.46 (B = 0.38, p = .022), and for chemotherapy it was 1.75 (B = 0.56, p = .007). When one symptom frequency increased, the likelihood of preferring CPR, ventilation support, hemodialysis, and chemotherapy increased by 44%, 56%, 46%, and 75%, respectively. In addition, duration of more than five years after cancer diagnosis increased the likelihood of preferring ventilation support by 292%. Being female decreased the likelihood of preferring hemodialysis by 72%. Being female and higher education level (> 12 years) decreased the likelihood of preferring chemotherapy by 77% and 90%, respectively. For hospice care, when one score increased in attitudes (more positive attitudes, B = 0.15, p = .001), the likelihood of

Table 4
Correlates of each preference of the advance directive life-support treatments (N = 107).

Outcome variable	[a]Factor	B	*p*	OR	95% CI	
					Lower	Upper
Cardiopulmonary resuscitation	Attitudes	−0.10	.051	0.91	0.825	1.000
	Symptom frequency	0.37	.029	1.44	1.037	2.006
	Model test: Chi-square = 10.85, *p* = .004					
Ventilation support	Cancer diagnosis[b]	1.36	.032	3.92	1.127	13.619
	Symptom frequency	0.44	.015	1.56	1.088	2.225
	Model test: Chi-square = 12.15, *p* = .002					
Hemodialysis	Sex[b]	−1.27	.018	0.28	0.098	0.803
	Symptom frequency	0.38	.022	1.46	1.056	2.023
	Model test: Chi-square = 13.30, *p* = .001					
Chemotherapy	Sex[b]	−1.48	.035	0.23	0.058	0.898
	Education[b]	−2.33	.040	0.10	0.011	0.895
	Symptom frequency	0.56	.007	1.75	1.167	2.613
	Model test: Chi-square = 21.15, *p* < .001					
Hospice	Attitudes	0.15	.001	1.16	1.066	1.262
	Fatigue	0.03	.050	1.03	1.000	1.060
	Pain	−0.03	.047	0.97	0.948	1.000
	Model test: Chi-square = 19.03, *p* < .001					

Abbreviations: CI, confidence interval; OR, odds ratio.

[a] Each model includes age, sex, education, duration after cancer diagnosis, symptom frequency, AD attitudes, perceived susceptibility, fatigue, nausea/vomiting, pain, and global health status. These variables were entered using backward stepwise approach (likelihood ratio).

[b] Reference: male, education < 12 years, cancer diagnosis ≤5 years.

Table 3
Differences in advance directive attitudes and perceived susceptibility according to each preference of the advance directive life-support treatments (N = 107).

Life-support treatments		Attitudes toward advance directives			Perceived susceptibility[a]		Global health status	
		M ± SD	t	p	Median (Q1 – Q3)	p	Median (Q1 – Q3)	p
Cardiopulmonary resuscitation	No (n = 90)	48.36 ± 6.00	2.47	.015	28.5 (20.0–33.0)	.182	66.7 (47.9–83.3)	.302
	Yes (n = 17)	44.53 ± 5.01			25.0 (17.5–28.0)		58.3 (45.8–66.7)	
Ventilator support	No (n = 91)	48.26 ± 6.08	2.16	.033	28.0 (20.0–33.0)	.531	66.7 (50.0–75.0)	.625
	Yes (n = 16)	44.81 ± 4.65			25.5 (16.2–32.8)		54.2 (43.8–72.9)	
Hemodialysis	No (n = 87)	48.02 ± 5.95	0.99	.324	27.0 (20.0–31.0)	.526	66.7 (50.0–75.0)	.384
	Yes (n = 20)	46.55 ± 6.24			26.0 (21.5–35.0)		58.3 (35.4–66.7)	
Chemotherapy	No (n = 94)	48.15 ± 6.07	1.88	.062	28.0 (20.0–33.0)	.271	66.7 (47.9–75.0)	.610
	Yes (n = 13)	44.85 ± 4.72			25.0 (15.0–28.0)		58.3 (45.8–66.7)	
Hospice care	No (n = 36)	44.78 ± 5.70	−3.88	< .001	22.5 (17.2–30.8)	.020	62.5 (41.7–75.0)	.687
	Yes (n = 71)	49.25 ± 5.60			29.0 (23.0–33.0)		58.3 (50.0–75.0)	

Note. Normally distributed numerical variables are presented by mean ± standard deviation and tested by *t*-test; non-normally distributed numerical variables are presented by median (Q1-Q3) and tested by Mann-Whitney test.

[a] Perceived susceptibility refers to personal susceptibility to unexpected EoL experience.

preferring hospice care increased by 16%, while when one score increased in pain burden ($B = -0.03$, $p = .047$), the likelihood decreased by 3%. The overall goodness of fit based on the Chi-square test for each model was appropriate, with each model accounting for from 17% to 34% of the variances (CPR: Nagelkerke $R^2 = 0.17$; ventilation support: Nagelkerke $R^2 = 0.19$; hemodialysis: Nagelkerke $R^2 = 0.19$; chemotherapy: Nagelkerke $R^2 = 0.34$); hospice care: Nagelkerke $R^2 = 0.23$).

4. Discussion

There has been limited empirical evidence regarding factors associated with LSTs in cancer survivors with poor socioeconomic status. This is one of few studies that reports patient characteristics, and non-modifiable and AD-related modifiable factors influencing the decisions for LSTs among low-income cancer survivors. A major finding of this study was that symptom frequency and longer duration after cancer diagnosis were important for preferring aggressive treatments, while being female and higher education level were associated with a lesser likelihood of preferring aggressive treatments. Another major finding was that positive attitudes were important for preferring hospice care, while higher symptom burden of pain for less preferring hospice care. These findings show the main targets of interventions for optimized use of ACP and ADs, such as effective symptom management, enhancement of positive attitudes regarding early administration of ADs, and consideration of several aforementioned demographic and clinical factors. These findings also demonstrate the need for early AD discussion as part of cancer management care for community-dwelling cancer survivors for seamless transition to palliative care in the future.

In this study, almost two-third (66.4%) of cancer survivors highly preferred hospice care, while less than 20% preferred each of the other aggressive treatments. According to the limited available data-based evidence regarding LST preferences (Kim et al., 2017a; Kim et al., 2017b), the findings from this study and prior studies were comparable, though slightly different. Although hospice care was the most preferred in both the current and previous studies, the percentages differed depending on population differences. Specifically, 81% in cancer patients with largely solid tumors (mean age: 58 years) in clinical practice (Kim et al., 2017b) vs. 66.4% in cancer survivors in this study (mean age: 67 years) vs. 56.4% in chronically ill community-dwelling elderly people (mean age: 77 years) (Kim et al., 2017a). Preference for aggressive treatments was relatively lower than preference for hospice care. However, it was still preferred by almost 15%–24% of participants: 23.3% for CPR and 24.0% for ventilation support in community-dwelling elderly adults (Kim et al., 2017a); 21.4% for CPR and 21.4% for ventilation support in cancer patients in clinical practice (Kim et al., 2017b); and 15.9% for CPR and 15.0% for ventilation support in cancer survivors in this study. These differences might arise from differences in their healthcare contexts. Chronically ill community-dwelling elderly people and cancer survivors may experience health decline over the course of illness, but, compared to patients with solid cancer, they might feel that such EoL care or related decisions are still remote (Park et al., 2015).

The use of ADs has not been optimized as there have been no significant changes from 2000 to 2012 (Narang and WrightNicholas, 2015) and with approximately half or lesser number of cancer patients having a form (Hubert et al., 2013; McDonald et al., 2017; van Oorschot et al., 2012). The deprivation of timely ACP discussion or AD documentation makes it more likely for patients to receive aggressive treatments near death and may prevent or delay timely consultation or referral to palliative/hospice care (Cappell et al., 2018; Choi et al., 2015; Narang and WrightNicholas, 2015). In Asian cultures, lack of autonomy in cancer patients regarding their AD decisions is an additional issue in the implementation of ADs (Kwon et al., 2012; Lee et al., 2013; Tang et al., 2005). Thus, healthcare providers in Asian countries need to explore an individual's EoL values and treatment directives and encourage AD documentation. This can facilitate patients to actively engage in their EoL care, consider their autonomy, and avoid receiving unwanted and futile EoL care.

This study also examined factors associated with decision-making for LST preferences on AD treatment directives among cancer survivors. It has been suggested that symptom burden, attitudes, perceived susceptibility to unexpected EoL experiences, and perceived health are associated with ACP or ADs. However, the associations of these multiple modifiable factors with ACP or ADs have rarely been examined in cancer survivors. The associations of one or two of the modifiable factors to ACP or ADs have been examined in advanced cancer patients (Wentlandt et al., 2012), stem-cell transplant patients (Wang et al., 2016), and community-dwelling elders (Noh et al., 2018). In advanced cancer patients, symptom burden was associated with preparation for EoL; those with less symptom burden were better prepared for EOL (Wentlandt et al., 2012). In palliative care, symptom management is a critical component in cancer, with its poor management being a main reason for palliative consultation (Wang et al., 2016). In community-dwelling elderly adults, perceived health was associated with knowledge about ACP, with white older adults with higher levels of perceived health having more knowledge and black older adults having knowledge deficits despite their poorer health perception (Noh et al., 2018). Patient knowledge of ADs (Kermel-Schiffman and Werner, 2017) or patient attitudes regarding ADs and locus of control were also associated with completion of ADs (Duckworth et al., 2014), with a lack in these modifiable factors increasing non-completion of ADs.

In this study, we examined the associations of several modifiable factors, including symptom frequency, attitudes, perceived susceptibility to unexpected EoL experiences, symptom burdens (fatigue, nausea/vomiting, and pain), and global health status/QOL, with LSTs. Some of these modifiable correlates were associated with preference for LSTs in this study. This study served to extend the current knowledge of factors that possibly affect ADs and specific LST decisions. A greater number of physical and psychological symptoms (symptom frequency) reported was associated with higher likelihood of preferring aggressive treatments, while positive attitudes toward ADs were associated with a greater likelihood of preferring hospice care, and a higher symptom burden of pain was associated with less likelihood than their counterparts. These findings supported that both symptom frequency and consequent burdens (symptom burden), particularly pain, were associated with decisions about LST preferences. This patient information regarding LST preferences implies that healthcare providers need to manage symptoms to reduce their adverse effects (symptom burden) on patient outcomes and improve survivorship care. It is also important to improve the attitudes of patients and their family members towards ADs through education and discussion. Improvements in symptoms and attitudes may lead to improvements in the completion of ADs, which can prevent futile treatments.

In addition, demographic and/or clinical influences on documentation of ADs were often reported from past studies (Duckworth et al., 2014; McDonald et al., 2017; van Oorschot et al., 2012), while we found associations of demographic and/or clinical factors with preferences for specific LSTs. In this study, a significant correlate of a higher likelihood of preferring LSTs was a longer time duration after cancer diagnosis (≥5-year) (ventilation support), while being female (hemodialysis and chemotherapy) and higher education (chemotherapy) were significant correlates of a lower likelihood of preferring LSTs. Age was not significantly associated with decisions for LST preferences. In previous studies that examined demographic and clinical factors associated with the completion of ADs, age was an important factor. Being younger was significantly associated with a lesser likelihood of AD completion among patients with hematologic malignancy (Duckworth et al., 2014), cancer patients undergoing radiotherapy (van Oorschot et al., 2012), or those with advanced cancer (McDonald et al., 2017). Among older adults, those with younger age (< 75 years) had higher odds of completing a late AD before death

(Enguidanos and Ailshire, 2017). In addition, those who had lower income (McDonald et al., 2017) or a shorter duration of cancer (van Oorschot et al., 2012) less frequently completed an AD. Further, among older adults, lower education (< 12 years), cancer or lung disease, having an expected death, and minorities had higher odds of completing a late AD before death (Enguidanos and Ailshire, 2017). Together, common demographic and clinical factors associated with less likelihood of or delayed AD documentation were younger age, lower education, lower income, or shorter cancer duration. Regarding specific LST preferences, these factors influenced treatment preferences differently. Cancer survivors in this study with a longer duration after cancer diagnosis had a higher likelihood of preferring aggressive treatments, while those with higher education had a lesser likelihood. Further validation of the results is necessary. In addition, more empirical evidence is needed for these demographic and clinical factors in consideration for ACP and AD-related care planning and education.

This study had some limitations. Data were derived from a homogeneous sample, including participants from a low-income class and a single region in an urban environment, which limits the generalization of the findings. Thus, further studies using an adequate number of heterogeneous cancer survivors are warranted. While symptom management is critical in cancer survivorship care, a future study is warranted to assess symptom experiences, including frequency and burden, using a reliable and valid scale. Nagelkerke R^2 for each model was relatively low, which may imply that there are more factors affecting ACP or ADs. Thus, determination of further correlates may be beneficial to provide valuable information for development of study design and interventions. This would in turn help specific patient populations and their caregivers prepare ADs through periodic ACP discussions, and help facilitate ACP and the determination of ADs. Therefore, future studies are warranted to investigate a wide spectrum of factors influencing documentation of ADs and LST preferences in the EoL period, such as functional status, social support, and religiosity (Trarieux-Signol et al., 2014; Zheng et al., 2016). Lastly, due to the nature of this community-based study, clinical information was lacking, such as stages of cancer, current treatments and prognosis, and ADs, which may be important for survivorship care as well as palliative discussion in the course of illness.

5. Conclusions

Two-thirds of cancer survivors preferred hospice care, while less than one-fifth favored aggressive treatments, such as CPR or ventilation, and fewer wished for chemotherapy. While both modifiable and non-modifiable factors were associated with LST preferences, these associations varied by differences in preference for aggressive treatments and hospice care. Among cancer survivors, symptom frequency was the only modifiable factor associated with preferring aggressive treatments, while positive attitudes and symptom burdens (effects of symptoms on daily life) were associated with preferring or less preferring hospice care, respectively. Among non-modifiable factors, longer duration after cancer diagnosis was associated with preferring aggressive treatments, while being female and a higher education level were associated with lesser likelihood of preferring aggressive treatments.

These results support the feasibility of discussing ADs, including future LST wishes among community-dwelling cancer survivors during nurses' home visiting for cancer management service. Expanding the scope of the service by integrating AD discussion enables low-income cancer survivors to take informed decisions about future medical care, allowing them to revise their LST preferences according to any changes occurring close to the EoL period. Continuity of care is likely to be accomplished through such a periodic management. This will in turn lead to facilitating seamless transition to hospice care and decrease meaningless aggressive treatments. The foci of cancer management could be improvements in symptom management for cancer survivors. Symptoms must be monitored to prevent adverse effects on daily life (symptom burden) and other patient outcomes, and, in turn, to improve AD attitudes, decisions about LST and ADs. Such an extended service may serve to facilitate AD documentation particularly for poor healthcare beneficiaries, and eventually, may promote cancer survivorship care.

Conflicts of interest

All authors declare that they have no conflict of interest.

CRediT authorship contribution statement

JinShil Kim: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing - original draft. **Seongkum Heo:** Conceptualization, Formal analysis, Supervision, Validation, Writing - review & editing. **Mi Yeong Kim:** Investigation, Project administration, Resources, Writing - review & editing. **Eun Young Park:** Conceptualization, Investigation, Validation, Writing - review & editing. **Eun Ju Seo:** Conceptualization, Data curation, Formal analysis, Visualization, Writing - review & editing. **Mee Ok Lee:** Conceptualization, Validation, Writing - review & editing. **Bo Yoon Jeong:** Data curation, Formal analysis, Validation, Writing - review & editing. **Jung-Ah Lee:** Conceptualization, Supervision, Validation, Writing - review & editing.

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