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Quality Matters: Effect of High-Quality Early Palliative Care in Advanced Cancer

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Declaration of Interests

YHY, the corresponding author, receives institutional research funding from the Korea Health Industry Development Institute. All other authors declare no competing interests.

Abstract

Context: Early palliative care (EPC) is an integral treatment for advanced cancer patients, improving quality of life and symptom management, but the impact of its *quality* on outcomes is less understood.

Objectives: This study aimed to quantify the quality of EPC and analyze its longitudinal association with depression levels, quality of life (QoL), patient survival, and self-management strategies in patients with advanced cancer.

Methods: This secondary analysis included 144 advanced cancer patients from a randomized controlled trial in South Korea. Participants were stratified into high-quality (N=76) and low-quality (N=68) EPC groups based on Quality Care Questionnaire–Palliative Care scores. Outcomes including QoL (McGill Quality of Life Questionnaire, EORTC QLQ-C15-PAL), depression (PHQ-9), and self-management strategies (SMASH Assessment Tool Short Form) were assessed at baseline, 12, 18, and 24 weeks. Two-year overall survival was analyzed using Kaplan–Meier curves and log-rank tests, while repeated measures used generalized estimating equations and linear mixed-effects models.

Results: The high-quality EPC group demonstrated a significantly lower prevalence of depression at 24 weeks (14.7% vs. 39.1%, p=0.036) and a higher 2-year survival rate (p=0.006) compared to the low-quality group. Significant improvements were observed in existential and social burden (MQOL) and self-management preparation and implementation strategies (SAT-SF) at 18 and 24

weeks in the high-quality EPC group. Overall QoL measured by EORTC QLQ-C15-PAL showed minimal group differences.

Conclusion: The quality of EPC services significantly impacts depression, patient survival, aspects of QoL, and self-management capabilities. These findings emphasize the importance of high-quality EPC beyond mere provision.

Key Message: This study provides novel evidence that the quality of early palliative care directly influences patient outcomes. High-quality care leads to reduced depression, improved survival, and enhanced self-management strategies in patients with advanced cancer, highlighting the critical need for qualitative assessment and enhancement of palliative care services.

Keywords: palliative care, quality, depression, survival, quality of life, self-management

Introduction

Early palliative care (EPC) is a vital integrative treatment strategy to improve quality of life (QoL) for patients with advanced and terminal cancer. It alleviates physical pain, reduces symptom burden, and addresses psychological and emotional distress.[1-4] When EPC is implemented with standard oncology treatment at early stages of disease trajectory, it has several beneficial outcomes, including reduced pain and discomfort, improved emotional well-being, and increased social support.[5-7] this indicates that EPC significantly contributes to overall patient well-being, extending beyond symptom management.

EPC's effects are particularly significant in the psychological and emotional domains.[8] Initiating integrated palliative care early in the diagnosis supports "patients' mental health" by reducing depression, alleviating anxiety, and easing existential distress. This significantly affects self-

management skills and helps restore meaning in life.[1,9] EPC interventions reduce depressive symptoms and enhance overall functional performance in patients with malignancies.[10]

EPC implementation affects survival rates. Several randomized controlled trials (RCTs) report that patients receiving EPC interventions (vs. standard care alone) experienced significantly longer overall survival.[4,5,11,12] This suggests that effective symptom management, treatment adherence, and emotional stability indirectly enhance survival outcomes. However, systematic reviews report inconsistent or statistically insignificant results regarding how EPC affects survival, highlighting various studies' limitations in drawing standardized conclusions.[6]

EPC also influences clinical decision-making, particularly regarding end-of-life care. Studies show that EPC interventions reduce unnecessary hospitalizations and admissions to intensive-care units among patients with terminal illnesses. These interventions facilitate establishment of treatment plans aligning with patient preferences, thereby enhancing healthcare resource utilization's efficiency.[13,14] This indicates that EPC is significant in promoting patient-centered decision-making and may help reduce healthcare costs.

Nevertheless, previous studies predominantly focused on EPC provision, with comparatively fewer investigating how EPC services' actual quality affects patient outcomes. Because of the limited practical analyses, this study quantifies EPC quality using the Quality Care Questionnaire–Palliative Care (QCQ-PC) and longitudinally analyzes changes in patients' QoL, depression levels, survival duration, and self-management strategies according to palliative care quality. As the first study to examine EPC quality's effect on patients, it clarifies how palliative care's qualitative aspects affect patient outcomes. The findings can help facilitate future EPC programs' standardization and enhancement, advancing patient-centered palliative care services.

Methods

Study Design and Participants

This study is a secondary analysis of a non-blinded RCT that evaluated standard supportive oncological care's efficacy compared to EPC and systematically integrated palliative care in patients with advanced cancer. From September 2017 to October 2018, 144 participants with advanced cancer were enrolled from 12 hospitals across South Korea. Patients who had previously received or were receiving palliative care during the study period were excluded. The primary study lists the enrollment and exclusion criteria.[1] This trial was registered with ClinicalTrials.gov (NCT03181854), and the study protocol was approved by the institutional review boards of Seoul National University College of Medicine and Hospital (approval number: H-1602-143-745) and all 12 participating hospitals. Attending physicians recruited the patients, and all participants provided written informed consent.

EPC Quality

This study's intervention group received EPC for 6 months, while the control group received standard oncological care. The intervention group received telephone coaching, regular meetings with the palliative care team, and educational materials and videos. Telephone coaching was conducted weekly for the initial 12 weeks, followed by bi-weekly sessions until the study was completed. Meetings with the palliative care team were held every 3 weeks for 6 months, during which the team addressed symptom management and psychological, social, and spiritual concerns, and they facilitated advance care planning when appropriate. The control group received conventional oncological care, with palliative care provided based on patient preferences. In the control group, patients were scheduled to meet with medical staff every three weeks over six months, identical to the intervention group. The same palliative care team, comprising an oncologist and health coaches, cared for both groups. Health coaches were registered nurses who had minimum 3 years of clinical experience and completed 23 h of offline lectures and 14 h of telephone coaching

practice.

Both groups' palliative care quality was measured using the Quality Care Questionnaire–Palliative Care (QCQ-PC),[15] which evaluates it from the perspective of patients with cancer. It includes 32 items and four factors: Factor 1, appropriate communication with healthcare professionals (10 items); Factor 2, discussions on the value of life and treatment goals (9 items); Factor 3, support and counseling for holistic care needs (7 items); and Factor 4, accessibility and continuity of care (6 items). Each item was rated on a four-point Likert scale (strongly agree, agree, disagree, and strongly disagree), and each factor's mean scores were calculated to derive a total score. The QCQ-PC was administered within 3 weeks after participants had enrolled. All participants, including those in the control group, had received some form of palliative care services during the study period before completing the QCQ-PC assessment, ensuring they had adequate experience to evaluate care quality. The 144 participants' overall mean QCQ-PC score was 2.33 (standard deviation [SD]=0.48). Participants were then categorized based on the mean score into the high-score (scores ≥ mean, 76 participants) and low-score (scores<mean, 68 participants) groups.

Measurement Instruments

Demographic data included age, sex, educational level, employment status, household income, and residential location, as well as details regarding tumor type, stage, and the Eastern Cooperative Oncology Group (ECOG) performance status.

The study's primary outcome was depression, evaluated at baseline and 12, 18, and 24 weeks. Depression was measured using the Patient Health Questionnaire-9 (PHQ-9), with scores≥10 indicating presence of depressive symptoms.[16] Secondary outcomes included patient survival from baseline to the 2-year follow-up, with mortality data retrieved from death records maintained by Statistics Korea. Moreover, QoL was assessed using the social and existential burden subscales of the McGill Quality of Life Questionnaire (MQOL)[17] and European Organization for Research and Treatment of Cancer Quality-of-Life Questionnaire Core 15 Items-Palliative (EORTC QLQ-C15-

PAL).[18] EORTC QLQ-C15-PAL is a 15-item shortened version of the EORTC QLQ-C30, developed for palliative care settings. It includes scales for physical and emotional functioning, global health status/QoL, and seven symptoms (fatigue, nausea/vomiting, dyspnea, pain, insomnia, appetite loss, and constipation). Furthermore, crisis-overcoming capacity was assessed using the SMASH Assessment Tool Short Form (SAT-SF),[19] a 30-item condensed version of the original 91-item SAT comprising three domains—core, preparation, and action strategies—with 10 items assigned to each domain.

Data Analysis

Participants' baseline sociodemographic and clinical characteristics—age, sex, education level, employment status, household income, residential area, tumor type, and ECOG performance status—were summarized using frequencies (percentages) and mean ±SD.

For the primary outcome, depression, PHQ-9 scores of ≥10 served as the threshold for categorizing patients as depressed or nondepressed. Depression prevalence rates at baseline and follow-up (12, 18, and 24 weeks) were reported as frequencies. The two groups' temporal changes in depression rates over time were analyzed using generalized estimating equations, incorporating group, time, and group-by-time interaction terms to evaluate significant trend differences. Two-year overall survival was estimated using Kaplan–Meier survival curves. Differences in groups' survival, categorized by high and low QCQ-PC scores, were evaluated using the log-rank test.

QoL changes, measured by the existential and social burden subscales of MQOL and EORTC QLQ-C15-PAL, and self-management strategies, assessed through total and subdomain scores of SAT-SF, were assessed as mean observed changes from baseline to 12, 18, and 24 weeks. Differences in these changes between groups were analyzed using linear mixed-effects models with random intercepts to account for within-participant correlations among repeated measures. The models included the QCQ-PC group, time, group-by-time interaction, and major covariates (age, sex, and baseline scores) as fixed effects to estimate adjusted between-group differences over time.

All statistical tests were two-tailed, and $p<0.05$ was considered statistically significant. Analyses were conducted using R software (version 4.4.2; R Foundation for Statistical Computing, Vienna, Austria).

Results

Sociodemographic Characteristics

This study included 144 participants enrolled in an RCT of an EPC intervention. Participants were categorized based on QCQ-PC scores: high QCQ-PC (n=76) and low QCQ-PC (n=68) score groups (Table 1). Among the 76 participants in the high QCQ-PC score group, 35 were from the intervention group and 41 were from the control group. Among the 68 participants in the low QCQ-PC score group, 38 were from the intervention group and 30 were from the control group. No statistically significant differences existed between the groups regarding socioeconomic factors, including gender, age, education level, employment status, marital status, and monthly income. However, significant differences were observed in residential area, tumor site, and ECOG performance status. The high QCQ-PC score group had a notably higher proportion of breast cancer patients (19.7% vs. 2.9%, p=0.006), while the low QCQ-PC score group had a higher proportion of lung cancer patients (19.1% vs. 6.6%). At baseline, no significant differences existed in depressive symptoms. QoL, measured by MQOL, was significantly higher in the low QCQ-PC score group (p=0.013, 0.012). Additionally, self-management capacities were significantly higher in the low QCQ-PC score group (p<0.001). QoL, assessed using EORTC QLQ-C15 PAL, showed almost no significant difference at baseline except physical functioning.

Differences in Depression Rates (PHQ-9≥9) Between Groups at Baseline and Follow-up

Figure 1 illustrates the prevalence of depression (PHQ-9 score≥9) among participants classified by QCQ-PC scores at baseline and during follow-up assessments at 12, 18, and 24 weeks. At baseline, depression rates were similar between the high and low QCQ-PC groups (35.5% and

40.3%, respectively). However, the groups' differences in depression rates became pronounced over time. By the 24-week follow-up, the high QCQ-PC group's depression rate decreased significantly to 14.7%, while that of the low QCQ-PC group remained high at 39.1%. This difference was statistically significant (p=0.036).

Figure 1. Differences in Depression Rates (PHQ-9≥9) Between Groups According to Early Palliative Care Quality at Baseline and Follow-Up (12, 18, and 24 Weeks)

Two-Year Survival Analysis Between Groups According to EPC Quality

Figure 2 illustrates Kaplan–Meier survival curves comparing 2-year survival rates between groups stratified by EPC quality. A statistically significant difference in survival rates was observed between the high and low QCQ-PC score groups (p=0.006), indicating a higher survival rate in the high QCQ-PC score group. At 1 year, the survival rate was approximately 50% in the high QCQ-PC score group, decreasing to 27.9% in the low QCQ-PC score group. At 2 years, survival rates declined to 25% and 11.8% in the high and low QCQ-PC groups, respectively.'

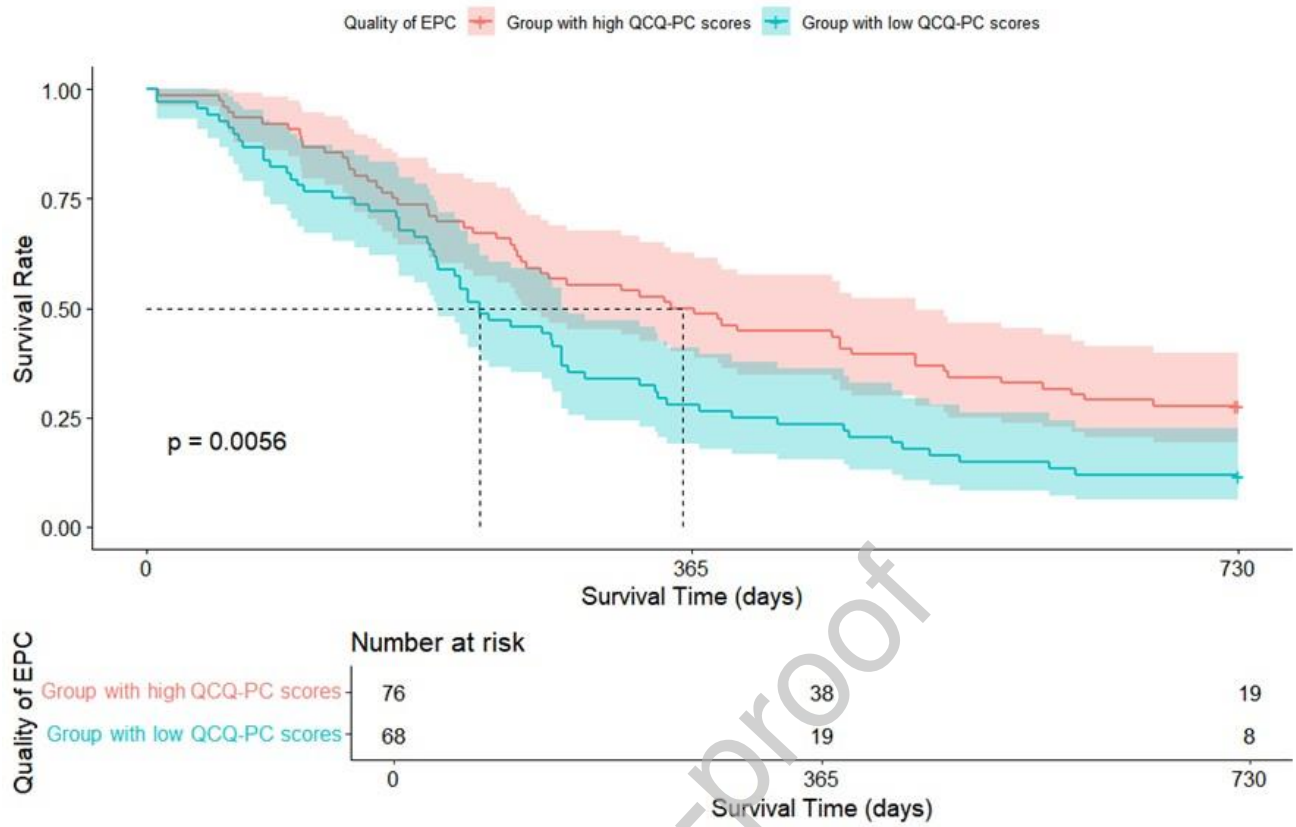

Figure 2. Two-year Survival Analysis Between Groups According to Early Palliative Care Quality

QoL Changes from Baseline to Follow-Up and Differences in Changes Between Groups

Table 2 shows mean observed changes from baseline in the existential well-being and social support subscales of MQOL, comparing groups stratified by QCQ-PC scores at baseline and follow-ups at 12, 18, and 24 weeks. Differences in existential well-being between the two groups were not statistically significant at 12 and 18 weeks. However, by week 24, the high QCQ-PC score group demonstrated a mean increase of 0.25 points (95% confidence interval [CI]: -0.44, 0.94), while the low QCQ-PC score group exhibited a mean decrease of 0.54 points (95% CI: -1.41, 0.33). The adjusted between-group difference in change scores was statistically significant at 1.59 points (95% CI: 0.14, 3.04; p=0.033).

For the social support subscale, the high (vs. low) QCQ-PC score group generally demonstrated more favorable changes. At 12 weeks, the high-score group showed a mean increase of 0.33 points

(95% CI: -0.29, 0.94), while the low-score group showed a mean decrease of 0.64 points (95% CI: -1.38, 0.11), resulting in a statistically significant adjusted difference of 1.45 points (95% CI: 0.24, 2.66; p=0.020). At 18 weeks, the groups' adjusted difference remained marginally significant at 1.01 points (95% CI: 0.00, 2.03; p=0.050). By 24 weeks, the high-score group continued demonstrating significantly greater improvements, with an adjusted difference of 1.41 points (95% CI: 0.11, 2.62; p=0.037).

However, QoL, measured by the EORTC QLQ-C15-PAL, showed no statistically significant differences, except for overall QoL at the 12-week follow-up (Table 3). At that point, the high QCQ-PC score group showed a mean increase of 3.49 points (95% CI: -3.46, 10.44), while the low-score group showed a mean decrease of 4.95 points (95% CI: -12.35, 2.44), resulting in a statistically significant adjusted difference of 16.26 points (95% CI: 2.63, 29.88; p=0.020).

Changes from Baseline in Self-Management Strategies and Differences in Changes Between Groups

Table 4 shows mean changes from baselines in self-management strategies (SAT) and the difference between groups according to QCQ-PC scores at 12, 18, and 24 weeks. A statistically significant difference in total SAT scores was observed at only 18 weeks; the high QCQ-PC score group exhibited a mean increase of 4.58 points (95% CI: -0.99, 10.15), while the low-score group showed a mean decrease of 11.42 points (95% CI: -19.63, -3.21), resulting in a significant adjusted difference of 18.96 points (95% CI: 5.23, 32.70; p=0.008). No significant differences were observed at 12- or 24-week follow-ups.

In the SAT core strategy subdomain, no statistically significant differences were observed between groups at any follow-up. However, in the preparation strategy subdomain, significant differences were observed at both 18 and 24 weeks. At 18 weeks, the high QCQ-PC score group showed a mean increase of 5.33 points (95% CI: -1.78, 12.45), while the low-score group had a mean decrease of 10.57 points (95% CI: -18.58, -2.57), resulting in a highly significant adjusted difference

of 20.81 points (95% CI: 6.42, 35.19; p=0.006). At 24 weeks, the high-score group showed a mean increase of 3.53 points, while the low-score group showed a mean decrease of 4.78 points, resulting in an adjusted difference of 17.64 points (95% CI: 0.72, 34.55; p=0.042).

The implementation strategy showed statistically significant differences between groups at both 18 and 24 weeks. At 18 weeks, the high QCQ-PC score group showed a mean increase of 7.50 points (95% CI: 2.52, 12.48), while the low-score group exhibited a mean decrease of 10.34 points (95% CI: -19.19, -1.50), resulting in a significant adjusted difference of 20.49 points (95% CI: 7.46, 33.52; p=0.003). At 24 weeks, the high-score group demonstrated an increase of 7.94 points (95% CI: 2.55, 13.34), while the low-score group showed a decrease of 3.19 points (95% CI: -12.36, 5.98), resulting in an adjusted difference of 14.93 points (95% CI: 0.78, 28.64; p=0.043).

Discussion

This is the first longitudinal analysis to investigate how EPC quality—beyond EPC provision—affects patient outcomes. Using QCQ-PC, we quantified EPC quality and assessed its association with depression levels, QoL, patient survival rates, and self-management strategies. Our findings indicate that the high-quality (vs. low quality) EPC group had significantly lower prevalence of depressive symptoms at the 24-week follow-up (14.7% and 39.1%, respectively). This reduction in depressive symptoms may result from several psychological mechanisms associated with EPC. First, EPC enhances patients' coping strategies by reducing avoidant coping mechanisms and promoting problem-focused and approach-oriented coping, thereby improving their capacity to manage stress effectively.[20,21] Second, EPC promotes hope and a positive viewpoint, helping patients overcome feelings of hopelessness and helplessness while enabling them to rediscover purpose and meaning in life.[22,23] For instance, the structured advance care planning discussions during team meetings may have reduced anxiety about the future and enhanced sense of control. Lastly, EPC comprehensively addresses symptom management through holistic care, improving patients' overall QoL and

alleviating depressive symptoms.[21,24,25] The regular PC sessions likely provided consistent emotional support and symptom monitoring, which are known to reduce feelings of isolation and hopelessness. These multifaceted psychological mechanisms and our results highlight the necessity for careful management and improvement of EPC quality to safeguard patients' mental health and overall QoL.

Regarding patient survival, we showed that high-quality EPC significantly enhances clinical outcomes. The 2-year survival rate was markedly higher in the high-quality (vs. low-quality) EPC group, indicating that EPC quality contributes to prolonged patient survival. While our study demonstrates association between EPC quality and 2-year survival, establishing causality requires additional consideration. Previous research supports plausible mechanisms for long-term survival benefits from early interventions, including reduced depression and improved self-management leading to better treatment adherence, enhanced communication facilitating appropriate care decisions, and reduced healthcare utilization suggesting more efficient care coordination[1,5,6,26]. These findings suggest that the survival advantage observed in our study is not merely a statistical artifact but may reflect the cumulative benefits of timely, comprehensive support on physical, psychological, and decision-making domains. Nonetheless, we acknowledge that residual confounding cannot be excluded, and that larger, prospectively designed studies are warranted to confirm causality.

In this study, the high-quality EPC group demonstrated statistically significant improvements in the existential and social burden subscales of MQOL, whereas no significant differences were observed in the overall QoL, functional, or symptom scales of EORTC QLQ-C15-PAL. These findings differ from previous research, which suggests that EPC effectively improves primary physical symptoms, including pain, fatigue, and dyspnea, thereby enhancing physical well-being.[27-29] However, our findings align with earlier investigations suggesting that EPC contributes to existential stability and overall QoL. EPC reduces emotional isolation by strengthening connections among patients, families, and friends.[29] Additionally, it offers personalized spiritual support that respects patients' individual beliefs and values[30] and creates comfortable treatment environments through

home-based palliative care, improving environmental well-being.[31] This study found no significant improvements in QOL indicators, measured by EORTC QLQ-C15-PAL. However, this outcome may indicate limitations of EORTC QLQ-C15-PAL, which may not adequately capture the social, spiritual, and environmental dimensions relevant to palliative care. However, our findings suggest that high-quality EPC can significantly improve the social, spiritual, and environmental dimensions of patients' multidimensional QoL. Consequently, provision of high-quality EPC is beneficial in enhancing patients' overall QoL.

Regarding self-management strategies, no significant differences were observed at the 12- or 24-week follow-ups. At 12 weeks, patients were likely still in the process of establishing therapeutic relationships with the palliative care team and developing self-management skills. The 18-week timepoint corresponded to the completion of the intensive EPC phase, when patients had received sufficient exposure to the intervention while active support was still ongoing. The attenuation of effects at 24 weeks suggests that sustained, intensive support may be required to maintain the observed benefits. The high-quality EPC group showed significant improvements in both preparation and implementation strategies at 18 and 24 weeks, respectively. These findings corroborate those of previous studies indicating that EPC enhances self-efficacy and resilience in patients.[1,32] Improvements in the preparation strategy may be the result of high-quality EPC; structured educational materials and advance care planning discussions, which helped patients to anticipate and prepare for future challenges. The implementation strategy gains probably reflect the practical problem-solving skills developed during the high-quality PC sessions. The findings indicate that EPC can strengthen patient-driven management skills, a benefit often unattainable through conventional oncological care alone. Therefore, we showed that provision of high-quality EPC may substantially enhance patients' self-management capacities.

This study has some limitations. First, as a secondary analysis of an RCT with a relatively small sample size, it was challenging to achieve statistical significance for certain outcome variables. Also,

a significant difference in the distribution of cancer types was observed between the two groups; given that metastatic breast cancer generally has a more favorable prognosis than metastatic lung cancer, patients with breast cancer may have had a longer survival window, allowing more time to build relationships with palliative care providers and fully benefit from EPC interventions. Future studies should stratify participants by cancer type or adjust for baseline prognostic factors. However, participants were in advanced stages of cancer, and most had metastases to other organs, except for two participants in the low QCQ-PC score group and one in the high QCQ-PC score group. Thus the groups' clinical status was comparable. To address this limitation, future studies should involve larger cohorts or prospective multicenter research with more participants. Second, assessments conducted at 12–24-week intervals may not adequately evaluate long-term changes, and the follow-up duration may be insufficient to reflect long-term changes in QoL or emotional status beyond the 2-year survival rate. Third, the assessment tools (QCQ-PC, SAT-SF, MQOL, and PHQ-9) are self-report measures, which may introduce bias. An important limitation is that our quality classifications rely on patient-reported perceptions rather than objective clinical standards. The QCQ-PC reflects subjective patient experiences, which may vary based on individual expectations, cultural factors, and prior healthcare experiences. Future research should consider incorporating both patient-reported and objective quality indicators (such as adherence to palliative care guidelines, timeliness of referrals, and multidisciplinary team involvement) to provide more comprehensive and replicable quality assessments. Fourth, participants were limited to patients with advanced cancer from 12 hospitals across South Korea. Thus, caution is necessary when generalizing these findings to other countries or cultural contexts.

Nevertheless, our study is clinically significant as the first to provide empirical evidence highlighting the necessity of delivering high-quality EPC rather than simply offering EPC services. Based on our findings and previous research, we recommend several essential components for high-quality EPC interventions. Regular EPC sessions appear critical for maintaining patient engagement

and providing consistent support. Structured advance care planning discussions should be prioritized, as these showed strong associations with quality ratings and self-management improvements. Educational materials addressing symptom management and coping strategies should be individualized and reinforced through personal contact. Future research should conduct multivariate analyses of detailed qualitative components of EPC programs, such as communication strategies and level of patient involvement in decision-making, to assess their effect on survival rates, emotional well-being, and overall QoL. Furthermore, longitudinal follow-up studies are essential to investigate how high-quality EPC affects QoL, depression, and reduction of caregiver burden following end-of-life care. Additional research is required to establish and validate quality management models for EPC across various cultural and healthcare settings, providing a foundation for standardization of patient-centered EPC services.

Data Sharing

Researchers can request de-identified individual-level patient data in writing 24 months after publication of the article. Please direct inquiries to the corresponding author.

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Tables

Table 1. Sociodemographic Characteristics, Quality of Life, Self-management Strategies, and Frequency of Depression of the Participants

		Total (N=144)	Group with high QCQ-PC scores (N=76)	Group with low QCQ-PC scores (N=68)	P-value
		N (%)			
Sex	Male	83 (57.6%)	41 (53.9%)	42 (61.8%)	0.343
	Female	61 (42.4%)	35 (46.1%)	26 (38.2%)	
Age in years, mean (SD)		60.7 (8.9)	59.9 (8.6)	61.5 (9.3)	0.291
Educational status	Below high school	68 (47.2%)	38 (50.0%)	30 (44.1%)	0.579
	High school	55 (38.2%)	26 (34.2%)	29 (42.6%)	
	College or higher	21 (14.6%)	12 (15.8%)	9 (13.2%)	
Employment status	Retired	21 (14.6%)	7 (9.2%)	14 (20.6%)	0.278
	Employed	13 (9.0%)	9 (11.8%)	4 (5.9%)	
	Unemployed	72 (50.0%)	39 (51.3%)	33 (48.5%)	
	Housewife	36 (25.0%)	20 (26.3%)	16 (23.5%)	
	Others	2 (1.4%)	1 (1.3%)	1 (1.5%)	
Marital status	Married or common law partner	109 (75.7%)	58 (76.3%)	51 (75.0%)	0.986
	Others	35 (24.3%)	18 (23.7%)	17 (25.0%)	
Monthly income (USD)	< 2,000	79 (55.2%)	42 (55.3%)	37 (55.2%)	0.214
	2,000-3,999	49 (34.3%)	29 (38.2%)	20 (29.9%)	
	≥ 4,000	15 (10.5%)	5 (6.6%)	10 (14.9%)	
Residence	Rural/suburban	58 (40.3%)	39 (51.3%)	19 (27.9%)	0.009
	Urban	86 (59.7%)	37 (48.7%)	49 (72.1%)	
Tumor site	Breast	17 (11.8%)	15 (19.7%)	2 (2.9%)	0.006
	Gastrointestinal	26 (18.1%)	12 (15.8%)	14 (20.6%)	
	Hepatobiliary	73 (50.7%)	39 (51.3%)	34 (50.0%)	
	Lung	18 (12.5%)	5 (6.6%)	13 (19.1%)	
	Others	10 (6.9%)	5 (6.6%)	5 (7.4%)	
ECOG performance status†	0	7 (4.9%)	7 (9.2%)	0 (0.0%)	0.017
	1	117 (81.2%)	61 (80.3%)	56 (82.4%)	
	2	20 (13.9%)	8 (10.5%)	12 (17.6%)	
MQOL‡, mean (SD)	Emotional Well-Being	6.0 (1.8)	5.6 (1.9)	6.4 (1.7)	0.013
	Social Support	6.7 (2.0)	6.3 (1.9)	7.2 (2.0)	0.012

Depression (PHQ-9≥9)		54 (37.5%)	27 (35.5%)	27 (40.3%)	0.525
Self-management strategies§, mean (SD)	SAT Total	44.7 (24.3)	35.1 (22.0)	55.3 (22.5)	< 0.001
	SAT Core strategy	53.9 (27.9)	44.4 (27.4)	64.6 (24.5)	< 0.001
	SAT Preparation strategy	40.6 (26.2)	30.9 (23.9)	51.5 (24.6)	< 0.001
	SAT Implementation strategy	39.4 (23.4)	30.0 (19.7)	49.8 (22.9)	< 0.001
EORTC QLQ-C15 PAL¶, mean (95% CI)	Overall quality of life	54.4 (20.8)	51.8 (22.0)	57.4 (19.0)	0.104
	Physical functioning	62.1 (23.1)	66.6 (21.9)	57.1 (23.5)	0.013
	Emotional functioning	78.4 (22.4)	80.9 (23.0)	75.6 (21.5)	0.154
	Dyspnea	18.5 (24.9)	17.5 (22.8)	19.6 (27.2)	0.624
	Pain	25.1 (27.9)	25.7 (28.5)	24.5 (27.4)	0.806
	Insomnia	27.8 (27.6)	27.6 (28.5)	27.9 (26.8)	0.947
	Appetite loss	30.8 (28.7)	28.9 (27.9)	32.8 (29.6)	0.420
	Constipation	27.1 (29.5)	26.8 (29.3)	27.5 (29.9)	0.888
	Fatigue	36.1 (21.2)	35.2 (22.8)	37.1 (19.3)	0.597
	Nausea and vomiting	13.4 (20.1)	12.3 (20.3)	14.7 (20.1)	0.472

*In some factors, there may be a missing value due to nonresponse of respondents.
† An ECOG score of 0 indicates fully active at pre-disease performance; 1 ambulatory but restricted in physically strenuous activity; 2 not fully ambulatory but lying or sitting <50% of the day.
‡ The MQOL (McGill Quality of Life Questionnaire) scale ranges from 0 to 10, with higher numbers representing better quality of life.
§ The Smart Management Strategy for Health Assessment Tool Short Form (SAT-SF) ranges from 0 to 100, with higher numbers representing better self-management abilities.
¶ The EORTC QLQ-C15-PAL (European Organization for Research and Treatment of Cancer Quality of Life-C15-Palliative) scale ranges from 0 to 100, with higher numbers indicating better quality of life.

Table 2. Mean Observed Changes (over-time change) from Baseline in MQOL (McGill Quality of Life Questionnaire) and Regression-estimated Differences in Changes Between Groups According to Quality of Early Palliative Care

Measure	Group with high QCQ-PC scores		Group with low QCQ-PC scores		Available cases analysis*	
Time from baseline (months)	N	Mean observed change from baseline (95% CI)	N	Mean observed change from baseline (95% CI)	Adjusted difference between change scores (95% CI)	p value
Existential Well-Being						
12 weeks	43	0.39 (-0.29, 1.06)	37	-0.60 (-1.20, 0.00)	0.52 (-0.63, 1.66)	0.367
18 weeks	40	0.34 (-0.28, 0.96)	29	-0.29 (-0.92, 0.35)	0.34 (-0.78, 1.47)	0.539
24 weeks	34	0.25 (-0.44, 0.94)	23	-0.54 (-1.41, 0.33)	1.59 (0.14, 3.04)	0.033
Social Support						
12 weeks	43	0.33 (-0.29, 0.94)	37	-0.64 (-1.38, 0.11)	1.45 (0.24, 2.66)	0.020
18 weeks	40	0.10 (-0.47, 0.67)	29	-0.91 (-1.47, -0.35)	1.01 (0.00, 2.03)	0.050
24 weeks	34	-0.06 (-0.69, 0.57)	23	-0.80 (-1.67, 0.06)	1.41 (0.11, 2.62)	0.037

* Differences in change scores between groups and associated tests of effect were estimated by regression, adjusting for baseline covariates.

Table 3. Mean observed changed from baseline and differences in change scores relative to baseline in EORTC QLQ-C15-PAL* between groups

Measure	Group with high QCQ-PC scores		Group with low QCQ-PC scores		Available cases analysis†	
Time from baseline (months)	N	Mean observed change from baseline (95% CI)	N	Mean observed change from baseline (95% CI)	Adjusted difference between change scores (95% CI)	p value
Global health status/quality of life						
12 weeks	43	3.49 (-3.46, 10.44)	37	-4.95 (-12.35, 2.44)	16.26 (2.63, 29.88)	0.020
18 weeks	40	1.25 (-5.83, 8.33)	29	-1.72 (-10.58, 7.14)	7.25 (-6.50, 21.01)	0.293
24 weeks	34	-3.43 (-11.50, 4.64)	23	1.45 (-8.00, 10.90)	-6.59 (-25.91, 12.74)	0.490
Physical functioning						
12 weeks	43	-1.24 (-5.25, 2.77)	37	1.98 (-4.52, 8.48)	0.95 (-8.74, 10.65)	0.844
18 weeks	40	-7.17 (-13.63, -0.70)	29	-2.07 (-10.64, 6.51)	-6.02 (-20.72, 8.67)	0.412
24 weeks	34	-7.24 (-15.43, 0.95)	23	-0.00 (-9.64, 9.64)	-3.32 (-23.50, 16.85)	0.738
Emotional functioning						
12 weeks	43	2.52 (-1.98, 7.02)	37	4.50 (-2.41, 11.42)	0.29 (-11.06, 11.64)	0.959
18 weeks	40	-5.21 (-11.38, 0.97)	29	-0.29 (-8.21, 7.64)	-1.44 (-14.25, 11.36)	0.821
24 weeks	34	-2.45 (-10.69, 5.79)	23	4.71 (-6.78, 16.20)	-9.78 (-30.91, 11.35)	0.350
Dyspnea						
12 weeks	43	0.78 (-5.35, 6.90)	37	4.50 (-3.85, 12.86)	-4.95 (-18.96, 9.07)	0.481
18 weeks	40	1.67 (-4.22, 7.56)	29	3.45 (-6.91, 13.81)	-7.71 (-24.15, 8.73)	0.349
24 weeks	34	10.48 (2.73, 18.22)	23	-7.25 (-22.89, 8.40)	10.18 (-11.10, 31.46)	0.335
Pain						

12 weeks	43	-3.88 (-11.78, 4.03)	37	8.56 (-0.57, 17.69)	-10.79 (-25.88, 4.29)	0.156
18 weeks	40	4.58 (-2.56, 11.72)	29	10.34 (1.00, 19.69)	-4.69 (-21.01, 11.62)	0.564
24 weeks	34	2.94 (-4.56, 10.44)	23	0.72 (-11.85, 13.30)	4.45 (-15.20, 24.10)	0.645
Insomnia						
12 weeks	43	-4.65 (-13.20, 3.90)	37	-2.70 (-11.14, 5.74)	8.43 (-8.31, 25.16)	0.316
18 weeks	40	4.17 (-5.24, 13.57)	29	1.15 (-9.82, 12.12)	2.89 (-18.85, 24.63)	0.789
24 weeks	34	-0.95 (-11.88, 9.98)	23	4.35 (-10.90, 19.59)	-3.04 (-31.38, 25.30)	0.827
Appetite loss						
12 weeks	43	-0.78 (-9.00, 7.45)	37	-2.70 (-14.53, 9.12)	-8.31 (-26.54, 9.92)	0.363
18 weeks	40	6.67 (-2.75, 16.08)	29	4.60 (-10.45, 19.65)	-1.53 (-23.19, 20.13)	0.887
24 weeks	34	-0.95 (-9.95, 8.04)	23	-2.90 (-17.90, 12.10)	-3.61 (-25.26, 18.05)	0.735
Constipation						
12 weeks	43	-3.10 (-12.28, 6.08)	37	-1.80 (-8.71, 5.10)	0.44 (-11.23, 12.10)	0.940
18 weeks	40	3.33 (-5.63, 12.30)	29	3.45 (-7.45, 14.35)	-4.92 (-22.06, 12.22)	0.565
24 weeks	34	1.96 (-4.40, 8.33)	23	2.90 (-9.33, 15.12)	7.76 (-11.74, 27.27)	0.421
Fatigue						
12 weeks	43	-2.07 (-8.19, 4.05)	37	0.60 (-6.44, 7.64)	-6.63 (-19.54, 6.27)	0.306
18 weeks	40	3.33 (-3.46, 10.12)	29	1.15 (-8.12, 10.42)	-0.54 (-16.24, 15.16)	0.945
24 weeks	34	1.96 (-6.33, 10.25)	23	-1.45 (-10.06, 7.16)	0.37 (-18.35, 19.08)	0.968
Nausea and vomiting						
12 weeks	43	0.00 (-4.04, 4.04)	37	-1.80 (-8.32, 4.72)	1.88 (-10.26, 14.02)	0.757
18 weeks	40	0.42 (-3.30, 4.13)	29	2.30 (-6.94, 11.54)	-2.39 (-12.96, 8.19)	0.651
24 weeks	34	0.00 (-4.17, 4.17)	23	-2.90 (-9.29, 3.49)	2.63 (-6.97, 12.22)	0.579

* EORTC QLQ-C15-PAL: European Organization for Research and Treatment of Cancer Quality of Life-C15-Palliative.

† Differences in change scores between groups and associated tests of effect were estimated by regression, adjusting for baseline covariates.

Table 4. Changes from Baseline in Self-management Strategies and Differences in Changes Between Groups by Quality of Early Palliative Care

Measure	Group with high QCQ-PC scores		Group with low QCQ-PC scores		Available cases analysis*	
Time from baseline (months)	N	Mean observed change from baseline (95% CI)	N	Mean observed change from baseline (95% CI)	Adjusted difference between change scores (95% CI)	p value
SAT Total						
12 weeks	43	0.49 (-4.41, 5.39)	37	-3.27 (-8.96, 2.43)	1.99 (-8.55, 12.52)	0.706
18 weeks	40	4.58 (-0.99, 10.15)	29	-11.42 (-19.63, -3.21)	18.96 (5.23, 32.70)	0.008
24 weeks	34	4.18 (-1.26, 9.63)	23	-4.25 (-14.29, 5.79)	10.55 (-5.55, 26.64)	0.190
SAT Core strategy						
12 weeks	43	-0.47 (-7.58, 6.65)	37	-5.24 (-12.19, 1.71)	0.91 (-13.42, 15.24)	0.898
18 weeks	40	0.92 (-6.26, 8.09)	29	-13.33 (-24.74, -1.92)	15.60 (-2.32, 33.51)	0.086
24 weeks	34	1.08 (-7.16, 9.32)	23	-4.78 (-17.08, 7.52)	-0.93 (-22.06, 20.19)	0.928
SAT Preparation strategy						
12 weeks	43	-1.32 (-6.63, 4.00)	37	-2.38 (-8.30, 3.54)	1.82 (-9.92, 13.57)	0.756
18 weeks	40	5.33 (-1.78, 12.45)	29	-10.57 (-18.58, -2.57)	20.81 (6.42, 35.19)	0.006
24 weeks	34	3.53 (-2.37, 9.42)	23	-4.78 (-15.28, 5.72)	17.64 (0.72, 34.55)	0.042
SAT Implementation strategy						
12 weeks	43	3.26 (-1.46, 7.97)	37	-2.19 (-8.67, 4.29)	3.22 (-7.00, 13.45)	0.528

18 weeks	40	7.50 (2.52, 12.48)	29	-10.34 (-19.19, -1.50)	20.49 (7.46, 33.52)	0.003
24 weeks	34	7.94 (2.55, 13.34)	23	-3.19 (-12.36, 5.98)	14.93 (0.78, 28.64)	0.043

* Differences in change scores between groups and associated tests of effect were estimated by regression, adjusting for baseline covariates.