Journal of Multidisciplinary Healthcare

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Latent Profiles of Advance Care Planning Engagement and Death Attitudes in Dialysis Patients with End-Stage Renal Disease

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Background: Early identification of individuals with low advance care planning (ACP) engagement remains a critical component of clinical care. However, we know little about the heterogeneity of ACP engagement at the individual level. This study identified latent subgroups of ACP engagement using latent profile analysis (LPA), and explored their associations with death attitudes.

Methods: This study recruited 302 end-stage renal disease (ESRD) patients undergoing dialysis. Data included sociodemographic characteristics, the Advance Care Planning Engagement Survey (ACPES; Chinese version), and the Death Attitude Profile–Revised (DAP-R). Based on multidimensional indicators, LPA was employed to identify distinct ACP engagement profiles. Model fit and classification quality in LPA were evaluated based on class sizes and entropy values. All analyses were completed in SPSS 26.0 and Mplus 8.3, with R3STEP and BCH methods employed to uncover underlying patterns and relationships.

Results: Among dialysis-dependent ESRD patients, ACP engagement was categorized into two latent profiles: a "low-ACP Engagement" profile (n = 162, 53.6%) and a "high-ACP Engagement" profile (n = 140, 46.4%), with good classification quality (entropy = 0.909). The profile membership was significantly associated with dialysis vintage, and educational level (both $p < 0.05$). BCH analyses revealed that patients with low ACP engagement reported significantly higher fear of death and death avoidance, whereas those with high ACP engagement showed greater neutral acceptance of death (all $p < 0.001$).

Conclusion: This study identifies two distinct ACP engagement profiles among dialysis-dependent ESRD patients. Findings emphasize the need for tailored interventions, particularly for patients with shorter dialysis vintage and lower education level, and highlight the role of death attitudes in shaping ACP engagement. These findings should be interpreted with caution due to the cross-sectional design and single-center setting.

Keywords: end-stage renal disease, dialysis, advance care planning, death attitudes, latent profile analysis

Introduction

Chronic kidney disease (CKD) affects approximately 8.2% of the Chinese population, accounting for an estimated 110 million individuals.[1] Critically, end-stage renal disease (ESRD), featured by irreversible kidney function damage, is usually the final stage of CKD as it progresses, imposing significant physical, psychological, and socioeconomic burdens on both patients and their families. Currently, ESRD is generally managed by hemodialysis (HD), peritoneal dialysis (PD), and renal transplantation. Given the adverse outcomes of ESRD, there is increasing recognition of the need to integrate advance care planning (ACP) into end-stage renal disease (ESRD) care. ACP refers to a structured process that patients with decision-making capacity, informed about their medical condition and prognosis, express and discuss their treatment preferences with healthcare providers and family members, guided by their personal values and life experiences.[2] ACP has been accepted as a fundamental component of palliative care, serving as a key quality indicator by promoting patients' autonomy in medical decision-making. A survey on ACP among elderly patients with renal failure reported that although 52% had completed ACP documents outside the healthcare system, only 27% regularly discussed ACP with their physicians.[3] The KDIGO 2024 CKD guidelines recommend introducing ACP early in the disease course to facilitate patients' understanding of prognosis,

Received: 20 July 2025
Accepted: 3 October 2025
Published: 8 October 2025

treatment options (such as dialysis modalities or conservative management), and decisions related to quality of life.[4] In a survey conducted among residents of 34 nursing homes in Hong Kong,[5] only 5.9% had heard of ACP; however and noticeably, 42.3% of them, after receiving an explanation, expressed a willingness to engage in ACP, indicating a potentially high level of acceptability. Empirical evidence suggests that ACP interventions (eg, the SPIRIT protocol) can significantly improve end-of-life preparedness, enhance alignment between patient and family goals, reduce decisional conflict, and alleviate caregiver-related bereavement anxiety.[6]

Attitudes toward death indicates the existential understanding of individuals towards the meaning of life, which is critical in shaping ACP engagement. Currently, ACP engagement remains suboptimal, possibly attributable to concerns about potential changes in future preferences, anxiety surrounding discussions on death, and uncertainty regarding whether advance directives will ultimately be honored.[7] It has been proposed previously that discussions on ACP may be improved effectively with a more open mindset by mitigating death-related anxiety and fostering acceptance of death as a neutral part of life.[8] In this study, death attitudes were assessed using the Death Attitude Profile–Revised (DAP-R), which encompasses five dimensions: fear of death (negative emotions such as fear and anxiety toward death), death avoidance (avoidance or denial of death), neutral acceptance (viewing death neither with fear nor avoidance, but as a natural part of life), approach acceptance (belief in a blissful afterlife), and escape acceptance (perceiving death as a release from the suffering of life). ACP engagement in this study was evaluated using the Advance Care Planning Engagement Survey (ACPES), which identifies four core behaviors: (1) designating a surrogate decision-maker; (2) clarifying values and quality-of-life goals; (3) granting flexibility to surrogates in decision-making; and (4) asking questions to physicians. Designating a surrogate refers to identifying a decision-maker and informing both the surrogate and healthcare professionals of this designation. Clarifying quality-of-life values involves determining personal values and goals and communicating them to surrogates and clinicians. Flexibility relates to discussing the degree of latitude afforded to surrogates in medical decision-making. Finally, asking questions to physicians entails preparing inquiries to ensure informed healthcare decisions. Indeed, prior studies[9,10] have primarily employed standardized ACP engagement scales to classify participants, yet accompanied by a limitation of disregard for the underlying heterogeneity in engagement patterns. Moreover, there is currently an insufficient examination of the association between variations in death attitudes and levels of ACP engagement, necessitating further investigation.

According to the existing evidence, most studies examining ACP participation among dialysis patients rely on traditional evaluation methods, such as total scores or cutoff values. Nevertheless, through such research strategies, it may often fail to capture the intricate interactions among individual-level factors. Significantly, latent profile analysis (LPA), as a person-centered analytic method, enables the identification of heterogeneity across patient subgroups,[11,12] offering a more refined understanding of individual differences and providing evidence to inform the development of tailored interventions. Given the heterogeneity of ACP engagement, a person-centered approach such as LPA was chosen over variable-centered methods, as it allows for identification of subgroups with distinct engagement patterns. Based on prior theory and empirical evidence, we expected two to three latent profiles. Furthermore, ACP engagement patterns have been established across various populations, including individuals with dementia,[13] decompensated cirrhosis,[14] advanced cancer,[15] and heart failure.[16] All these findings support that the use of LPA may facilitate the identification of distinct subgroups with varied levels of ACP engagement. Identifying these profiles may enable dialysis clinics to design tailored ACP interventions targeting patients with specific needs, thereby enhancing participation and reducing decisional conflicts.

In recent years, there is a steady rise in the number of patients receiving HD and PD in China. According to the data from the Chinese Society of Nephrology, as of 2024, mainland China reported 1,027,267 HD patients and 156,379 PD patients. The challenge lies in that there is few research on ACP engagement among this group, despite the expanding dialysis population, highlighting limited data reference. Previous studies have indicated that age, educational attainment, experiences of emergency care or hospitalization, cultural background, and psychological factors are intrinsic determinants of ACP engagement.[4] Based on sample size considerations and evidence from prior literature, the present study selected dialysis vintage, resuscitation experience, hospitalization within the past two years, education level, and prior awareness of ACP and ADs as predictors to examine their associations with ACP engagement. Accordingly, by employing LPA, the present study was conducted to: (1) identify distinct ACP engagement profiles among dialysis-dependent ESRD patients, (2) investigate the predictive effects of dialysis vintage, resuscitation experience, hospitalization in the past two years, education level, and prior awareness of ACP

and ADs on ACP engagement profiles; and (3) examine differences in death attitudes across the identified profiles. It is anticipated that this study may generate clinically meaningful insights to enhance ACP participation, uphold patients' autonomy in medical decision-making, and improve the quality of end-of-life care through evidence-based interventions.

Methods

Participants and Procedures

Through convenience sampling, this cross-sectional study recruited ESRD patients undergoing dialysis at the Central Hospital of Wuhan between March and December 2024. Inclusion criteria: (1) ≥18 year-old patients diagnosed with ESRD according to the 2012 KDIGO criteria; (2) patients currently receiving HD, PD, or both; (3) patients who had no prior completion of advance directives (ADs); (4) patients with intact cognitive function and communication ability; and (5) those who voluntarily participate in this study with written informed consent. Exclusion criteria: (1) subjects who refused to participate in the study, and (2) those with acute-phase complications. Prior to the study, ethical approval was obtained from the Ethics Committee of the Central Hospital of Wuhan, China (Approval No. WHZXKYL2024-069).

For sample size calculation, the standard deviation of ACPES scores was estimated at 22.95 based on a pilot study of 40 eligible patients. Using PASS 23.0, the required sample size was 225 with α set at 0.05 and a distance from the mean to the limit of 3.00. Furthermore, to account for potential invalid questionnaires due to incomplete or inaccurate responses, the sample size was increased by 20%, resulting in a final sample size of 282 participants.

Data Collection

To ensure the smooth conduct of the study, a research team was established. The team consisted of one head nurse from the Department of Nephrology (study supervisor), one attending nephrologist (responsible for disease diagnosis and basic treatment), and three nurses (responsible for data collection and management). Prior to initiating the survey, all members in our research team received standardized training to ensure consistent understanding of study protocols and operational procedures. The training program covered: (1) in-depth understanding of the research topic and related concepts; (2) mastery of the questionnaire structure and content; (3) communication techniques and standardized interview scripts; and (4) procedures for documentation and archiving. A pilot survey involving 40 participants was conducted to assess the clarity of the questionnaire and the comprehension of participants. Using anonymized, paper-based questionnaires, formal data collection was carried out at the HD Center and PD Clinic of the Central Hospital of Wuhan. Trained researchers were responsible for screening eligible patients, providing standardized explanation of the study objectives, and obtaining written informed consent. Participants were instructed to complete the filling of questionnaires independently based on written guidelines. In addition, for those with limited literacy or physical impairments, structured interviews would be provided by trained staff to ensure accurate data collection. All completed questionnaires were subjected to immediate on-site quality checks to identify omissions or logical inconsistencies, which were resolved through participant verification. Eventually, of the 353 questionnaires distributed, 302 were deemed valid, yielding a response rate of 85.6%. None of the valid questionnaires contained missing data, ensuring completeness of the dataset.

Measures

Demographic and Clinical Characteristics

Based on a comprehensive literature review, the data collection instrument was developed and comprised three major domains. The first domain addressed sociodemographic characteristics, including gender, age, marital status, relationship with primary caregiver, monthly household income (in Chinese yuan), and educational level. The second domain focused on clinical parameters such as dialysis modality (HD or PD), dialysis vintage, number of hospitalizations in the past two years, and history of resuscitation. The third domain pertained to ACP-related factors, including prior awareness of ACP and familiarity with ADs.

ACP Engagement

The ACPES, developed initially by Sudore et al[17] in 2013, is a critical tool to assess ACP behaviors across four conceptual domains: identifying a surrogate decision-maker (SDM), discussing goals and values related to quality of life with clinicians

and the SDM, determining the flexibility granted to the SDM, and asking clinicians questions to support informed decision-making. Subsequently, Liu et al[18] culturally adapted and validated the instrument for use among Chinese community-dwelling older adults with chronic illnesses. The Chinese version covers four psychological process dimensions—knowledge, contemplation, self-efficacy, and readiness—each rated on a 5-point Likert scale, with 34 items totally. In the present study, the means of these four dimensions were employed as continuous indicators for LPA. Scores of all these 34 items would be summed to calculate the total score of ACPES, yielding a possible range of 34 to 170, with higher scores indicating greater overall ACP engagement. With good psychometric property demonstrated (overall Cronbach's α = 0.817 in validation studies), this adapted scale showed excellent internal consistency (Cronbach's α = 0.953) in this study.

Death Attitude

The Death Attitude Profile–Revised, developed by Wong et al in 1994,[19] is a validated tool for assessing both positive and negative attitudes toward death. The 32-item scale comprises five dimensions: fear of death (7 items), death avoidance (5 items), neutral acceptance (5 items), approach acceptance (10 items), and escape acceptance (5 items). Items are rated on a 5-point Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (5 points), with higher scores indicating stronger endorsement of the respective attitude. The Mandarin version, adapted by Tang et al,[20] demonstrated good internal consistency, with a Cronbach's α of 0.875 and a split-half reliability of 0.864. In the current study, the total scale showed a Cronbach's α of 0.849.

Statistical Analysis

Statistical analyses were conducted using SPSS 26.0 and Mplus 8.3. This study employed a person-centered statistical technique, ie, LPA, to identify unobserved subgroups based on homogeneous patterns across observed variables. The models were estimated using robust maximum likelihood (MLR), which provides standard errors robust to non-normality. To ensure stability of the solution, we used 1000 random sets of starting values with 250 final optimizations. The mean scores of the four ACPES dimensions were considered as indicators in the LPA model with 1- to 5-class solutions. Model fitting was assessed using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size-adjusted BIC (aBIC), with lower values indicating better fitting. Entropy values, with a range of 0~1, closer to 1 would reveal higher classification precision. Furthermore, the model solutions were compared by using the Lo-Mendell-Rubin adjusted likelihood ratio test (LMRT) and bootstrap likelihood ratio test (BLRT), with $p < 0.05$ indicating a significantly better fitting for the k-class model compared to the (k–1)-class model. The R3STEP procedure in Mplus was used to examine predictors of latent profile membership, with dialysis vintage treated as a continuous variable and resuscitation experience, hospitalization in the past two years, education level, prior awareness of ACP and ADs treated as ordered categorical variables. The BCH method was applied to examine whether the latent ACP engagement profiles differed on death attitudes (DAP-R). All scale indicators were derived as dimension mean scores. As the ACPES employed a five-point Likert response format, all indicators were measured on a comparable scale, and thus no additional standardization was applied prior to LPA. No missing data were present in the final analytic sample (n = 302); therefore, no imputation procedures were required. Continuous variables were summarized as means ± standard deviations ($\bar{x} \pm s$), and categorical variables as frequencies and percentages (%). A two-tailed $p < 0.05$ was considered statistically significant.

Results

General Characteristics

In our final cohort for analysis, there were 302 dialysis-dependent ESRD patients, with a mean age of 65.61±13.29 years. The majority of the included individuals were males (64.6%), married (62.3%), and had completed junior high school education (42.4%). Table 1 summarizes the detailed sociodemographic and clinical characteristics of the enrolled participants.

LPA of ACP Engagement

LPA based on ACPES domain means identified one to five potential profiles among dialysis-dependent ESRD patients. Consequently, values for AIC, BIC, and aBIC decreased progressively with increasing class number (Table 2). The two-profile

Table 1 Baseline Characteristics and Scale Scores of Participants (N = 302)

Variables	Classification	Mean ± SD or n (%)
Gender	Male	195 (64.6)
	Female	107 (35.4)
Age (years)		65.61±13.29
Dialysis modality	HD	199 (65.9)
	PD	80 (26.5)
	Combination of HD and PD	23 (7.6)
Education level	Primary or below	130 (43.0)
	Junior	128 (42.4)
	Senior high/technical school	40 (13.2)
	College or above	4 (1.3)
Dialysis vintage (months)		65.70±45.99
Household monthly income (Chinese yuan)	<5000	156 (51.7)
	5000~9999	123 (40.7)
	≥10000	23 (7.6)
Marital status	Unmarried	10 (3.3)
	Married	188 (62.3)
	Divorced/widowed	104 (34.4)
Relationship with primary caregiver	Family members	250 (82.8)
	Domestic helper	25 (8.3)
	Living alone	27 (8.9)
Hospitalization (past 2 years)	Yes	255 (84.4)
	No	47 (15.6)
Resuscitation experience	Yes	49 (16.2)
	No	253 (83.8)
Prior awareness of ACP	Yes	18 (6.0)
	No	284 (94.0)
Prior awareness of ADs	Yes	55 (18.2)
	No	247 (81.8)
Death attitude	Fear of death	2.34 ± 0.38
	Death avoidance	2.41 ± 0.37
	Neutral acceptance	2.65 ± 0.46
	Approach acceptance	2.29 ± 0.66
	Escape acceptance	2.31 ± 0.82
ACP Engagement	Knowledge	1.85 ± 0.65
	Contemplation	2.82 ± 0.93
	Self-efficacy	2.64 ± 0.89
	Readiness	2.24 ± 0.64

Abbreviations: HD, Hemodialysis; PD, Peritoneal Dialysis; ACP, Advance Care Planning; ADs, Advance Directives.

Table 2 Fit Indices for One to Five Latent Profiles (n = 302)

Models	AIC	BIC	aBIC	Entropy	LMRT	BLRT	Proportion of Each Profile
1	2788.670	2818.354	2792.982				1.000
2	**2351.149**	**2399.385**	**2358.156**	**0.909**	**<0.001**	**<0.001**	**0.531/0.469**
3	2308.088	2374.876	2317.790	0.803	0.016	<0.001	0.214/0.351/0.345
4	2278.865	2364.205	2291.262	0.801	0.339	<0.001	0.172/0.360/0.313/0.154
5	2248.780	2352.672	2263.871	0.846	0.270	<0.001	0.153/0.313/0.320/0.097/0.115

Notes: Bold text indicates the optimal model selected.

Abbreviations: AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; aBIC, adjusted BIC; LMRT, Vuong-Lo–Mendell–Rubin likelihood ratio test; BLRT, Bootstrapped Likelihood Ratio Test.

Table 3 ACP Engagement Scores Across Latent Profiles in Dialysis-Dependent ESRD Patients

	n	Knowledge	Contemplation	Self-efficacy	Readiness
Low-ACP engagement	162	1.53 ± 0.52	2.12 ± 0.59	1.94 ± 0.45	2.00 ± 0.49
High-ACP engagement	140	2.21 ± 0.58	3.62 ± 0.49	3.44 ± 0.52	2.52 ± 0.66

solution yielded significant results for both LMRT and BLRT (both $p < 0.001$). Finally, the two-profile model was selected as the optimal solution considering statistical fit indices (AIC/BIC/aBIC), classification accuracy (entropy = 0.909), and clinical interpretability.

Latent Profile Characteristics

According to the two-profile model, ACPES domain scores were stratified by latent class among dialysis-dependent ESRD patients. As presented in Table 3, Profile 1 (n = 162, 53.6%) and Profile 2 (n = 140, 46.4%) were respectively termed the low- and high-ACP engagement group. Among them, patients in Profile 1 displayed consistently lower scores across all four domains, indicating limited engagement and conceptual awareness regarding ACP; conversely, patients from Profile 2 showed elevated scores, suggestive of more intentional contemplation and proactive participation in ACP. Further inter-profile comparative analysis revealed the greatest divergence in self-efficacy scores, while knowledge scores showed the least variation. Profile-specific ACPES means are visualized in Figure 1.

Death Attitude Score Profiles Across Latent Classes

It was observed with distinct psychological patterns, according to the analysis of death attitude subscale scores across latent profiles of dialysis-dependent ESRD patients. The low-ACP engagement group exhibited the highest mean score in death avoidance (2.54 ± 0.41) and the lowest in approach acceptance (2.33 ± 0.66), indicating heightened death-related fear and limited acceptance. In contrast, the high-ACP engagement group demonstrated the highest neutral acceptance score (2.86 ± 0.55) and the lowest fear of death score (2.23 ± 0.34), unveiling a more accepting and less anxious orientation toward mortality. In addition, inter-profile comparisons showed the greatest divergence in neutral acceptance and the least variation in escape acceptance, as presented in Table 4.

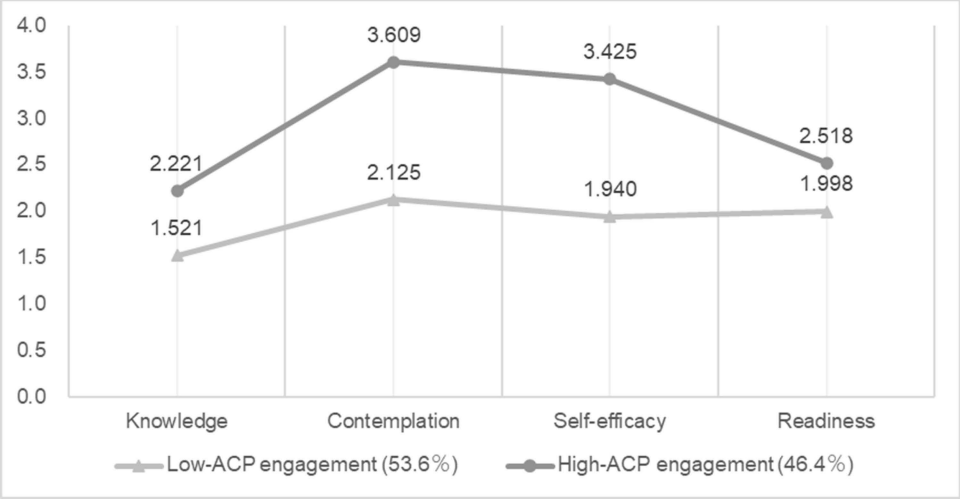

Figure 1 Profile plot of ACP engagement among dialysis-dependent ESRD patients.

Table 4 Death Attitude Scores Across Latent Profiles in Dialysis-Dependent ESRD Patients

	n	Fear of Death	Death Avoidance	Neutral Acceptance	Approach Acceptance	Escape Acceptance
Low-ACP engagement	162	2.52 ± 0.44	2.54 ± 0.41	2.52 ± 0.30	2.33 ± 0.66	2.35 ± 0.89
High-ACP engagement	140	2.23 ± 0.34	2.34 ± 0.36	2.86 ± 0.55	2.23 ± 0.65	2.26 ± 0.75

Table 5 Results of Multinomial Logistic Regressions for the Effects of Predictors on Profile Membership (R3STEP)

Predictor	Coef.(SE)	OR	P-value
Dialysis vintage (months)	0.007 (0.003)	1.007	0.035*
Hospitalization (past 2 years)	0.136 (0.425)	1.145	0.765
Education level	0.571 (0.178)	1.770	0.014*
Resuscitation experience	0.570 (0.383)	1.767	0.256
Prior awareness of ACP	0.027 (0.689)	1.027	0.969
Prior awareness of ADs	−0.414 (0.418)	0.661	0.220

Notes: Low-ACP engagement is the reference group. *p < 0.05.
Abbreviations: OR, odds ratio; SE, standard error of coefficient.

Table 6 BCH Results for the Differences on the Death Attitude Across Latent Profiles

Outcome	Class 1 M (SE)	Class 2 M (SE)	BCH χ^2	Comparison
Fear of Death	2.452 (0.032)	2.230 (0.029)	24.499***	1 > 2
Death Avoidance	2.484 (0.031)	2.344 (0.031)	9.892**	1 > 2
Neutral Acceptance	2.514 (0.025)	2.799 (0.049)	25.534***	2 > 1
Approach Acceptance	2.336 (0.053)	2.232 (0.056)	1.700	1=2
Escape Acceptance	2.356 (0.072)	2.262 (0.064)	0.898	1=2

Note: Class 1, Low-ACP engagement, Class 2, High-ACP engagement. **p < 0.01, ***p < 0.001.
Abbreviation: SE, standard error.

Predictors of Latent Profile Membership and Differences in Death Attitudes

Table 5 presents the results of the multinomial logistic regression analyses. The findings indicate that dialysis vintage, and education level were significantly associated with profile membership, whereas prior hospitalization, resuscitation experience, and prior awareness of ACP or ADs were not. Each additional month of dialysis treatment was associated with approximately a 0.7% increase in the odds of belonging to the high-ACP engagement group. Similarly, with each incremental increase in education level, the odds of being classified into the high-ACP engagement group increased by about 77%. Table 6 summarizes the results of the equality tests of death attitudes across profiles using the BCH method. Class 1 exhibited higher levels of fear of death and death avoidance compared with Class 2 (both $p < 0.001$). In contrast, Class 2 showed significantly greater neutral acceptance of death than Class 1 ($p < 0.001$). No significant between-class differences were found in approach or escape acceptance.

Discussion

Maintenance hemodialysis (MHD) patients experience a markedly higher incidence of in-hospital cardiopulmonary resuscitation (CPR), reported at 1.4 events per 1,000 hospital days, significantly exceeding rates observed in the general population.[21] Moreover, 14.9% of in-hospital deaths among this group are preceded by CPR events.[22] A retrospective study[23] reported a 35% mortality among MHD patients, noting that only 22.2% had documented withdrawal of life-sustaining treatments, despite a high symptom burden at the end of life. Awareness of kidney supportive care remains low, and most patients rely heavily on physician-led decision-making. Furthermore, cultural norms emphasizing life preservation and family-centered

decision-making further constrain patients' autonomy and discourage the discontinuation of treatment.[24] Notably, moderate to severe palliative care needs can be found in nearly half of ESRD patients.[25] Moreover, conventionally, ACP, focusing on terminal-stage decision-making frequently, is often misperceived as synonymous with "treatment abandonment". To address this, Wang et al[25] advocate for the early integration of ACP into a broader supportive care model—one that incorporates palliative principles while concurrently prioritizing quality of life throughout the disease trajectory, rather than deferring discussions until the terminal phase.

This study yielded two principal findings. First, through LPA, this study identified two distinct patterns of ACP engagement among dialysis-dependent ESRD patients. To be specific, the two patterns were low- and high-ACP engagement profiles, respectively reflecting passive participation and active involvement. Our results suggest that dialysis vintage, and education level significantly predicted ACP engagement profile membership. In our study, 94% of patients were unaware of ACP, and 81.8% had never heard of living wills. Similarly, in a study of HD patients in Taiwan, China,[26] 46.9% were unfamiliar with ACP and 90% had not completed ADs. Furthermore, a moderately low level of participation was found in our study, as evidenced by the overall ACP engagement score of 81.90 ± 20.55 among dialysis-dependent ESRD patients. Notably, low ACP engagement appears consistently prevalent, despite differences in assessment tools and methodologies across studies. In our LPA, slightly more individuals with low-ACP engagement were noticed than those with high-ACP engagement (53.6% vs 46.4%), reflecting heterogeneity in individual participation patterns. This trend may be attributed to Chinese cultural factors since Chinese patients' autonomy may be limited by our traditional avoidance of death-related discourse in our culture, combined with family-centered decision-making under filial piety norms, offering potential explanation for the early-stage development of ACP implementation in this population.[24] In Western countries, ACP is underpinned by the principles of patient autonomy, informed decision-making, and truth-telling, which are highly consistent with its core philosophy. However, these values often conflict with Confucian cultural traditions, in which death is considered a taboo topic and elderly individuals tend to avoid death-related discussions. Confucianism also emphasizes familism, particularly in end-of-life care decisions, where the collective will of the family often takes precedence over the patient's individual autonomy.[27] Within this cultural context, filial piety frequently drives adult children to pursue life-prolonging treatments for their parents, even when such decisions may contradict the parents' own preferences.[28] Notably, individuals with high-ACP engagement exhibited significantly higher scores across all ACP domains, revealing possibly stronger healthcare self-efficacy and more rational acceptance of death in this group. Altogether, these findings highlight the clinical utility of ACP engagement profiling in identifying domain-specific participation characteristics and guiding tailored interventions to support individuals with low-ACP engagement.

Death attitudes, shaped by personal understanding and cultural context, encompass the cognitive, emotional, and behavioral orientation of an individual toward mortality. The BCH analyses revealed notable differences in death attitudes across latent profiles. Specifically, individuals with low-ACP engagement exhibited higher levels of fear of death and death avoidance compared to those with high-ACP engagement. It can be interpreted that long-term exposure to dialysis may exacerbate patients' physical and psychological distress, potentially reinforcing their negative perceptions of death. Moreover, this group of patients may experience intensified death anxiety and discourage engagement in ACP, owing to the culturally embedded taboos surrounding death-related discourse, particularly within Confucian-influenced contexts. In contrast, patients in the high-ACP engagement group demonstrated greater neutral acceptance of death, suggesting that proactive ACP involvement fosters a more adaptive and accepting orientation toward mortality. Patients with high-ACP engagement may demonstrated greater death literacy, viewing death as a natural stage of life and engaging in meaning-making processes that facilitate ACP participation. Importantly, ACP can also serve as a psychosocial process that can promote existential integration and preparedness for death, in addition to documentation of treatment preferences.[29] Heightened fear of death, as unveiled by empirical evidence, can inhibit ACP engagement, while dismantling death-related superstitions and reframing death as a biological inevitability can significantly improve patients' receptivity to ACP.[8] No significant between-group differences were observed for approach or escape acceptance, implying that these dimensions may be less sensitive to ACP engagement. Collectively, these findings underscore the need to integrate death education and psychological support into ACP interventions, particularly for patients characterized by strong fear or avoidance tendencies, in order to promote healthier and more constructive attitudes toward end-of-life care. As documented in our study, dialysis vintage and education level as significant predictors of class membership, aligning with the results reported by Chen et al[26] and Tsai et al.[30] Specifically, Chen et al[26] found significantly higher levels of ACP awareness, contemplation, self-efficacy, and readiness in patients undergoing dialysis for >5 years, particularly among those with higher

education levels. Extended exposure to dialysis may increase the opportunity for repeated clinical interactions, which may deepen patients' understanding of disease progression and hence their enhanced ACP engagement. Meanwhile, a double advantage is obvious in patients with higher educational attainment. It is manifested as higher health literacy, which may enable more informed decisions regarding care preferences and foster a rational perspective on end-of-life planning; and higher cognitive capacity, which may support the integration of multimodal information acquired through clinician communication, peer interaction, and print or digital health resources, thereby promoting deeper assimilation of ACP concepts. Interestingly, hospitalization history, resuscitation experience, and prior awareness of ACP or ADs were not significantly related to class membership. While it might be assumed that acute medical events such as hospitalization or undergoing resuscitation would prompt reflection on treatment preferences, our findings suggest that the mere occurrence of such experiences may not translate into proactive ACP engagement. This could be explained by limited recall, insufficient communication at the time of the event, or cultural avoidance of end-of-life discussions. Future research should explore not only whether such events occur but also how they are experienced and processed, and whether structured follow-up discussions could enhance their impact on ACP engagement. Taken together, these findings highlight important targets for clinical practice. Nurses and clinicians should prioritize ACP discussions with newly initiated dialysis patients and those with lower educational attainment, ensuring that communication is tailored to patients' health literacy levels.

At this stage, there is insufficient development and implementation of death education initiatives in China. Low-ACP engagement group exhibited higher levels of fear of death and death avoidance. These results highlight the importance of assessing death-related attitudes and providing targeted psychological support, particularly for ESRD patients with low ACP engagement. In order to benefit the clarification of personal values and treatment preferences, as well as the improvement of illness awareness for specific patients, it is critical that evidence-based death education programs—delivered through face-to-face consultations, instructional videos, educational brochures, and structured seminars—should incorporate life review techniques. Existing investigations have documented measurable effectiveness concerning structured interventions integrating psychoeducation on disease trajectories, cognitive-behavioral strategies to mitigate fear of death (eg, progressive muscle relaxation), and ACP literacy enhancement. For example, video decision aids contributed to the improved awareness and acceptance of supportive kidney care (SKC) among older adults with advanced CKD.[31] Song et al[32] implemented an interventional strategy named "Sharing Patient's Illness Representations to Increase Trust", based on illness representation theory, leading to improved decision-making confidence in dialysis patients and reduced post-bereavement surrogate distress through value-based discussions. In British Columbia, by using electronic symptom tracking tools and regional champion networks, Chiu et al[2] successfully embedded ACP into a provincial palliative care framework for CKD G4–G5 patients to achieve standardized documentation, resulting in enhanced patient-centered outcomes. Similarly, van der Smissen et al[33] developed a web-based ACP platform, enabling patients with chronic illness to express care preferences via guided, evidence-informed modules. To advance ACP uptake, multilevel implementation strategies are warranted and should be considered, such as: (1) enhanced clinician training in prognostic communication; (2) contextual adaptation of interventions to local healthcare workflows; (3) policy reforms supporting concurrent provision of dialysis and hospice care; and (4) cross-sector collaboration to address systemic barriers.[34]

Strengths and Limitations

This study utilized LPA to identify two distinct ACP engagement profiles (low- and high-ACP) and further examined the influence of sociodemographic characteristics on ACP engagement among dialysis-dependent ESRD patients, while also comparing differences in death attitudes between the two profiles. This person-centered approach provides nuanced insights into the relationship between death attitudes and ACP engagement, thereby informing the development of tailored intervention strategies. Nevertheless, several limitations should be acknowledged. First, the cross-sectional design precludes establishing causal relationships among variables. Second, as a single-center study, the generalizability of the findings may be limited to other dialysis populations with different demographic, cultural, or healthcare system characteristics. Caution is warranted when extrapolating these results, and replication in larger, multicenter cohorts is needed to enhance external validity. Third, potential selection bias may have been introduced owing to non-representative sampling and imbalanced recruitment across dialysis modalities. Finally, another limitation concerns classification error

inherent in LPA. Although the R3STEP and BCH procedures adjust for uncertainty in class assignment, individuals are not perfectly classified into a single profile, and some degree of misclassification may persist.

Conclusion

This study, using LPA, identifies two distinct patterns of low-ACP and high-ACP engagement among dialysis-dependent patients with ESRD. These patterns exhibit intimate associations with death attitudes, particularly fear of death, death avoidance and neutral acceptance, and are also influenced by dialysis vintage, and educational level. Given the cross-sectional design, single-center samples, and potential uncertainty in class assignment, these findings should be interpreted with caution, serving as indications rather than definitive causal evidence. In clinical practice, recognizing these profiles may facilitate the development of tailored interventions, such as psychological support to address death anxiety or structured ACP discussions to foster proactive patient engagement. Future research should involve larger, multi-center longitudinal studies to further clarify causal mechanisms and to standardize terminology when describing death attitudes, thereby enhancing consistency between research and practice.

Data Sharing Statement

The data incorporated in this study can be obtained from the Ethics Committee of the Central Hospital of Wuhan. However, these data are not publicly accessible, resulting in restricted data availability. Nevertheless, data may be made available from the corresponding author upon reasonable request and with Ethics Committee approval.

Ethics Statement

Approval for this study was granted by the Ethics Committee of the Central Hospital of Wuhan, China (Approval No. WHZXKYL2024-069). The research was conducted in accordance with the Declaration of Helsinki. All participants provided their written informed consent prior to participating in this study.

Acknowledgments

We gratefully acknowledge all participants who took part in this project, and the support of the Central Hospital of Wuhan.

Funding

The author(s) acknowledge the receipt of financial assistance for the research, authorship, and/or publication of this article. Support for this work came from the Central Hospital of Wuhan (Grant No. 23YJ55).

Disclosure

The authors report no conflicts of interest in this work.

References

1. Wang L, Xu X, Zhang M, et al. Prevalence of chronic kidney disease in China: results from the sixth china chronic disease and risk factor surveillance. *JAMA Intern Med*. 2023;183(4):298–310. doi:10.1001/jamainternmed.2022.6817
2. Chiu HH, Murphy-Burke DM, Thomas SA, et al. Advancing palliative care in patients with CKD: from ideas to practice. *Am J Kidney Dis*. 2021;77(3):420–426. doi:10.1053/j.ajkd.2020.09.012
3. Ladin K, Neckermann I, D'Arcangelo N, et al. Advance care planning in older adults with CKD: patient, care partner, and clinician perspectives. *J Am Soc Nephrol*. 2021;32(6):1527–1535. doi:10.1681/ASN.2020091298
4. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2024 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int*. 2024;105(4S):S117–S314. doi:10.1016/j.kint.2023.10.018
5. Xu X, Chau PH, Cheung DST, et al. Preferences for end-of-life care: a cross-sectional survey of Chinese frail nursing home residents. *J Clin Nurs*. 2023;32(7–8):1455–1465. doi:10.1111/jocn.16483
6. Song MK, Manatunga A, Plantinga L, et al. Effectiveness of an advance care planning intervention in adults receiving dialysis and their families: a cluster randomized clinical trial. *JAMA Netw Open*. 2024;7(1):e2351511. doi:10.1001/jamanetworkopen.2023.51511
7. Park HY, Kim YA, Sim JA, et al. Attitudes of the general public, cancer patients, family caregivers, and physicians toward advance care planning: a nationwide survey before the enforcement of the life-sustaining treatment decision-making act. *J Pain Symptom Manage*. 2019;57(4):774–782. doi:10.1016/j.jpainsymman.2018.12.332
8. Graham-Wisener L, Nelson A, Byrne A, et al. Understanding public attitudes to death talk and advance care planning in Northern Ireland using health behaviour change theory: a qualitative study. *BMC Public Health*. 2022;22(1):906. doi:10.1186/s12889-022-13319-1

9. McMahan RD, Barnes DE, Ritchie CS, et al. Anxious, depressed, and planning for the future: advance care planning in diverse older adults. *J Am Geriatr Soc*. 2020;68(11):2638–2642. doi:10.1111/jgs.16754
10. Liu L, Zhao YY, Zhang LH, et al. Measuring self-efficacy and readiness for advance care planning in Chinese older adults. *J Pain Symptom Manage*. 2020;60(3):622–629. doi:10.1016/j.jpainsymman.2020.06.013
11. Nylund-Gibson K, Garber AC, Carter DB, et al. Ten frequently asked questions about latent transition analysis. *Psychol Methods*. 2023;28 (2):284–300. doi:10.1037/met0000486
12. Berlin KS, Williams NA, Parra GR. An introduction to latent variable mixture modeling (part 1): overview and cross-sectional latent class and latent profile analyses. *J Pediatr Psychol*. 2014;39(2):174–187. doi:10.1093/jpepsy/jst084
13. Zhu Y, Olchanski N, Cohen JT, et al. Life-sustaining treatments among medicare beneficiaries with and without dementia at the end of life. *J Alzheimers Dis*. 2023;96(3):1183–1193. doi:10.3233/JAD-230692
14. Ufere NN, Halford JL, Caldwell J, et al. Health care utilization and end-of-life care outcomes for patients with decompensated cirrhosis based on transplant candidacy. *J Pain Symptom Manage*. 2020;59(3):590–598. doi:10.1016/j.jpainsymman.2019.10.016
15. Switzer B, Jazieh K, Bernstein E, et al. Impact of an electronic medical record alert on code status documentation for hospitalized patients with advanced cancer. *JCO Oncol Pract*. 2020;16(3):e257–e263. doi:10.1200/JOP.19.00408
16. Kitakata H, Kohno T, Kohsaka S, et al. Preferences on advance care planning and end-of-life care in patients hospitalized for heart failure. *ESC Heart Fail*. 2021;8(6):5102–5111. doi:10.1002/ehf2.13578
17. Sudore RL, Stewart AL, Knight SJ, et al. Development and validation of a questionnaire to detect behavior change in multiple advance care planning behaviors. *PLoS One*. 2013;8(9):e72465. doi:10.1371/journal.pone.0072465
18. Liu D, Zhang L, Li J, et al. Verification of the Mandarin Chinese version of advance care planning engagement survey scale in community-dwelling older people. *Int J Older People Nurs*. 2023;18(1):e12502. doi:10.1111/opn.12502
19. Wong PTP, Reker GT, Gesser G. Death attitude profile—revised: a multidimensional measure of attitudes toward death. death anxiety handbook: research, instrumentation, and application. In: *Series in Death Education, Aging, and Health Care*. Philadelphia, PA: Taylor & Francis; 1994:121–148.
20. Tang L, Zhang L, Li YX, et al. Validation and reliability of a Chinese version Death Attitude Profile-Revised (DAP-R) for nurses. *J Nurs Sci*. 2014;29:64–66. doi:10.3870/hlxzz.2014.14.064
21. Daudre-Vignier C, Bates DG, Scott TE, et al. Evaluating current guidelines for cardiopulmonary resuscitation using an integrated computational model of the cardiopulmonary system. *Resuscitation*. 2023;186:109758. doi:10.1016/j.resuscitation.2023.109758
22. Wong SP, Kreuter W, Curtis JR, et al. Trends in in-hospital cardiopulmonary resuscitation and survival in adults receiving maintenance dialysis. *JAMA Intern Med*. 2015;175(6):1028–1035. doi:10.1001/jamainternmed.2015.0406
23. Gayathri MS, Naik B, Ghoshal A, et al. Profiling mortality patterns and place of death in patients on maintenance hemodialysis: a retrospective study in a tertiary care academic hospital in India. *BMC Palliat Care*. 2025;24(1):107. doi:10.1186/s12904-025-01748-9
24. Li X, Luo JK. Perceptions and attitudes of kidney supportive care among elderly patients with advanced chronic kidney disease and dialysis healthcare professionals in China: a qualitative study. *BMC Nephrol*. 2023;24(1):316. doi:10.1186/s12882-023-03372-2
25. Wang X, Mo Y, Yuan Y, et al. Exploring the influencing factors of unmet palliative care needs in Chinese patients with end-stage renal disease undergoing maintenance hemodialysis: a cross-sectional study. *BMC Palliat Care*. 2023;22(1):113. doi:10.1186/s12904-023-01237-x
26. Chen LC, Tu IT, Yu IC, et al. The explorations of the awareness, contemplation, self-Efficacy, and readiness of advance care planning, and its predictors in Taiwanese patients while receiving hemodialysis treatment. *BMC Palliat Care*. 2022;21(1):180. doi:10.1186/s12904-022-01063-7
27. Gao F, Chui PL, Che CC, Xiao L, Zhang Q. Advance care planning readiness among community-dwelling older adults and the influencing factors: a scoping review. *BMC Palliat Care*. 2024;23(1):255. doi:10.1186/s12904-024-01583-4
28. Pei Y, Zhang W, Wu B. Advance care planning engagement and end-of-life preference among older Chinese Americans: do family relationships and immigrant status matter? *J Am Med Dir Assoc*. 2021;22(2):340–343. doi:10.1016/j.jamda.2020.06.040
29. Eason RJ, Brighton LJ, Koffman J, et al. Coming to terms with dying: advance care planning as a conduit between clinicians, patients, and conversations about death and dying - a qualitative interview study. *Palliat Med*. 2025;39(3):425–436. doi:10.1177/02692163251318907
30. Tsai SF, Chang CY, Yang JY, et al. Exploring knowledge, attitude, and intention towards advance care planning, advance directive, and the patient self-determination act among hemodialysis patients. *BMC Palliat Care*. 2023;22(1):201. doi:10.1186/s12904-023-01321-2
31. Eneanya ND, Percy SG, Stallings TL, et al. Use of a supportive kidney care video decision aid in older patients: a randomized controlled trial. *Am J Nephrol*. 2020;51(9):736–744. doi:10.1159/000509711
32. Song MK, Ward SE, Fine JP, et al. Advance care planning and end-of-life decision making in dialysis: a randomized controlled trial targeting patients and their surrogates. *Am J Kidney Dis*. 2015;66(5):813–822. doi:10.1053/j.ajkd.2015.05.018
33. van der Smissen D, Rietjens JAC, van Dulmen S, et al. The web-based advance care planning program "explore your preferences for treatment and care": development, pilot study, and before-and-after evaluation. *J Med Internet Res*. 2022;24(12):e38561. doi:10.2196/38561
34. Goff SL, Unruh ML, Klingensmith J, et al. Advance care planning with patients on hemodialysis: an implementation study. *BMC Palliat Care*. 2019;18(1):64. doi:10.1186/s12904-019-0437-2