Health-related Quality of Life and Health Utility of Chinese Patients Undergoing Nocturnal Home Haemodialysis in comparison to Other Modes of Dialysis

Running title: HRQOL and health utility of home HD

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Abstract

Background: To compare the health-related quality of life (HRQOL) and health utility of Chinese patients with end-stage renal disease (ESRD) undergoing nocturnal home haemodialysis against those patients undergoing other modes of dialysis.

Methods: Chinese ESRD patients undergoing nocturnal home haemodialysis were recruited in renal specialist outpatient clinics at three public hospitals in Hong Kong. SF-12 Health Survey (SF-12) was used to measure HRQOL and generate the SF-6D heath utility score. Mean scores of SF-12 domains, physical and mental component summary, and SF-6D health utility of 41 patients undergoing nocturnal home haemodialysis were compared to available scores of patients receiving other forms of dialysis, namely peritoneal dialysis (n=103), hospital in-centre haemodialysis (n=135), or community in-centre haemodialysis (n=118). Adjusted linear regression models were performed to examine the impact of mode of dialysis on the HRQOL and health utility scores, accounting for the socio-demographic and clinical characteristics.

Results: ESRD patients undergoing peritoneal dialysis and community in-centre haemodialysis had better health utility, physical and mental component summary scores than the hospital in-centre haemodialysis. Adjusted analysis showed that hospital in-centre haemodialysis reported worse physical component summary and health utility scores when compared to peritoneal dialysis and community in-centre haemodialysis.

Conclusions: HRQOL and health utility scores of patients undergoing nocturnal home haemodialysis were similar to those undergoing peritoneal dialysis and community in-centre haemodialysis. Better physical aspects of HRQOL and health utility was observed in peritoneal dialysis and community-based haemodialysis than hospital in-centre haemodialysis, providing evidence for the increase in capacity of non-hospital based haemodialysis which provided flexibility as well as patient-centredness and empowerment in Hong Kong.

Keywords: quality of life; patient-reported outcome; end-stage renal disease; dialysis; nocturnal home haemodialysis

Manuscript Text

Background

Chronic kidney disease (CKD) is a common chronic disease, affecting 8-16% of the population worldwide[1]. In 2010, the estimated prevalence of CKD in the Chinese population stood at about 10.8%, with approximately 119.5 million[2]. CKD stage is assessed by the estimated glomerular filtration rate (eGFR)[3], which is an indication of the level of kidney damage. The lower the eGFR, the more severe the patient's CKD stage, with those at the highest stage classified as having end-stage renal disease (ESRD)[4]. Progression time to ESRD and mortality, and the need for renal replacement therapies (RRTs) may differ based on the etiology of CKD. Where available, RRTs including dialysis and renal transplantation have had a substantial impact on the prolongation of survival in patients with ESRD. Renal transplantation has proven to be the most preferred, effective and beneficial option[5] but scarcity of transplantable organs, donors and healthcare resources for renal transplantation is a significant limitation in both developed and developing countries. Due to such practical considerations, maintenance dialysis remains the first-line management approach for ESRD.

In Hong Kong's public healthcare sector, 1147 new cases of ESRD were accepted for RRT in 2013, an incidence rate of 159 patients per million population[6]. At the end of 2013, there were 3817 patients on peritoneal dialysis (PD) and 1192 on haemodialysis (HD), for a ratio of approximately 3:1[6] owing to the longstanding "peritoneal dialysis first" policy in Hong Kong[7]. The paradigm of RRTs shifts certain proportions of ESRD patients from conventional in-centre haemodialysis and PD to nocturnal home haemodialysis, an

alternative dialysis modality for ESRD patients in Hong Kong. The first nocturnal home haemodialysis case has been recruited in Hong Kong public hospital in 2006 [8]. Studies have shown that nocturnal haemodiaysis is more effective than conventional hemodialysis in improving clinical outcomes like clearing most small[9-11], middle and larger molecule toxins[12, 13]. Nocturnal home haemodialysis allows patients to self-dialyze overnight which minimizes disruption to daily life, and has been shown to have additional clinical benefit[14] as demonstrated by significant reduction in incident left ventricular hypertrophy and serum albumin concentration which were proxy measures for inflammation[15].

Beyond survival and maintenance of clinical outcomes, patient-reported outcomes such as health-related quality of life (HRQOL) are increasingly important for the evaluation of RRT modalities, whereby HRQOL is the subjective and multidimensional concepts encompassing biological and psychological aspects of health outcomes[16]. There is currently little evidence directly comparing HRQOL between nocturnal home haemodialysis and other modes of dialysis although the patient-level data have been analysed in pairwise comparisons[17-19] or in a before-and-after study design[20, 21]. The Frequent Hemodialysis Network Nocturnal Trial[18] evaluated the overall benefits of nocturnal haemodialysis compared to in-centre haemodialysis, suggesting no significant improvement in physical-related and mental-related scores using the SF-36 Health Survey. When compared to in-centre haemodialysis, nocturnal home haemodialysis was associated with significant improvement in HRQOL[14] and health utility scores[19]. With respect to the shortage of direct HRQOL comparisons, earlier literature reviews [22, 23] synthesized the health utility scores of patients undergoing different RRTs but indirect comparisons of home nocturnal haemodiaysis and other dialysis modes were not available. Those reviews considered home haemodiaysis as part of haemodiaysis modality for analysis. A recent

systematic review and meta-analysis of health utility scores in CKD patients [24] showed that there has been a paucity of studies reporting health utility scores for ESRD patients treated with nocturnal home haemodialysis. Yet, those studies that have been undertaken were limited by the small sample size and the lack of comparison to patients treated with other RRTs.

The aim of this study was to compare the HRQOL and health utility of Chinese patients with ESRD receiving nocturnal home haemodialysis against those patients receiving other modes of dialysis. Our study hypothesis was that nocturnal home haemodialysis patients had better HRQOL and health utility than other patients undergoing other forms of dialysis.

Methods

Study Design and Sampling

Analyses were based on cross-sectional data of ESRD patients pooled from the following studies conducted in Hong Kong:

(1) A multi-centre cohort study was conducted in 2014-2015, which evaluated the psychometric properties of Kidney Disease Quality of Life-36 (KDQOL-36) questionnaire in 356 Chinese adults receiving maintenance haemodialysis or peritoneal dialysis[25]. Eligible patients were those undergoing peritoneal dialysis, hospital in-centre haemodialysis, or community in-centre haemodialysis. Within such cohort, some patients undergoing haemodialysis in community centres came from patient-reported outcome survey when evaluating the quality of care of haemodialysis public-private partnership (HD PPP)

programme[26-28]. Details of patient recruitment and data collection for the first cohort have been reported elsewhere[25].

(2) Given that the patients undergoing nocturnal home haemodialysis (3-6 sessions weekly) were not enrolled in the first cohort study, the second cohort evaluated the HRQOL of patients undergoing nocturnal home haemodialysis. A total of 43 ESRD patients on nocturnal home haemodialysis selected by convenience sampling were recruited into the second cohort at the time when the patients attended the regular follow-up consultation at renal specialist outpatient clinics at three public hospitals in Hong Kong, between May 2016 and October 2016. The majority of them (41, 95.3%) completed the HRQOL questionnaires by face-to-face interview.

Patients in the first and second cohorts were administered with the socio-demographic questions and HRQOL instruments using the Chinese (Hong Kong) version SF-12 version 2 (SF-12v2). Clinical and laboratory data were retrieved from clinical medical record and laboratory system of electronic patient records in Hospital Authority.

The information letter explained the study aim, and the written informed consent was obtained from all participants. Ethics approval of this study was granted by the institutional review board of the University of Hong Kong and of the Hong Kong Hospital Authority for Hong Kong West Cluster (reference: UW 15-952, UW 10–366 and UW 15–090), Hong Kong East Cluster (reference: HKEC-2010-096), Kowloon West Cluster (reference: KW/EX-16-011 (95-11) and KW/EX/10-150 (34–17)), Kowloon Central Cluster/ Kowloon East Cluster (reference: KC/KE-10-0208/ER-3), Joint Chinese University of Hong Kong-New Territories East Cluster (reference: CRE-2011.051) and New Territories West Cluster (reference: NTWC/CREC/911/11).

Study Instruments

HRQOL: Chinese (Hong Kong) SF-12 Health Survey

The Chinese (Hong Kong) SF-12 Health Survey version 2 (SF-12v2) has been validated[29] and normed[30] on the general Chinese population in Hong Kong, and thus was used to measure HRQOL in the Chinese patients with ESRD [27, 28, 31]. It measures eight subscales of HRQOL by assessing physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH) on a transformed scale score with theoretical range from 0 to 100. A higher score indicates better HRQOL. The eight scale scores were aggregated based on population-specific weights to calculate two summary scores, the physical (PCS) and mental component summary (MCS) scores.

Health Utility: SF-6D

The SF-6D is a six-dimensional health state classification (physical health, role limitation, bodily pain, vitality, mental health, and social functioning)[32]. Seven out of twelve items from SF-12 have been selected to derive SF-6D health utility scores, as described by Brazier and colleagues[33]. The SF-12-derived SF-6D health utility score was responsive to detect HRQOL improvements over time[34], with theoretical plausible range from 0.315 (the worse possible health state) to 1 (full health), according to Chinese Hong Kong population-specific scoring algorithm[35, 36]. The SF-6D utility score has been normed on the Chinese general population in Hong Kong[37], and used to measure utility in Chinese patients on dialysis[38, 39]. Available SF-6D data serves as utility input for

estimation of the quality-adjusted life-year under each dialysis group in health economic evaluations.

Data Analysis

Descriptive statistics were used to calculate the characteristics of socio-demographic and clinical data in four dialysis modality groups (Peritoneal Dialysis, "PD"; Hospital Haemodialysis, "HD"; Nocturnal Home HD, "Home-HD"; and Community in-centre HD, "Community-HD"). Differences in characteristics between groups were tested using one-way analysis of variance (ANOVA) for continuous variables or Chi-square test for categorical variables.

The effects of dialysis modality on HRQOL and health utility scores were assessed. Unadjusted analyses on the HRQOL and health utility scores were tested using one-way ANOVA with Tukey's Post-hoc test for multiple comparisons. Adjusted linear regression models were performed to estimate the differences in HRQOL and health utility scores between nocturnal home haemodialysis and other modes of dialysis, accounting for the socio-demographic data and laboratory results collected at baseline assessment of two cohort studies. Socio-demographic characteristics including gender, age, education level, marital status, and working status were adjusted for confounders. Laboratory results included blood haemoglobin, albumin, serum calcium, phosphorus, urea, low density lipoprotein – cholesterol (LDL-C), fasting glucose and eGFR. Clinical characteristics including duration of ESRD diagnosis and the number of dialysis sessions per week were not adjusted in regression analyses because that information was not fully available at pooled dataset.

Pairwise deletion of missing data was used for statistical analyses because the data were missing completely at random (MCAR). All statistical analyses were performed using Stata Version 13.0. All significance tests were two-tailed and those with a p-value less than 0.05 were considered statistically significant.

Results

Baseline characteristics of study cohorts

Table 1 summarizes the baseline characteristics of the participants from four dialysis modality groups. The mean age of the 399 participants recruited (PD: n=103; HD: n=135; Home-HD: n=43; Community-HD: n=118) was 57.3 (SD=12.7), with 152 (38.1%) female and 247 (61.9%) male.

For socio-demographic factors, significant differences in age ($p<0.001$), educational level ($p=0.006$), working status ($p<0.001$), and monthly household income ($p=0.047$) were found across the four treatment groups. In terms of laboratory tests conducted on participants, significant differences were found in blood haemoglobin ($p=0.003$), weekly standard Kt/V, albumin, serum calcium, phosphorus, creatinine, urea, systolic blood pressure, LDL-C and eGFR (all p-values<0.001). The duration of ESRD diagnosis for participants in the Home-HD group was found to be significantly longer than group PD (7.5 ±4.9 vs. 3.8±3.3, $p<0.001$). The number of weekly treatment sessions for participants in Home-HD group was also found to be significantly greater than Community-HD and HD group (3.7±0.5 vs 2.5±0.5 vs 2.3±0.5, $p<0.001$).

HRQOL and health utility scores by dialysis modality groups

Table 2 summarizes the SF-12v2 and SF-6D scores of the participants with respect to their dialysis modality groups. For SF-12v2, HD patients had the lowest HRQOL, with significantly lower HRQOL scores than PD, Home-HD and community-HD patients except the domain of MH. For PCS, HD patients significantly scored the lowest than all other groups. Patients from Community-HD group scored the highest, followed by Home-HD group, PD group, and the HD group (41.0±12.4 vs 40.9±11.7 vs 40.3±12.0 vs 34.2±12.0). There was, however, no significant differences observed for MCS of the patients across the dialysis groups. For SF-6D, HD patients had significantly lower score than PD and community-HD groups. Patients from Community-HD group scored again the highest, followed by Home-HD group, PD group, and HD group (0.790±0.107 vs 0.778±0.110 vs 0.778±0.091 vs 0.731±0.114; $p<0.001$).

Factors associated with PCS, MCS, and SF-6D scores

Table 3 summarizes the associations of PCS, MCS, and SF-6D scores with socio-demographic factors and clinical characteristics by multiple linear regressions. Adjusted analysis of the effects of socio-demographic and clinical characteristics on eight SF-12 domain scores are found in Supplemental Table 1.

PCS score. In terms of dialysis modalities, both PD ($\beta=6.843$, $p<0.001$) and Community-HD ($\beta=5.420$, $p=0.001$) were found to be significantly and positively associated with the PCS score when compared with HD, but not the Home-HD group ($p=0.116$). For socio-demographic factors and laboratory results, male ($\beta=5.199$, $p<0.001$), occupation group ($\beta=5.191$, $p=0.002$) and haemoglobin ($\beta=0.809$, $p=0.033$) were also found to be significantly

and positively associated with PCS score but fasting glucose (β=-0.646, p=0.023) was negatively associated with PCS score, indicating that PD, community-HD, male, occupation group, higher haemoglobin but lower fasting glucose tended to achieve better PCS score.

MCS score. In terms of dialysis modalities, PD, Home-HD, and Community-HD were found to have no significant association with the MCS score when compared with HD. For social-demographic factors, only higher education level attainment group (secondary/tertiary) was found to be significantly and positively associated with the MCS score (β=4.209, p=0.001), indicating that higher education level group tended to achieve better MCS score.

SF-6D score. In terms of dialysis modalities, both PD (β=0.041, p=0.005) and community-HD (β=0.051, p=0.001) again were found to be significant and positive predictors of the SF-6D score when compared with HD, but not the Home-HD group. For socio-demographic factors and laboratory results, male (β=0.041, p=0.001), secondary/tertiary education level (β=0.039, p=0.002), occupation group (β=0.041, p=0.007) and haemoglobin (β=0.009, p=0.014) were also found to be significantly and positively associated with the SF-6D score, indicating that PD, community-HD, male, working and higher education level attainment group (secondary/tertiary) and higher blood haemoglobin tended to achieve better SF-6D score.

Discussions

In this study, we evaluated the effect of nocturnal home haemodialysis on HRQOL and health utility scores in comparison to other dialysis modes for patients with ESRD in Hong Kong. Given that comparisons of nocturnal home haemodialysis and other dialysis modes were not available in three published systematic reviews and meta-analyses[22-24], our

study provided primary source of evidence to quantify differences in HRQOL and health utility scores among four modes of dialysis. Principal findings of this study revealed similar HRQOL and health utility for nocturnal home haemodialysis with other modes of dialysis. Nevertheless, nocturnal home haemodialysis had better health utility, physical- and mental-related aspects of HRQOL than hospital in-centre haemodialysis, despite statistically insignificant differences. Notably, those scores differed among the different groups of dialysis patients, particularly whose undergoing hospital in-centre haemodialysis reflected the worst scores. The hospital in-centre haemodialysis had significantly worsened HRQOL and health utility when compared to PD and community in-centre haemodialysis. Moreover, results from current study supported the estimates of health utility in different dialysis modes, as a health benefit input for cost-effectiveness analysis, to inform healthcare decision-making of whether nocturnal home haemodialysis is regarded as cost-effective first-line dialysis option.

Hospital in-centre haemodialysis provided non-superior HRQOL, except for mental health, compared with other dialysis modes. One possible reason for significant differences between hospital in-centre haemodialysis and other modes of dialysis was in part due to differences in health status of ESRD patients. Sicker patients were more likely to commence hospital in-centre haemodialysis, and yield HRQOL impairment. Interestingly, multiple comparisons of HRQOL differences showed that peritoneal dialysis patients self-perceived worse general health, vitality and social functioning than home nocturnal haemodialysis, in contrary to direct comparison results from previous study[40].

The implication of this study was that community in-centre haemodialysis and peritoneal dialysis may be preferred choices in view of convenience and preservation of patients'

HRQOL. Strategy of maintenance dialysis in community-based setting switched ESRD patients from hospital-based setting to community-based setting, and thus reduced the nurse-to-patient ratio in hospital dialysis centre and health services burden in public sector. With the rising trend in the number of ESRD patients and their financial impact on public healthcare system, future research is needed to advocate healthcare policy to increase capacity and overcome barriers of maintenance dialysis in non-hospital, home- or community-based setting which offered flexibility, patient-centredness and empowerment to patients.

A number of limitations should be acknowledged in this study. Firstly, the effects of nocturnal home haemodialysis on HRQOL and utility scores were not evaluated using the design of randomized controlled trial which minimized patient selection and confounding biases. However, random assignment of initial dialysis modality was not ethically acceptable on the grounds that decisions to dialysis modality were primarily based on individual risk assessment, patients' current health status, and physician's discretion. For instance, stably controlled ESRD patients achieving better HRQOL were eligible for referral of home nocturnal haemodialysis. Thereby, due to differential socio-demographic and clinical characteristics between four RRT groups, causal association of home nocturnal haemodialysis with better HRQOL was not supported in this cross-sectional study. In this study, reverse causality where choice of dialysis mode may be dependent on HRQOL cannot be excluded. Secondly, unlike previous longitudinal studies following ESRD patients under maintenance dialysis over certain period of time[28, 41, 42], cross-sectional data precluded the measurement of HRQOL and utility scores over time, and the effect of hospitalization and complication events on the HRQOL outcomes. Thirdly, health utility reported in this study was not elicited from direct utility measurement. The EQ-5D

instrument was not administered in two cohorts while SF-6D score was computed using the raw responses of SF-12, although both the EQ-5D and SF-6D are valid instruments for assessing health utility scores of patients with ESRD[43]. Utility instruments and their elicitation method varied measurement values of health utility within the same patient population. Fourth, socio-demographic and clinical characteristics of patients who did not participate were not available so the response bias cannot be examined, when non-respondents were no longer assessable. Their characteristics were not captured by our questionnaire survey and clinical management system. Finally, the completion rates of ESRD diagnosis duration, dialysis vintage, vascular access, weekly sessions taken, and some laboratory data such as weekly standard Kt/V, weight, total cholesterol, triglyceride, high density lipoprotein – cholesterol, glycaemic control were low. Those laboratory data were neither documented in clinical management system nor available in pooled dataset. Information on hospitalizations, comorbidities (e.g. diabetes, cardiovascular events, etc), medications and mortality was not fully available in this pooled data, since only patients undergoing nocturnal home haemodialysis completed questionnaires on HRQOL, comorbidities and healthcare utilization. Thus, those clinical parameters were omitted from the adjusted analysis.

Conclusions

HRQOL and health utility scores of patients undergoing nocturnal home haemodialysis were similar to those undergoing peritoneal dialysis and community in-centre HD. Better physical aspect of HRQOL and health utility were observed in Peritoneal Dialysis and Community in-centre HD than hospital in-centre haemodialysis, providing evidence for the increase in

capacity of non-hospital based haemodialysis which provided flexibility as well as patient-centredness and empowerment in Hong Kong.

List of abbreviations

Health-related quality of life (HRQOL)

End-stage renal disease (ESRD)

Chronic kidney disease (CKD)

Estimated glomerular filtration rate (eGFR)

Renal replacement therapies (RRTs)

Peritoneal dialysis (PD)

Haemodialysis (HD)

Nocturnal Home HD (Home HD)

Community in-centre HD (Community HD)

Kidney Disease Quality of Life-36 (KDQOL-36)

Haemodialysis public-private partnership (HDPPP)

The Chinese (Hong Kong) SF-12 Health Survey version 2 (SF-12v2)

Physical functioning (PF)

Role physical (RP)

Bodily pain (BP)

General health (GH)

Vitality (VT)

Social functioning (SF)

Role emotional (RE)

Mental health (MH)

Physical component summary (PCS)

Mental component summary (MCS)

One-way analysis of variance (ANOVA)

Low density lipoprotein – cholesterol (LDL-C)

Declarations

Ethics approval and consent to participate

The study protocol was approved by the institutional review board of the University of Hong Kong/HA, Hong Kong West Cluster (UW 15-592, UW 10–366 and UW 15–090), Hong Kong East Cluster (HKEC-2010-096), Kowloon West Cluster (KW/EX-16-011(95-11) and KW/EX/10-150 (34–17)) , Kowloon Central Cluster/ Kowloon East Cluster (KC/KE-10-0208/ER-3), Joint Chinese University of Hong Kong-New Territories East Cluster (CRE-2011.051) and New Territories West Cluster (NTWC/CREC/911/11). Written informed consent to participate in the study was obtained from participants.

Consent for publication

Not applicable

Availability of data and materials

The data that support the findings of this study are available from database of the Clinical Management System of the Hospital Authority, Hong Kong but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Hospital Authority, Hong Kong.

Competing interests

The authors declare that they have no competing interests.

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Authors' Contributions

CW and JC constructed the study design. CW conducted the data analysis. CW and JC were responsible for the paper draft and data interpretation. CL, SF, W.K.L, S.L.L, DC, Y.L.C. and I.K. were responsible for expertise advice and final approval. All authors read and approved the final manuscript.

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Table 1. Baseline characteristics of study cohort

Factor	Total (N = 399)	PD (N = 103)	Hospital-HD (N = 135)	Home-HD (N = 43)	Community-HD (N = 118)	p-value
Socio-Demographic (%, n)						
Gender						0.420
Female	38.1 % (152)	38.8 % (40)	43.0 % (58)	32.6 % (14)	33.9 % (40)	
Male	61.9 % (247)	61.2 % (63)	57.0 % (77)	67.4 % (29)	66.1 % (78)	
Age (mean±SD), year	57.3±12.7	63.1±12.7	56.4±12.6	47.9±8.5	56.8±11.6	<0.001*
Education level						0.006*
No formal school	7.3 % (29)	9.7 % (10)	8.1 % (11)	0.0 % (0)	6.8 % (8)	
Primary	25.3 % (101)	25.2 % (26)	31.1 % (42)	4.7 % (2)	26.3 % (31)	
Secondary (including matriculation)	53.6 % (214)	47.6 % (49)	51.9 % (70)	72.1 % (31)	54.2 % (64)	
Tertiary	13.8 % (55)	17.5 % (18)	8.9 % (12)	23.3 % (10)	12.7 % (15)	
Marital Status						0.308
Married	63.6 % (252)	71.8 % (74)	59.8 % (79)	69.8 % (30)	58.5 % (69)	
Working Status						<0.001*
Yes	21.4 % (85)	19.4 % (20)	16.3 % (22)	60.5 % (26)	14.5 % (17)	
Monthly household Income, HKD						0.047*
$0-9,999	55.4 % (155)	54.0 % (34)	64.6 % (64)	34.9 % (15)	56.0 % (42)	
$10,000-19,999	17.5 % (49)	15.9 % (10)	18.2 % (18)	20.9 % (9)	16.0 % (12)	
$20,000-29,999	15.4 % (43)	12.7 % (8)	13.1 % (13)	23.3 % (10)	16.0 % (12)	
$30,000-39,999	3.2 % (9)	3.2 % (2)	0.0 % (0)	9.3 % (4)	4.0 % (3)	
≥$40,000	8.6 % (24)	14.3 % (9)	4.0 % (4)	11.6 % (5)	8.0 % (6)	
Laboratory Results (mean±SD)						
Weekly standard Kt/V	2.4±1.2	NA	2.8±1.4	6.2±2.0	1.7±0.3	<0.001*
Blood haemoglobin, g/dL	10.6±1.7	10.7±1.7	10.2±1.7	10.6±1.8	11.0±1.5	0.003*
Albumin, g/L	39.2±5.1	36.1±4.4	38.3±4.9	42.7±5.5	41.3±3.9	<0.001*
Serum Calcium, mmol/L	2.4±0.2	2.3±0.2	2.3±0.2	2.5±0.2	2.4±0.2	<0.001*
Phosphorus, mmol/L	1.7±0.6	1.6±0.4	1.9±0.7	1.1±0.7	1.9±0.6	<0.001*
Creatinine, mmol/L	802.0±305.9	866.5±258.5	850.8±283.3	447.7±328.4	825.2±272.6	<0.001*
Urea, mmol/L	21.3±10.0	23.0±9.5	23.7±9.6	10.6±10.0	21.1±8.3	<0.001*
SBP, mmHg	141.4±24.0	134.2±21.5	144.9±29.4	136.3±23.8	147.4±21.5	<0.001*

DBP, mmHg	77.1±13.7	76.3±13.2	78.6±15.6	78.3±13.9	76.6±13.2	0.685
LDL-C, mmol/L	2.3±0.9	2.3±0.8	2.0±0.8	2.7±0.9	2.5±0.8	<0.001*
Fasting glucose, mmol/L	5.9±2.1	6.3±2.2	5.6±1.7	5.6±1.5	6.0±2.7	0.075
eGFR, mL/min/1.73 m^2	8.4±10.9	5.9±3.2	6.2±3.0	25.6±26.0	6.6±3.2	<0.001*
Clinical Characteristics (%, n)						
Duration of ESRD diagnosis (mean±SD), year	4.9±4.2	3.8±3.3	NA	7.5±4.9	NA	<0.001*
Service Utilization (mean±SD)						
Treatment sessions, times/week	2.6±0.7	NA	2.3±0.5	3.7±0.5	2.5±0.5	<0.001*

HD = Haemodialysis; PD = Peritoneal Dialysis; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; TC = Total Cholesterol;
LDL-C = Low Density Lippoprotein - Cholesterol; eGFR = estimated Glomerular Filtration Rate; ESRD = End Stage Renal Disease; SD = Standard Deviation
Note:
*Significant with p-value < 0.05

Table 2. HRQOL scores of study cohort

Factor	Total (N = 397)	PD (N = 103)	Hospital-HD (N = 135)	Home-HD (N = 41)	Community-HD (N = 118)	Multiple Comparison*
SF-12v2 Scores (mean±SD)						
Physical Functioning	58.1±35.3	62.6±34.1	47.0±35.4	65.2±33.0	64.2±34.5	1,3,4 > 2
Role Physical	58.9±30.6	66.7±30.9	49.4±30.3	60.7±25.1	62.3±29.9	1,4 > 2
Bodily Pain	64.5±31.6	69.4±33.9	57.2±32.3	60.4±25.0	69.9±29.0	1,4 > 2
General Health	39.0±26.5	33.5±24.4	34.4±25.8	49.0±26.1	45.7±27.1	3,4 > 1,2
Vitality	43.4±25.5	42.2±29.7	37.2±23.6	54.9±19.5	47.5±23.7	3 > 1,2 ; 4 > 2
Social Functioning	64.6±33.9	60.4±38.3	57.8±33.1	79.9±25.1	70.8±30.7	3 > 1,2 ; 4 > 2
Role Emotional	75.8±24.0	77.4±22.8	71.6±26.1	71.3±24.1	80.6±21.5	4 > 2
Mental Health	70.1±20.1	72.5±19.9	67.8±20.7	70.4±14.5	70.4±21.4	
Physical Component Summary	38.5±12.4	40.3±12.0	34.2±12.0	40.9±11.7	41.0±12.4	1,3,4 > 2
Mental Component Summary	50.9±10.1	50.3±10.0	50.1±10.5	52.2±9.1	52.0±10.0	
SF-6D Score (mean±SD)	0.766±0.111	0.778±0.110	0.731±0.114	0.778±0.091	0.790±0.107	1,4 > 2

HD = Haemodialysis; PD = Peritoneal Dialysis; SF-6D = Short Form-6 Dimensions

Note:

*Significant difference with p-value < 0.05 between four dialysis modality groups tested by one-way ANOVA with Tukey's Post-hoc test: 1. PD; 2. HD; 3.Home-HD; 4. Community-HD

Table 3. Factors associated with health-related quality of life and SF-6D health utility scores by multiple linear regressions

Factor †	PCS (n = 364)			MCS (n = 364)			SF-6D score (n = 364)		
	Coeff.	95%CI	P-value	Coeff.	95%CI	P-value	Coeff.	95%CI	P-value
Dialysis modality (vs. Hospital-HD)									
PD	6.843*	(3.483,10.204)	<0.001*	-0.237	(-3.209,2.734)	0.875	0.051*	(0.020,0.082)	0.001*
Home-HD	4.410	(-1.098,9.917)	0.116	-0.976	(-5.846,3.894)	0.694	0.022	(-0.029,0.072)	0.401
Community-HD	5.420*	(2.323,8.517)	0.001*	0.721	(-2.018,3.460)	0.605	0.041*	(0.012,0.069)	0.005*
Socio-demographic									
Male (vs. Female)	5.199*	(2.638,7.760)	<0.001*	0.494	(-1.771,2.759)	0.668	0.041*	(0.017,0.065)	0.001*
Age, year	-0.008	(-0.125,0.108)	0.889	0.088	(-0.015,0.191)	0.094	0.000	(-0.001,0.001)	0.596
Secondary/Tertiary (vs. No formal education/Primary)	1.618	(-1.136,4.372)	0.249	4.209*	(1.774,6.644)	0.001*	0.039*	(0.014,0.065)	0.002*
Married (vs. Not married)	-1.284	(-3.819,1.252)	0.320	-1.345	(-3.587,0.896)	0.239	-0.009	(-0.033,0.014)	0.425
Working (vs. Not working)	5.191*	(1.992,8.390)	0.002*	1.709	(-1.120,4.538)	0.236	0.041*	(0.011,0.070)	0.007*
Laboratory Result									
Blood haemoglobin, g/dL	0.809*	(0.067,1.552)	0.033*	0.295	(-0.361,0.952)	0.377	0.009*	(0.002,0.015)	0.014*
Albumin, g/L	0.190	(-0.094,0.474)	0.189	0.141	(-0.110,0.392)	0.271	0.002	(-0.001,0.004)	0.219
Serum Calcium, mmol/L	-5.272	(-11.452,0.908)	0.094	1.454	(-4.011,6.919)	0.601	-0.029	(-0.086,0.028)	0.324
Phosphorus, mmol/L	0.443	(-1.723,2.609)	0.688	-0.149	(-2.064,1.766)	0.879	0.005	(-0.015,0.025)	0.625
Urea, mmol/L	-0.079	(-0.223,0.066)	0.284	0.093	(-0.035,0.220)	0.155	0.000	(-0.001,0.001)	0.872
LDL-C, mmol/L	-0.033	(-1.479,1.414)	0.964	0.432	(-0.847,1.711)	0.507	0.003	(-0.011,0.016)	0.708
Fasting glucose, mmol/L	-0.646*	(-1.202,-0.090)	0.023*	0.274	(-0.217,0.766)	0.273	-0.003	(-0.008,0.003)	0.320
eGFR, mL/min/1.73 m^2	-0.120	(-0.257,0.018)	0.087	0.073	(-0.049,0.194)	0.241	-0.001	(-0.002,0.000)	0.219

HD = Haemodialysis; PD = Peritoneal Dialysis; LDL-C = Low Density Lippoprotein - Cholesterol; eGFR = estimated Glomerular Filtration Rate; PCS = Physical Component Summary; MCS = Mental Component Summary; SF-6D = Short Form-6 Dimensions; CI = Confidence Interval; Coeff = Coefficient

Notes:

*Significant with p-value < 0.05

† Variable in brackets is the reference category for independent variables