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Original Article

Clinical and patient-reported outcomes of Chinese patients undergoing haemodialysis in hospital or in the community: A 1-year longitudinal study

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SUMMARY AT A GLANCE

For appropriately selected hemodialysis (HD) patients, community based HD modality seems to be a better treatment than hospital based HD treatment in view of Patient Enablement Instrument (PEI) and Global Rating Scale (GRS) scores.

ABSTRACT:

Aim: **Little is known about the effect of haemodialysis (HD) setting on outcomes of patients with end stage renal disease (ESRD). The study aimed at comparing clinical outcomes and patient-reported outcomes (PRO) of patients on community-based (CBHD) and hospital-based haemodialysis (HBHD).**

Methods: **A prospective cohort of Chinese ESRD patients receiving HBHD ($n = 89$) or CBHD ($n = 117$) in Hong Kong were followed up for 12 months. Subjects were assessed on clinical outcomes of dialysis adequacy (Kt/V) and blood haemoglobin and PRO of health-related quality of life (SF-12v2), general health condition (Global Rating Scale (GRS)) and confidence to cope with their illness (Patient Enablement Instrument (PEI)). Differences between groups were analyzed by independent *t*-tests for the SF-12v2, GRS and PEI scores. χ^2 tests were used to analyze the difference in proportion of patients reaching the targets of Kt/V and blood haemoglobin and with GRS > 0 and PEI > 0. Multiple linear and logistic regressions were performed to assess the adjusted difference-in-difference estimation.**

Results: **The mean PEI and GRS scores of CBHD patients at 12 months were significantly higher than those of HBHD patients. CBHD patients had significantly greater improvement in self-efficacy and were more likely to be enabled after 12 months than the HBHD patients.**

Conclusion: **The study showed similar clinical outcomes and PRO between CBHD and HBHD but CBHD was more effective than HBHD in promoting patient enablement over a 12-month period. The results suggest added value for patients receiving CBHD and support the transfer of HD care from the hospital to the community.**

Over the past decade, a range of different approaches have been developed to improve the management of care for people with chronic illness. One of them is community-based management, which adopts a patient-oriented approach to care. Transferring the care of stable patients with chronic disease into the community allows patients to be close to their home or their place of work saving time and improving the patient illness experience. Studies have demonstrated the value of community-based care for patients with chronic disease, such as mental health and diabetes.[1,2] In chronic end stage renal disease, this approach is supported by the findings of a systematic review of observational studies, which showed that community-based haemodialysis could provide quality of care comparable to or even better than publicly funded hospital clinics.[3,4] Moreover, patients receiving community-based haemodialysis require less medical attention compared with those receiving hospital-based haemodialysis, therefore it is considered less costly.[5]

In Hong Kong, government policy mandates that patients who require dialysis in the public sector receive peritoneal dialysis as the first line treatment unless there are contraindications.[6] This policy accounts for the relatively low prevalence of haemodialysis (HD) in Hong Kong compared with other developed countries. For example, in Hong Kong 23.8% of dialysis patients receive HD[7] compared with 40% in Australia,[8] 76%

in the UK[9] and 95% in Japan.[8] For those patients who are on HD, most undergo the treatment in a renal unit of a government-funded hospital.[10] However, hospital-based HD is resource-intensive and costly[11] which encourages the exploration of alternative models of service delivery. An example of this is the shared-care, public-private partnership model, which was launched in Hong Kong in 2010. This haemodialysis public-private partnership programme (HD-PPP), aimed to enhance the accessibility of HD for needy ESRD patients by providing the option of receiving HD in the community. Such a community-based option would appear to have the benefits of accessibility, personalized care, continuity of care and other environmental advantages but whether this setting affects patient outcomes compared with usual hospital-based HD has not been systematically examined. This study therefore aims to compare the longitudinal clinical and patient-reported outcomes of HD patients in order to determine the effectiveness of community-based HD in Hong Kong.

METHODS

Subjects and sampling

This was a longitudinal observational study. Subjects were recruited between October 2012 and March 2013 from two different settings distributed across Hong Kong[1]: Community-based haemodialysis (CBHD) – patients receiving HD in the community as part of the government-funded HD-PPP programme and[2] Hospital-based haemodialysis (HBHD) – patients receiving HD as outpatients in government-funded hospitals.

All subjects in community-based HD centres of the HD-PPP programme were recruited to join the study, while patients in government-funded hospital-based HD units were recruited by convenience sampling until a target sample size was reached. Subjects from both settings were excluded if they were aged <18 years; could not understand Cantonese; had cognitive impairment, refused to participate; or were too ill to give consent. Trained research assistants explained the nature of the study and invited subjects to participate. Those patients who agreed to participate and who provided written consent then completed a structured interviewer-administered questionnaire, which assessed patient-reported outcomes. The health-related quality of life questionnaire was administered at baseline and 12 months while the patient enablement index and global rating scale were administered at 12 months only.

Setting

Community-based haemodialysis (CBHD)

The Haemodialysis Public Private Partnership (HD-PPP) is a shared-care programme that gives eligible patients the option of receiving HD treatment in the community but continue to be followed up in the renal clinic of the public hospital. In this service provision model, HD services are purchased from non-government HD providers in the community without additional cost to the patient. In order to maintain the quality of care of the HD service, the protocols for HD are standardized across different community centres and care-providers receive regular training. At each community HD centre, the nurse to patient ratio is 1:5 which is much lower than that in public hospitals. Nephrologists are generally not present on site but may be called as needed. All patients receive regular follow up care at the hospital renal clinic every 2–3 months. There were five community-based HD centres, which provided HD services for 124 patients under the HD-PPP programme during the study period.

Hospital-based haemodialysis (HBHD)

There were 13 government-funded hospitals across Hong Kong from which the HBHD patients were recruited. These hospitals were chosen because they were the same hospitals providing follow-up care to the CBHD patients. The number of patients who receive HD as outpatients in hospitals ranges from 10 to 50 depending on the size of hospitals. At each hospital, the nurse to patient ratio is 1:8 with nephrologists present on site.

Sample size calculation

A total of 115 patients from each group were needed to detect the unadjusted difference-in-difference between CBHD and HBHD at 12-month follow-up by independent *t*-test with moderate effect size of 0.5 and 90% power at a significance level of 0.05, assuming an attrition rate of 25%. All subjects in community-based HD centres of the HD-PPP programme were recruited to join the study, while patients in government-funded hospital-based HD units were recruited by convenience sampling until a target sample size was reached. Subjects from both settings were excluded if they were aged <18 years; could not understand Cantonese; had cognitive impairment, refused to participate; or were too ill to give consent. Trained research assistants explained the nature of the study and invited subjects to participate. Those patients who agreed to participate and who provided written consent then completed a structured interviewer-administered questionnaire.

Clinical outcome measures

The two criteria used as part of the evaluation of quality of care for the HD-PPP programme in Hong Kong were adopted as the clinical outcome measures for this study. The target standard for dialysis adequacy measured by equilibrated, single pool or on-line Kt/V was ≥ 1.2 if patients were receiving three HD sessions per week, ≥ 1.8 if receiving twice weekly HD or a total weekly Kt/V ≥ 3.6 (including dialysis and residual renal function). The target standard for blood haemoglobin was set as ≥ 9 g/dL. These criteria and standards were determined based on international best practice and expert opinion.[12]

Patient-reported outcome measures

The Short Form-12 version 2 (SF-12 v2) Health Survey

The Chinese (Hong Kong) SF-12 Health Survey is a frequently used measure of Health-Related Quality of Life (HRQOL), which has been validated and normed on the general Chinese population in Hong Kong.[13,14] It has been used to measure generic HRQOL in patients with diabetes, colorectal cancer, lower urinary tract symptoms depression and end stage renal disease undergoing haemodialysis in the local population.[15–20] It measures eight domains of HRQOL namely physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health on a scale with theoretical range from 0 to 100. A higher score indicates better HRQOL. The eight domain scores are aggregated based on population-specific weights to calculate two summary scores, the physical (PCS) and mental component summary (MCS) scores.

Patient enablement instrument (PEI)

The Patient Enablement Instrument (PEI) is a measure of patients' understanding of and ability to cope with illness. It was originally developed as a means of assessing the effectiveness of a primary care consultation.[21] The traditional Chinese version of the PEI has been shown to be valid and reliable in Chinese patients in Hong Kong.[21,22] It consists of six items, which enquires about the degree to which a patient is able to (i) cope with life, (ii) understand their illness, (iii) cope with their illness, (iv) keep themselves healthy, (v) be confident about their health, and (vi) help themselves). Each item is rated on a 3-point scale (0 = the same or less; 1 = slightly improved/increased; 2 = greatly improved/increased). The summation of six item scores provides the PEI score ranging from 0 to 12, with a higher score indicating better self-perceived enablement. Subjects with PEI total score > 0 are considered to have enablement over the past 12-month period, while those with PEI total score = 0 were considered to have no enablement over the period.

Global rating scale (GRS)

The Global Rating Scale (GRS) is a single retrospective item assessing the subject's global perception of any change in his/her overall health condition on a 7-point scale (–3 = much worse to 3 = much improved, with 0 = no change) over a period of 12 months. The GRS has been used in longitudinal studies evaluating changes in general health condition over time.[23]

Data analysis

Descriptive statistics were used to calculate the baseline characteristics of socio-demographic and clinical data in the CBHD, HBHD and the overall HD patients. Differences in baseline characteristics between CBHD and HBHD patients were tested by independent *t*-tests for continuous variables or χ^2 tests for categorical variables.

The within-subject changes in the SF-12 v2 PCS and MCS between baseline and 12-month interview were analyzed by paired *t*-tests. The unadjusted difference-in-difference in the SF-12 v2 PCS and MCS scores between CBHD and HBHD were tested by independent *t*-tests. The differences in mean PEI and GRS scores at 12-month interview between two groups were analyzed by independent *t*-tests. χ^2 tests were used to assess the differences in proportions of reaching the targets of Kt/V and blood haemoglobin, positive PEI (PEI > 0) and GRS (GRS > 0) between two groups. In addition, adjusted difference-in-difference estimation between groups and the association of target achievement of Kt/V, blood haemoglobin, PEI and GRS at 12-months were assessed by multiple linear and logistic regressions, respectively, adjusted by the confounding factors including socio-demographics, clinical parameters and comorbidities at baseline.

All statistical analysis was performed using STATA Version 13.0 (StataCorp LP, College Station, TX, USA). All significance tests were two-tailed and findings with a p-value less than 0.05 were considered statistically significant.

RESULTS

A total of 124 subjects were enrolled into the HD-PPP programme to receive HD in community-based centres and 110 subjects completed baseline face-to-face interviews. 181 subjects who received HD in government-funded hospital based HD centres were recruited and 134 completed baseline face-to-face interviews. 89 (80.9%) CBHD and 117 (87.3%) HBHD completed the 12-month follow-up interviews.

The socio-demographic and clinical characteristics of CBHD and HBHD patients at baseline are displayed in Table 1. All of the socio-demographics except working status and the transportation used to dialysis centre between groups were similar. More subjects in HBHD were in active employment, whereas more CBHD patients travelled by public transport for HD. There were no significant differences in the proportions of subjects in each group reaching the target levels of Kt/V and blood haemoglobin. Moreover, both groups had similar proportions of people suffering from common co-morbidities with the exceptions of diabetes mellitus and coronary heart disease. A larger proportion of CBHD patients suffered from diabetes mellitus while more HBHD patients suffered from coronary heart disease.

Clinical outcomes

Table 2 shows the comparisons of Kt/V and blood haemoglobin of CBHD and HBHD subjects at baseline and 12-months. There were no statistical changes in the proportions reaching the Kt/V and blood haemoglobin targets between groups. Similarly no association was found between setting and the achievement

Table 1 Socio-demographic and clinical and co-morbidity information between community-based (CBHD) and hospital-based haemodialysis (HBHD) patients

Factor	Total baseline ($n = 244$)	CBHD patients	HBHD patients	*P*-value
		Baseline ($n = 110$)	Baseline ($n = 134$)	
Socio-demographic				
Sex				0.757
Female	40.16% (98)	39.09% (43)	41.04% (55)	
Male	59.84% (146)	60.91% (67)	58.96% (79)	
Age (mean ± SD), year	56.59 ± 12.69	57.25 ± 13.03	56.04 ± 12.43	0.463
Educational level				0.696
No formal education	8.61% (21)	10.00% (11)	7.46% (10)	
Primary	27.05% (66)	23.64% (26)	29.85% (40)	
Secondary	53.69% (131)	55.45% (61)	52.24% (70)	
Tertiary	10.66% (26)	10.91% (12)	10.45% (14)	
Marital status				0.583
Unmarried	34.57% (84)	32.73% (36)	36.09% (48)	
Married	65.43% (159)	67.27% (74)	63.91% (85)	
Smoking status				0.152
Non-smoker	95.08% (232)	97.27% (107)	93.28% (125)	
Current smoker	4.92% (12)	2.73% (3)	6.72% (9)	
Come alone/accompanied for HD session				0.494
Alone	83.61% (204)	81.82% (90)	85.07% (114)	
Accompanied by others	16.39% (40)	18.18% (20)	14.93% (20)	
Transportation				0.024*
Walk	8.20% (20)	8.18% (9)	8.21% (11)	
Public transport	74.59% (182)	81.82% (90)	68.66% (92)	
Taxi/ Others	17.21% (42)	10.00% (11)	23.13% (31)	
Working status				0.011*
Not working	79.10% (193)	86.36% (95)	73.13% (98)	
Working	20.90% (51)	13.64% (15)	26.87% (36)	
Clinical and Co-morbidity Information †				
Baseline Kt/V				0.337
Target‡ not achieved	26.76% (57)	29.63% (32)	23.81% (25)	
Target‡ achieved	73.24% (156)	70.37% (76)	76.19% (80)	
Baseline blood haemoglobin (mean ± SD), g/dL	10.38 ± 1.74	10.51 ± 1.72	10.26 ± 1.76	0.280
Baseline blood haemoglobin				0.184
Target not achieved (<9 g/dL)	23.29% (51)	19.44% (21)	27.03% (30)	
Target achieved (≥9 g/dL)	76.71% (168)	80.56% (87)	72.97% (81)	
Co-morbidities				
Diabetes mellitus	28.77% (63)	35.19% (38)	22.52% (25)	0.038*
Hypertension	68.04% (149)	66.67% (72)	69.37% (77)	0.668
Coronary heart disease	20.55% (45)	14.81% (16)	26.13% (29)	0.038*
Stroke	3.65% (8)	5.56% (6)	1.80% (2)	0.139
Heart failure	13.24% (29)	11.11% (12)	15.32% (17)	0.359
Psychological condition	4.11% (9)	6.48% (7)	1.80% (2)	0.081
Number of co-morbidities (mean ± SD)	1.38 ± 1.15	1.40 ± 1.13	1.37 ± 1.18	0.854

Notes: *Significant with *P*-value < 0.05 by χ^2 square test or *t*-test as appropriate †2 of the CBHD patients and 23 of the HBHD patients are excluded in the analysis as their ID cannot be linked with the HA dataset ‡Target: Kt/V ≥ 1.8 for 2 HD sessions per week or Kt/V ≥ 1.2 for 3 HD sessions per week or Kt/V ≥ 3.6 for weekly data

of target Kt/V or blood haemoglobin at 12-months after adjustment for confounding factors (Table 3).

Patient-reported outcomes

Patient-reported outcomes of CBHD and HBHD subjects at baseline and 12-months are demonstrated in Table 2. Paired *t*-tests found no statistical differences in SF-12 v2 PCS and MCS scores between baseline and 12-months in both CBHD and HBHD patients. Compared with HBHD patients, CBHD patients had higher PEI (3.42 *vs* 1.79) and GRS (0.36 *vs* –0.37) scores at 12-months. Moreover, more patients in CBHD had increased enablement (85.4% *vs* 64.1%) and improved global health condition (46.1% *vs* 28.2%). The results of adjusted difference-in-difference estimation of the changes in PRO at 12-months between groups are shown in Table 4. After adjusting for socio-demographic and co-morbidities, there was no significant change in SF-12 v2 PCS and MCS between groups. CBHD patients had significantly greater improvement in self-

Table 2 Comparisons of Kt/V, blood haemoglobin, SF-12 v2, PEI score and GRS between community-based (CBHD) and hospital-based haemodialysis (HBHD) patients

	CBHD patients ($n = 89$)		HBHD patients ($n = 117$)		Difference in change
	Baseline	Assessment on the 12th month	Baseline	Assessment on the 12th month	
Kt/V target[§] achieved	75.86%	78.16%	79.17%	78.49%	2.98%
	Diff. = 2.30% $P = 0.719$		Diff. = –0.68% $P = 0.910$		
Blood haemoglobin target[¶] achieved	82.76%	85.06%	72.73%	79.38%	–4.35%
	Diff. = 2.30% $P = 0.680$		Diff. = 6.65% $P = 0.275$		
PCS	45.63 ± 11.14	43.78 ± 10.68	40.01 ± 10.89	37.96 ± 12.61	0.20
	Paired diff. = –1.85 ± 10.10 $P = 0.957$		Paired diff. = –2.05 ± 12.38 $P = 0.962$		
MCS	55.24 ± 8.44	55.80 ± 10.38	53.72 ± 9.98	53.01 ± 11.45	1.27
	Paired diff. = 0.56 ± 9.39 $P = 0.286$		Paired diff. = –0.71 ± 13.76 $P = 0.710$		
PEI	NA	3.42 ± 2.63 85.39%[†]	NA	1.79 ± 2.10 64.10%[†]	1.63* 21.29%*
GRS	NA	0.36 ± 1.40 46.07%[‡]	NA	-0.37 ± 1.52 28.21%[‡]	0.73* 17.86%*

GRS, Global Rating Scale (Range scale: –3–3); MCS, Mental Component Summary Score (Range scale: 0–100); NA: Not applicable; PCS, Physical Component Summary Score (Range scale: 0–100); PEI, Patient Enablement Instrument (Range scale: 0–12). Notes: *Significant with P-value < 0.05 by χ^2 test or t-test as appropriate [†]PEI > 0 [‡]GRS > 0 [§]Target: Kt/V ≥ 1.8 for 2 HD sessions per week or Kt/V ≥ 1.2 for 3 HD sessions per week or Kt/V ≥ 3.6 for weekly data [¶]Target: blood haemoglobin ≥ 9 g/dL

Table 3 Effectiveness of haemodialysis public-private partnership programme (HD-PPP) associated with changes in SF-12 v2, PEI score and GRS at 12 months by multivariable linear regressions

Multivariate linear regressions	Independent variables		
	CBHD patients[†]		
	Coeff.	95% CI	P-value
Model 1: Change[‡] in PCS ($n = 183$)	3.372	(–0.086, 6.830)	0.056
Model 2: Change[‡] in MCS ($n = 183$)	1.470	(–1.937, 4.877)	0.395
Model 3: PEI score at 12-month ($n = 183$)	1.511*	(0.737, 2.286)	<0.001*
Model 4: GRS at 12-month ($n = 183$)	0.597*	(0.114, 1.081)	0.016*

CI, Confidence Interval; Coeff, Coefficient; GRS, Global Rating Scale (Range scale: –3–3); MCS, Mental Component Summary Score (Range scale: 0–100); PCS, Physical Component Summary Score (Range scale: 0–100); PEI, Patient Enablement Instrument (Range scale: 0–12). All models are adjusted by baseline socio-demographic and clinical and co-morbidity information Notes: *Significant with P-value < 0.05 [†]HBHD patients (Control) are the reference level for the comparison between groups [‡]Change means 12-month – baseline

Table 4 Effectiveness of haemodialysis public-private partnership programme (HD-PPP) associated with target achievement of Kt/V, blood haemoglobin, PEI score and GRS at 12 months by multivariable logistic regressions

Multivariate logistic regressions	Independent variables		
	CBHD patients[†]		
	OR	95% CI	P-value
Model 1: Kt/V target[‡] achieved at 12-month ($n = 179$)	1.081	(0.427,2.739)	0.869
Model 2: Blood haemoglobin target[§] achieved at 12-month ($n = 183$)	1.161	(0.402,3.351)	0.783
Model 3: PEI > 0 at 12-month ($n = 183$)	2.705*	(1.158,6.321)	0.022*
Model 4: GRS > 0 at 12-month ($n = 183$)	1.576	(0.769,3.231)	0.214

CI, Confidence Interval; GRS, Global Rating Scale (Range scale: –3–3); OR, Odds Ratio; PEI, Patient Enablement Instrument (Range scale: 0–12).All models are adjusted by baseline socio-demographic and clinical and co-morbidity information Notes: *Significant with P-value < 0.05 [†]HBHD patients (Control) are the reference level for the comparison between groups [‡]Target: Kt/V ≥ 1.8 for 2 HD sessions per week or Kt/V > 1.2 for 3 HD sessions per week or Kt/V ≥ 3.6 for weekly data [§]Target: blood haemoglobin ≥ 9 g/dL

efficacy and global health condition after 12 months (PEI: Coeff. = 1.593, $P < 0.001$; GRS: Coeff. = 0.597, $P = 0.016$) than HBHD patients. Table 3 also illustrates that CBHD patients were generally more likely to become enabled (OR = 2.705, $P = 0.022$) after 12 months than the HBHD patients. CBHD patients were also more likely to improve global health condition after 12 months compared with HBHD patients but this was not statistically significant (OR = 1.576, $P = 0.214$).

DISCUSSION

We note that the CBHD group were mostly a self-selected group and therefore should already be motivated, fairly independent and in relatively better health, which might suggest that they were in a more advantageous position to do well. That more CBHD patients took public transit and a significantly lower proportion of CBHD patients had coronary heart disease compared with the HBHD group support this. However, it was surprising that in the CBHD group, the proportions of patients with diabetes and not working were significantly higher than that in the HBHD group, which may suggest the opposite, i.e. relatively poorer health. The reason for this is not clear but additional data on duration or severity of the comorbid condition and household income would help to clarify the actual health condition of the CBHD group as well as to determine whether not working was due to choice rather than poor health. There was no significance difference between groups in other demographic

and background features or comorbidities such as hypertension, stroke and heart failure, which implied that the groups were otherwise similar.

Clinical outcomes

Community-based HD patients achieved dialysis adequacy and blood haemoglobin levels comparable with that achieved by patients undergoing HBHD. This result was expected as the service provision procedures and setting requirements for HD treatment were standardized between hospital and community HD centre and overseen by regular review and audit. Moreover, as the community HD centres also offer private HD services concurrently with the HD-PPP programme, they have a vested interest in maintaining high quality of care and standards of service in order to remain competitive. Moreover, these findings are consistent with previous studies in which the clinical outcomes of haemodialysis treatment in the community were found to be at least equivalent to those achieved in the hospital setting.[24,25]

Patient-reported outcomes – health-related quality of life

Previous longitudinal studies of HD patients found that the mental aspect of health-related quality of life remained constant while the physical component declined.[26–28] This was different from our study where neither the physical nor the mental summary scores (PCS and MCS) of the SF-12v2 changed over time. A possible explanation for why the study subjects in both groups perceived no change in physical health-related quality of life may be due to freedom of choice in selecting the HD setting, which suited their physical needs. Those who attended the CBHD were usually more independently mobile and chose the CBHD setting because of easy geographical accessibility, which is consistent with previous findings which associated longer travelling time to dialysis centres with lower quality of life.[29] Similarly, HBHD patients chose to remain in the hospital setting because they felt their needs were already well looked after and indicated to interviewers that they were satisfied with the setting and the care and did not wish to move. Being satisfied with care may have a positive relationship with health-related quality of life.[30] On the other hand, it is also possible that the duration of the follow up was too short to detect meaningful changes in HRQOL or that the SF-12 v2 instrument, being a generic measure, might not be responsive enough to capture the change of HRQOL in HD patients. Further study with the use of both generic and disease-specific measures would be useful to evaluate the HRQOL of HD patients for a longer period of time.

Patient-reported outcomes – enablement and global health condition

At the 12-month interview, more CBHD patients reported increased enablement and improved general health condition compared with HBHD patients. With a lower nurse to patient ratio in community HD centre compared with the renal unit of hospital (5:1 compared with 8:1) the possibilities for patient empowerment are greater in the CBHD setting. The lower nursing ratio can allow a nurse to spend more time with patients in order to provide more in-depth, personalized patient care including providing additional education and opportunity for self-care. For example, in some community HD centres, there were interactive education sessions run during the dialysis session, which taught patients different exercises that could be done during dialysis treatment. As well, patients were given the responsibility of measuring their own body weight, setting up their own dialysis station at the start of each session. The effort to encourage patients to take an active role in their chronic disease management may have led to the enhancement in patients' confidence and ability to cope observed in this setting. This sense of empowerment could lead to better perception of their own general health condition.[19]

However, after adjusting for background factors, the patients' perception of general health condition remained constant which may be because incomplete cases were excluded in the adjusted analysis. Among the incomplete cases, nearly three-quarters of HBHD patients did not improve in global health condition, which may influence the conclusion. Further study would be needed to confirm the improvement of global health condition for the CBHD patients.

Limitations of this study

There were a number of limitations to this study. Firstly, all subjects were recruited from the public sector and the results may not be generalizable to Chinese patients receiving HD in the private sector. In addition, the CBHD were mostly a self-selected group with some inherent differences compared with the HBHD group, such as functional independence and health status. Second, the follow-up period was only 12 months and only two clinical outcomes measures were evaluated. A longer follow-up period and a more comprehensive complement of clinical outcome indicators could be captured, to enable a more thorough evaluation of the impact of CBHD in this context. Third, as this was an observational study, the effect of HD setting on outcomes could be biased and a randomized controlled trial would be needed to explore more definitively any differences in effectiveness between CBHD and HBHD.

CONCLUSIONS

The study showed that community-based and hospital-based HD achieved similar clinical outcomes with an additional benefit of better patient enablement for subjects undergoing CBHD. The advantages conferred by the community setting appear to translate to a higher level of confidence in coping among these HD subjects and supports the transfer of HD care from the hospital to the community. Further studies are needed to evaluate

long-term effectiveness and the change of HRQOL of CBHD subjects.

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CLINICAL TRIAL REGISTRATION

US Clinical Trial Registry NCT02307903

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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