JAN JOURNAL OF ADVANCED NURSING

ORIGINAL RESEARCH

Health-related quality of life in patients undergoing peritoneal dialysis: effects of a nurse-led case management programme

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Accepted for publication 19 February 2010

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CHOW S.K.Y. & WONG F.K.Y. (2010) Health-related quality of life in patients undergoing peritoneal dialysis: effects of a nurse-led case management programme. *Journal of Advanced Nursing* **66**(8), 1780–1792.
doi: 10.1111/j.1365-2648.2010.05324.x

Abstract

Aim. This paper is a report of an examination of the effectiveness of a nurse-led case management programme in improving the quality of life of peritoneal dialysis patients in Hong Kong.

Background. Patients with end-stage renal failure need integrated health care to maintain a desirable quality of life. Studies suggest that transitional care using a nurse case management model has a positive effect for patients suffering from chronic diseases, but the results have not been conclusive.

Method. Eighty-five patients participated in the study in 2005, 43 in the study group and 42 in the control group. Patients in the control group received routine hospital discharge services. Study group patients received a comprehensive education programme prior to discharge and standardized, 6-week nurse-initiated telephone follow-up. Kidney disease quality of life was measured for each patient at three time intervals: before the intervention, at completion of the 6-week intervention and 6 weeks after completion of the programme.

Results. Repeated measures analysis of variance, general linear model was carried out. Statistically significant within-group effects were found for symptoms/problems, effects of kidney disease, sleep, role-physical, pain, emotional wellbeing and social function. Statistically significant interaction effects were demonstrated for staff encouragement, patient satisfaction, sleep and social function.

Conclusion. The nurse-led case management programme can be applied effectively to patients receiving peritoneal dialysis. The new model of care is particularly useful for enhancing patients' wellbeing in the transition from hospital to home.

Keywords: Hong Kong, nurse-led case management, peritoneal dialysis, quality of life, transitional care

Introduction

Patients with end-stage renal failure (ESRF) face lifelong physical, psychological and social problems related to their illness and its treatment. This chronic and irreversible failure of kidney function poses a challenge to nurses and practitioners of related disciplines in the healthcare system. Dialysis is the major treatment modality to sustain the lives of patients awaiting kidney transplantation. Although the treatment is able to prolong life expectancy, it impacts the patient's physical, psychological and social well-being and may impose a considerable burden on patients and families (Cheng *et al.* 2002, Wasserfallen *et al.* 2004). Peritoneal dialysis (PD) is often presented as an easy and less cumbersome dialysis modality. In 2006, of the total number of patients having renal replacement therapy (RRT) in Hong Kong, 50·1% were receiving PD, 11·3% were receiving haemodialysis, and the remaining 38·6% had undergone renal transplantation (Hong Kong Renal Registry Report, 2008). Healthcare statistics in Hong Kong show that ESRF is becoming a major health problem, with a high hospitalization rate and high morbidity (Hospital Authority Statistical Report, 2008). Frequent re-hospitalization has direct implications for health service planning and affects patients' sense of wellbeing (Tsay & Hung 2004, Wong *et al.* 2004, Chow *et al.* 2008).

Background

Team-oriented and collaborative practices during the treatment course have contributed to improving patient satisfaction and clinical outcomes (Hankins *et al.* 1996, Sierchio 2003). In recent decades, studies have shown that transitional care using a nurse case management model produces a positive effect for patients suffering chronic diseases (Laramee *et al.* 2003, Wong *et al.* 2010). Patients with ESRF need integrated health and social care to maintain a desirable quality of life and to decrease morbidity during the course of the disease. A supportive social and interpersonal environment is important for patients and their families, both as a preventive agent and as a protective buffer against the impact of ESRF-related stress (Burton *et al.* 1990). A multidisciplinary approach led by nurses providing a collaborative process to assess, plan, coordinate and evaluate options and services to meet an individual's health needs through communication and available resources is deemed necessary during transition from hospital to home. Nurse-initiated telephone follow-up care is effective in increasing self-efficacy in symptom management and decreasing the use of healthcare services. The intervention has been considered an efficient and cost-effective way of providing follow-up interventions for patients suffering end stage renal failure and congestive heart diseases (Car & Sheikh 2003, Wong *et al.* 2010). Within the case management programme, the telephone method often involves a nurse calling patients after hospital discharge to ensure that the treatment plan is being followed and care is being continued (Riegel *et al.* 2002, Car & Sheikh 2003, Wong *et al.* 2004).

Health behaviours need to be negotiated, not dictated. In the psychosocial model, motivational interviewing is an approach to nursing management that promotes clients' adherence to the plan of care by assessing their readiness for positive change through a therapeutic, trusting nurse–client relationship (Berger 2004a). The challenges for nurses in caring for patients having PD are to explore concerns and to encourage them to elaborate on their concerns and what they see as the benefits of the change. Motivational interviews are patient-centred, where the case manager collaborates with the patients on mutually agreed goals, thus resulting in adherence behaviours and ultimately increasing the quality of life of clients (Berger 2004b).

Using telephone follow-up is considered an appropriate adjunct to care, necessary in preventing unnecessary readmissions, maintaining patients' health status and lessening the burden of care on families (Berry 2002, Uppal *et al.* 2004, Courtney *et al.* 2009). Despite the efficient use of telephone contact by advanced practice nurses in a variety of patient populations to improve care and decrease healthcare costs, follow-up care for patients having peritoneal dialysis has been limited, and less attention has been given to understanding patient-focused outcomes. No study has been conducted to demonstrate the effect of telephone intervention on the postdischarge care of patients with renal conditions. The concept of a transitional programme supported by collaboration and motivational interviews for disease management is understood, but there remains a research gap in the area of renal care.

The study

Aim

The aim of this study was to examine the effectiveness of a nurse-led case management programme in improving the quality of life of peritoneal dialysis patients in Hong Kong.

Design

The study was a randomized controlled trial with a pre-test and post-test. The renal unit of two local regional hospitals in Hong Kong participated in the study.

Participants

Patients admitted to the renal units of the study hospitals were sequentially recruited. Patients having on intermittent peritoneal dialysis or haemodialysis and those with planned admissions for special treatment procedures were excluded from the study. Patients with Tenckhoff catheters *in situ* for less than 3 months were also excluded because the adaptation period required to adjust to the new treatment regimen may bias quality of life measurements. The inclusion criteria also included patients who were able to access a telephone after discharge from the hospital.

The effect size of the study was set at small (0·3) as this was a new area of inquiry. Based on Repeated Measures Analysis of Variance, an estimated sample size of 90 (45 case and 45 control) was considered adequate to demonstrate the effects of the experimental intervention. The design achieved 78% power with a 5% significance level and 0·3 effect size. Fifty sets of computer-generated random numbers were used, and patients who fitted the criteria were randomized to the study or control group. Eighty-five patients were recruited into the study, with 43 in the study group and 42 in the control group.

Intervention

A comprehensive intervention protocol was developed by the researchers and reviewed by experienced renal nurses and physicians, with further revisions been made according to their advices. Patients in the study group received a comprehensive discharge planning protocol and a standardized 6-week nurse-initiated telephone follow-up regimen. The 6-week telephone intervention was based on Brooten's concept of nurse dose for discharged patients (Brooten & Youngblut 2006). Nurse dose is defined as the amount of nurse time and the number of contacts, the latter being a common measure of dose used in home care and an important unit in relation to patient outcomes. The discharge planning included participation of patients and family members in discussing the discharge plan, a predischarge comprehensive assessment of the patient's physical, social, cognitive and emotional needs based on the Omaha System (Martin 2005), and an individualized education programme conducted by the nurse case manager. Nurse case managers went through a training programme of 24 hours including theoretical input, case training and review. In addition, all nurses had to complete the training using a simulated patient to ensure consistency of the interventions. The predischarge interview was conducted in the form of a motivational interview, with an understanding of the patient's perspective and emphasizing the spirit of collaboration and autonomy. Shared objectives were developed, with a realistic action plan incorporating the patient's preferences, including exercise regimen, medication, fluid and diet adherence behaviours, technical procedures for home peritoneal dialysis and avoidance of infection. The involvement of the family highlighted the need for family members to be fully prepared to support the patient and perform their roles as caregivers in the recovery process.

Although all the patients had received routine, intensive training prior to the start of the dialysis regimen, the predischarge education programme was provided to strengthen and consolidate past learning experiences, clarify misconceptions and optimize health outcomes. Nurse case managers contacted patients by telephone weekly for six consecutive weeks. The first call was conducted within 72 hours after discharge to assess the patient's status and to give advice as this timeframe is considered the critical period of transition from hospital to home (Wong *et al.* 2004). The content of the telephone call was guided by the protocol and the specific problems identified in the predischarge assessment. Patients were reassured that they could contact the case manager as needed should they require further assistance, or could call the 24-hour hotline service if the case manager was not available at any time. In the follow-up calls, the nurse checked and reinforced the patient's behaviours in achieving the objectives, identified new and potential complications and needs and maintained a sustained relationship with the patient. During each telephone call, the case manager would discuss with the patient any problems encountered after returning home, and if necessary would make an appropriate referral. In the chronic healthcare context, negotiated care has the potential to humanize contemporary medical technologies by responding to clients' experiences of illness and integrating the demands of therapeutic regimens into their own lifestyles (Polaschek 2003). During telephone contacts, if patients required further interventions that could not be provided over the telephone, there were several possible management options for the case manager. Decisions on management options were underpinned by the nurse's professional judgement and objective referral criteria. The options included referral to the community nurse for home visit, referral to the renal nurse clinics or wards for follow-up, referral to the renal doctor's clinic for advanced assessment, investigation, and medical treatment, and, lastly, referral to the emergency department for urgent treatment.

The nurse normally spent 20–30 minutes on the initial telephone contact with the patient. The duration of follow-up calls varied, depending on patients' specific. Each of the follow-up calls focused on achievement of shared objectives and reinforcement of health-related behaviours. The overall duration of the phone call was based on the comprehensive fulfilment of the protocol. The telephone conversations were audiotaped for documentation. We reviewed the tapes to ensure adequacy and consistency of the interventions.

Patients were referred to the Community Nursing Services (CNS) when they required physical assessment, instruction on techniques in carrying out self-peritoneal dialysis and drug compliance monitoring where the telephone interviews did little to resolve problems that had been identified. The community nurses conducted scheduled home visits and used their professional judgement to define the frequency, intensity and focus of contacts to meet patients' and caregivers' needs. The interventions were implemented according to detailed clinical protocols developed by the community nursing centre and monitored by the nurse-in-charge to ensure a standardized service from individual nurses. The community nurses reported to the case manager on the conditions of the referred clients after each home visit.

Patients in the control group received routine discharge care offered by the renal units in which the study was conducted. This included standard information and a telephone hotline service, a set of self-help printed materials and a reminder to attend their outpatient clinic appointment. Control and study group patients received the same routine care during hospitalization as other patients in the unit.

Data collection

The data were collected in 2005 at three time intervals using a structured self-report questionnaire. Outcome data collected at T1 (on discharge) provided the baseline for comparison. Data collected at T2 (6 weeks postdischarge, after completion of the case management intervention) were used for comparison with T1 data to determine the immediate intervention effects. T3 data (12 weeks postdischarge) were used to detect sustaining effects of the case management intervention. The timeframe selected for data collection was referenced from Egan's study of patients with chronic obstructive pulmonary disease using the case management intervention (Egan *et al.* 2002). In addition to the outcome data, information on demographic characteristics, comorbidities, existing complications, duration of PD regimen, financial situation and availability of family and social support was collected at T1. Data collection was through face-to-face interview.

Outcome measures

The Kidney Disease Quality of Life Short Form (KDQOL-SF$^{\text{TM}}$), version 1.3, comprising 79 items, was used in the study. The instrument was chosen because it provides a comprehensive assessment of both generic and kidney disease-targeted areas of quality of life for patients having dialysis. It is a self-report questionnaire developed in the USA specifically for individuals with kidney disease receiving dialysis (Hays *et al.* 1994, 1997). It includes the Short-form 36-item (SF-36) general health survey and a range of scales targeting the particular concerns of patients having dialysis. The questionnaire has 19 subscales and one free standing question on overall health rating. The eight subscales for the SF-36 are Physical Function, Role-Physical, Role-Emotional, Social Function, Pain, Mental Health, Vitality and General Health. The 11 subscales for kidney disease-specific are Symptoms/Problems, Effects of Kidney Disease, Burden of Kidney Disease, Work Status, Cognitive Function, Quality of Social Interactions, Sexuality, Sleep, Social Support, Dialysis Staff Encouragement and Patient Satisfaction. In total 20 subscales derived from 80 items, except for quality of social interaction, all kidney disease targeted measures exceeded 0·70 for internal consistency reliability estimates, according to Martin and Thompson (2000). The instrument was reverse-translated into Chinese and was found to be valid for Hong Kong Chinese patients (Li 1998); the internal consistency ranged from 0·71 to 0·95 for each of the 11 kidney disease-targeted scales, and from 0·72 to 0·94 for the eight general health scales of the SF-36. All subscale scores were standardized and transformed so that higher scores represented a desirable quality of life when compared to the lower scores.

Ethical considerations

The study was approved by the research ethics committees of the study hospitals and the university with which the principal investigator was affiliated.

Data analysis

Comparisons were made between the two groups of patients. Descriptive statistics were compared for demographic variables (e.g. age, gender, social support and comorbid conditions). General linear model (GLM) was employed to determine the between-group (intervention), within-group (times) and interactions effect to determine (time × group) statistically significant differences in patterns between groups against time. The study design had two factors. When a statistically significant ($P < 0{\cdot}05$) difference was found, repeated measures were performed to determine which group contributed to the effects. SPSS version 15 (SPSS Inc., Chicago, IL, USA) was used to perform the statistical analysis.

Results

During the data collection period, 123 patients met the eligibility criteria and were assessed by the hospital nurse for recruitment into the study. Twenty-three patients who failed to meet the inclusion criteria were excluded. Of these, 14 were transferred to haemodialysis before discharge. Of the remaining nine, five refused to participate, whilst four were unable due to their physical condition. The 100 patients who joined the study were randomly assigned to either the study or control group. There were 50 patients in each of the treatment arms. At week 12, 43 of the 50 (86·0%) study patients and 42 of the 50 (84·0%) controls had completed the follow-up questionnaires. A total of 85 patients completed the protocol and were included in the analysis (Figure 1).

Among these 85 patients, 33 (38·8%) were female and 52 (61·2%) were male. Their ages ranged from 23 to 78 years, with a mean of 56·9 years (SD = 13·5). Most participants were married (71·8%). The mean number of years on PD was 3·2, ranging from 0·3 to 12 years. The majority of the patients were also suffering from diseases other than end-stage renal failure. Tables 1 and 2 display the patient demographics. Chi-square comparison and t-test showed no statistically significant differences between the study and control group in terms of clinical and demographic variables. Successful randomization was therefore confirmed.

The results of the outcome measures of quality of life were mixed. A non-statistically significant main effect for intervention (between-groups) was observed in all of the parameters. However, statistically significant within-group (time) and interaction effects were observed in some variables across time, including Symptoms, Effects of Kidney Disease, Sleep, Role-physical, Pain, Emotional Well-being and Social Function (Table 3). To determine the attribution of time effects

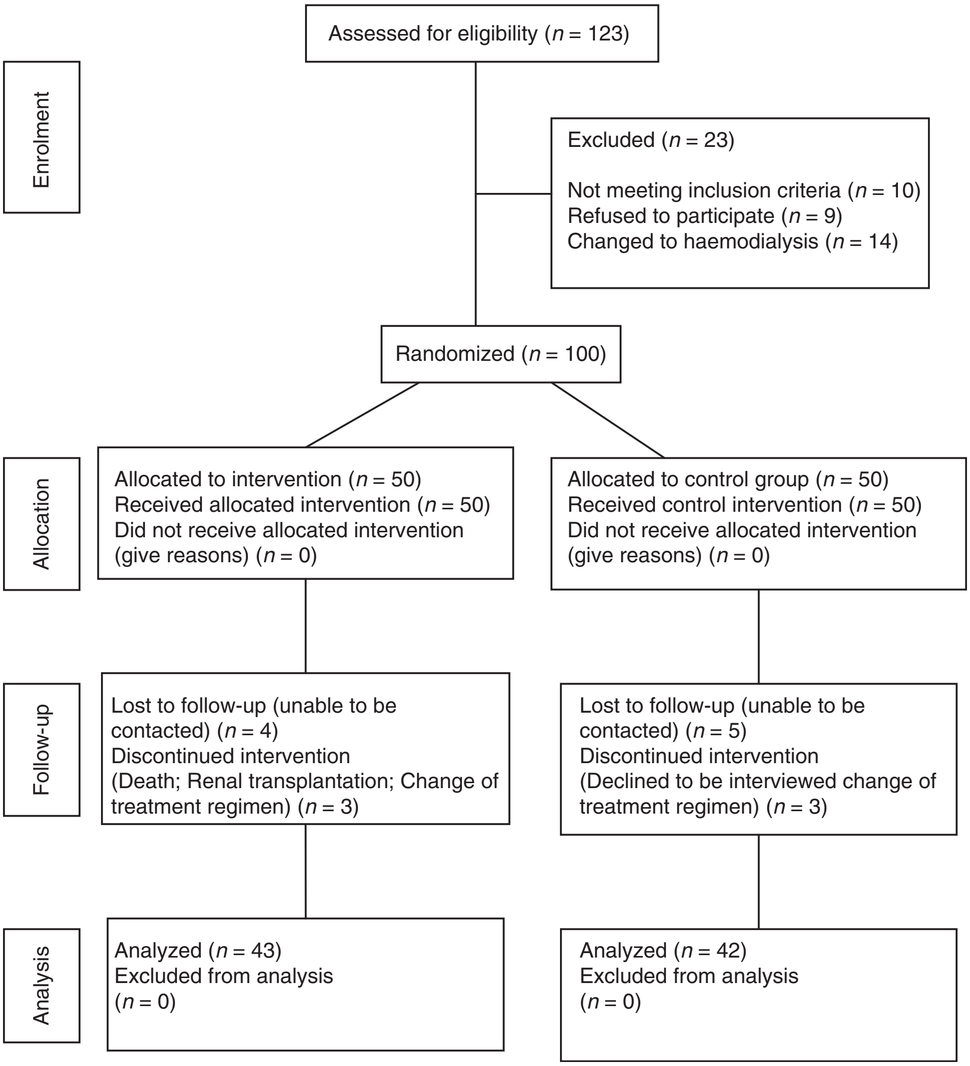

Figure 1 Trial design.

Table 1 Demographics (*n* = 85)

Variable	Total *n* = 85 (%)	Control *n* = 42 (%)	Study *n* = 43 (%)	χ^2/*t*-test *P* value
Gender				
Male	52 (61·2)	24 (57·1)	28 (65·1)	0·45*
Female	33 (38·8)	18 (42·9)	15 (34·9)	
Age (years)				
Mean (SD)	56·9 (13·5)	54·5 (12·8)	59·4 (13·97)	0·10†
Median (range)	57 (23–78)	53 (25–76)	61 (23–78)	
Marital status				
Single	8 (9·4)	4 (9·5)	4 (9·3)	0·41*
Married	61 (71·8)	33 (78·6)	28 (65·1)	
Divorced	8 (9·4)	3 (7·1)	5 (11·6)	
Widow	8 (9·4)	2 (4·8)	6 (14·0)	
Education				
No formal education	9 (10·6)	6 (14·3)	3 (7·0)	0·61*
Primary	35 (41·2)	16 (38·1)	19 (44·2)	
Secondary	34 (40·0)	16 (38·1)	18 (41·9)	
Post-secondary	3 (3·5)	1 (2·4)	2 (4·7)	
University or above	4 (4·7)	3 (7·1)	1 (2·3)	
Occupation				
Employed full-time	7 (8·2)	3 (7·1)	4 (9·3)	0·15*
Employed part-time	2 (2·4)	1 (2·4)	1 (2·3)	
Unemployed	14 (16·5)	9 (21·4)	5 (11·6)	
Retired	52 (61·2)	21 (50·0)	31 (72·1)	
Homemaker	10 (11·8)	8 (19·0)	2 (4·7)	
Accommodation				
A flat	77 (90·6)	39 (92·9)	38 (88·4)	0·48*
Single room	8 (9·4)	3 (7·1)	5 (11·6)	
Financial status				
More than sufficient	7 (8·2)	4 (9·5)	3 (7·0)	0·79*
Barely sufficient	50 (58·8)	23 (54·8)	27 (62·8)	
Insufficient	23 (27·1)	13 (31·0)	10 (23·3)	
Extremely insufficient	5 (5·9)	2 (4·8)	3 (7·0)	

*Pearson chi-square test.

†Independent sample *t*-test.

from the two groups, repeated measures were conducted separately for the groups at the three time intervals. Results demonstrated that the statistically significant differences ($P < 0·05$) in the study group contributed the within group effects. For Symptom/Problem, Effect of Kidney Disease, Role-physical and Emotional Wellbeing dimensions, study group patients displayed greater improvement in their scores during the first 6 weeks after intervention, followed by a slight decline in the following 6 weeks, while the control group patients displayed a slight improvement during the first 12 weeks, but to a lesser degree than the study group. For pain intensity, the pattern of improvement was markedly different between the two groups. Study group patients showed marked improvements after the intervention, with the effect declining in the following 6 weeks, whilst scores remained unchanged during the first 6 weeks among the control group, with some improvements in the subsequent 6 weeks.

The variables that demonstrated interaction effects ($P < 0·05$) were Quality of Sleep, Staff Encouragement, Patient Satisfaction and Social Functioning. The interaction effect for Physical Functioning showed a trend towards statistically significance ($P = 0·06$). The statistically significant interaction effect indicated that rates of improvement between the two groups across time were highly different, further implying that one approach worked better at one point than another (Portney & Watkins 2008). For Social Functioning and Sleep, statistically significant within-group and interaction effects were observed. Figure 2a–d illustrate the evolution of quality of life scores from T1 to T3 for Social Functioning, Sleep, Patient Satisfaction and Encouragement from Dialysis Staff.

Table 2 Participants' disease conditions

Variable	Total *n* = 85 (%)	Control *n* = 42 (%)	Study *n* = 43 (%)	χ^2/*t*-test *P* value
Comorbidity§				
No other disease (yes)	26 (30·6)	14 (33·3)	12 (27·9)	0·59*
Diabetes (yes)	35 (41·2)	16 (38·1)	19 (44·2)	0·57*
Heart disease (yes)	28 (32·9)	12 (28·6)	16 (37·2)	0·40*
Systemic lupus erythematosus (yes)	1 (1·2)	1 (2·4)	0 (0)	0·49†
Respiratory disease (yes)	2 (2·4)	1 (2·4)	1 (2·3)	1·00†
Psychiatric disorder (yes)	1 (1·2)	0 (0·0)	1 (2·3)	1·00†
Blood disease (yes)	0 (0·0)	0 (0·0)	0 (0·0)	NA
Cancer (yes)	3 (3·5)	2 (4·8)	1 (2·3)	0·54*
Others (yes)	19 (22·4)	9 (21·4)	10 (23·3)	0·84*
Reason for end-stage renal failure§				
Unknown (yes)	49 (57·6)	22 (52·4)	27 (55·1)	0·33*
Hypertension (yes)	9 (10·6)	5 (11·9)	4 (9·3)	0·70*
Diabetes (yes)	21 (24·7)	9 (21·4)	12 (27·9)	0·49*
Polycystic kidney (yes)	0 (0·0)	0 (0·0)	0 (0·0)	NA
Chronic glomerular nephritis (yes)	1 (1·2)	1 (2·4)	0 (0·0)	0·49†
Systemic lupus erythematosus (yes)	1 (1·2)	1 (2·4)	0 (0·0)	0·49†
Others (yes)	5 (5·9)	4 (9·5)	1 (2·3)	0·16*
Years on continuous ambulatory peritoneal dialysis				
Mean (SD)	3·2 (2·6)	3·5 (2·6)	3·0 (2·6)	0·38‡
Median (Range)	2·0 (0·3–12·0)	2·8 (0·3–10·0)	2·0 (0·3–12·0)	

*Pearson chi-square test.

†Fisher's Exact test.

‡Independent Sample *t*-test.

§Some patients suffered several comorbid conditions resulting in comorbidity greater than the number of subjects recruited in each group. ESRF was multi-factorial in some patients.

Discussion

Study limitations

The primary limitation in this study was that of recruitment. As patients were recruited from only two regional general hospitals and the majority of hospitals with specialized renal care facilities and staffs were not involved in the study, the results cannot be generalized for the whole population of patients having PD in Hong Kong. Use of a double-blind design with a placebo control group is the best way to reduce most of the possible biases in clinical trials. Theoretically, the placebo group might also receive phone calls from the nurse to discuss issues not indicated in the usual structured telephone interview. However, such a design would create uncertainty and be highly demanding on the unit and case managers. Another problem would be the possibility of contamination of the placebo group during telephone conversations. It would be unethical for nurses not to provide support or information to patients during telephone interviews when problems were identified during the conversations. A control group receiving routine care with no telephone follow-up was therefore used for the comparison of patient outcomes in this study. Finally, the study design did not include controls for telephone hotline contacts between the nurse, patients and their families. Because all patients (i.e. in both the study group and the control group) were offered with the hotline service and were free to call to review problems after discharge, the frequency and duration of the calls were not noted in this study.

Effects of the intervention

The results confirmed that the quality of life of the study group patients was higher than that of the control group in about 50% of the dimensions in KDQOL-SF^{TM}. Within the general dimensions of KDQOL-SF^{TM}, study group patients were experiencing higher quality of life and reported a better emotional state, less bodily pain, improved social functioning, and fewer problems with work or other regular activities due to their physical health, as compared to control group patients.

Patients having both haemodialysis and CAPD have ranked physical limitations as their top stressors in comparison with

Table 3 Kidney disease quality of life (KDQOL) in study group (*n* = 43) and control group (*n* = 42): mean score and change over time

	Time			Between group		Within group		Interaction effect	
Outcome measures	T1 [Mean (SD)]	T2 [Mean (SD)]	T3 [Mean (SD)]	*F*	*P* value	*F*	*P* value	*F*	*P* value
KDQOL									
Symptom/problem									
Study	62·6 (16·5)	67·0 (16·9)	66·1 (17·4)	0·62	0·43	4·50	0·01*	0·24	0·79
Control	60·6 (17·0)	63·5 (13·8)	64·3 (14·7)						
t-test, *P* value	−0·56, 0·58	−1·05, 0·30	−0·50, 0·62						
Effect of kidney disease									
Study	53·5 (17·9)	59·4 (20·3)	58·7 (17·3)	0·02	0·90	3·28	0·04*	0·46	0·63
Control	56·0 (20·7)	58·6 (20·3)	58·4 (21·3)						
t-test, *P* value	0·59, 0·56	−0·17, 0·86	−0·08, 0·94						
Burden of kidney disease									
Study	20·8 (23·6)	20·8 (23·6)	24·6 (24·4)	0·00	0·98	1·01	0·37	1·01	0·37
Control	22·2 (19·4)	22·2 (19·4)	22·2 (18·6)						
t-test, *P* value	0·30, 0·77	0·30, 0·77	−0·51, 0·61						
Work status									
Study	15·1 (27·9)	18·6 (30·9)	14·0 (29·5)	0·54	0·47	0·91	0·41	0·25	0·78
Control	10·7 (23·5)	13·1 (29·3)	11·9 (28·8)						
t-test, *P* value	−0·79, 0·43	−0·84, 0·40	−0·32, 0·75						
Cognitive function									
Study	69·0 (22·2)	70·4 (20·9)	67·3 (24·5)	1·05	0·31	0·25	0·78	0·45	0·64
Control	63·3 (26·5)	64·4 (26·5)	64·9 (21·3)						
t-test, *P* value	−1·07, 0·29	−1·15, 0·25	−0·47, 0·64						
Quality of social interaction									
Study	60·3 (24·2)	65·4 (23·1)	65·9 (21·5)	0·00	0·98	1·60	0·21	1·32	0·27
Control	63·5 (23·1)	64·8 (25·3)	63·0 (23·0)						
t-test, *P* value	0·62, 0·54	−0·13, 0·90	−0·60, 0·55						
Sexual function									
Study	100·0 (0·0)	100·0 (0·0)	75·0 (0·0)	0·47	0·53	2·75	0·11	0·93	0·43
Control	85·0 (16·3)	75·0 (35·4)	72·5 (35·8)						
t-test, *P* value	−0·74, 0·48	−0·46, 0·66	−0·10, 0·92						
Sleep									
Study	35·5 (22·7)	45·2 (24·9)	48·4 (24·3)	0·59	0·44	3·46	0·03*	9·47	0·00**
Control	42·0 (22·3)	37·6 (19·1)	39·5 (21·2)						
t-test, *P* value	1·34, 0·18	−1·57, 0·12	−1·81, 0·07						
Social support									
Study	68·8 (25·1)	70·9 (26·8)	66·7 (29·3)	0·01	0·95	0·80	0·44	0·20	0·81
Control	70·2 (25·6)	69·4 (21·1)	67·7 (21·9)						
t-test, *P* value	0·26, 0·79	−0·28, 0·78	0·18, 0·86						
Staff encouragement									
Study	75·3 (27·8)	83·4 (22·6)	84·9 (26·4)	0·80	0·37	0·17	0·84	5·21	0·01**
Control	83·9 (25·5)	72·3 (35·4)	74·4 (33·8)						
t-test, *P* value	1·49, 0·14	−1·73, 0·09	−1·60, 0·11						
Patient satisfaction									
Study	63·2 (20·1)	62·0 (16·0)	65·1 (19·5)	2·09	0·15	0·93	0·40	3·62	0·03*
Control	61·5 (19·0)	61·5 (17·5)	54·0 (17·2)						
t-test, *P* value	−0·39, 0·69	−0·14, 0·89	−2·79, 0·01						
Physical functioning									
Study	47·7 (28·5)	50·1 (28·9)	48·1 (26·7)	0·00	0·95	0·88	0·42	2·81	0·06
Control	52·3 (27·1)	45·5 (24·9)	47·1 (27·3)						
t-test, *P* value	0·76, 0·45	−0·79, 0·43	−0·17, 0·87						
Role-physical									
Study	3·5 (11·7)	15·7 (27·3)	9·3 (18·9)	0·21	0·65	6·95	0·00**	1·77	0·18
Control	5·4 (14·1)	9·5 (21·4)	8·9 (20·5)						
t-test, *P* value	0·67, 0·51	−1·16, 0·25	−0·09, 0·93						

Table 3 (*Continued*)

	Time			Between group		Within group		Interaction effect	
Outcome measures	T1 [Mean (SD)]	T2 [Mean (SD)]	T3 [Mean (SD)]	F	P value	F	P value	F	P value
Pain									
Study	48·4 (37·6)	61·5 (32·9)	59·5 (36·2)	0·90	0·35	3·17	0·05*	1·54	0·22
Control	48·3 (29·8)	48·2 (28·5)	56·9 (34·1)						
t-test, P value	−0·01, 0·99	−1·98, 0·05	−0·34, 0·74						
General health perception									
Study	27·9 (21·2)	29·4 (19·5)	25·9 (22·0)	0·73	0·40	0·06	0·94	1·26	0·29
Control	25·1 (21·3)	23·0 (16·5)	25·7 (19·1)						
t-test, P value	−0·61, 0·55	−1·64, 0·10	−0·05, 0·96						
Emotional wellbeing									
Study	59·3 (19·9)	64·4 (17·9)	63·8 (22·7)	0·00	0·97	4·35	0·01**	0·18	0·84
Control	60·5 (24·3)	64·0 (22·4)	63·3 (21·3)						
t-test, P value	0·25, 0·80	−0·08, 0·93	−0·10, 0·92						
Role-emotional									
Study	42·6 (43·2)	48·8 (43·9)	45·7 (41·2)	0·08	0·78	1·50	0·23	0·38	0·69
Control	36·5 (41·5)	46·0 (44·8)	48·4 (44·9)						
t-test, P value	−0·67, 0·51	−0·29, 0·77	0·29, 0·78						
Social function									
Study	26·7 (24·3)	42·4 (31·7)	41·0 (28·1)	0·71	0·40	7·95	0·00**	4·62	0·01**
Control	30·4 (27·1)	29·2 (24·5)	38·1 (27·9)						
t-test, P value	0·65, 0·52	−2·16, 0·03	−0·48, 0·64						
Energy/fatigue									
Study	40·2 (23·3)	45·1 (20·2)	43·7 (18·6)	1·00	0·32	1·17	0·31	0·36	0·70
Control	38·2 (20·4)	39·4 (19·5)	40·4 (22·2)						
t-test, P value	−0·43, 0·67	−1·32, 0·19	−0·76, 0·45						
Overall health									
Study	41·9 (18·3)	47·0 (15·1)	45·8 (19·6)	1·02	0·32	2·33	0·11	0·43	0·63
Control	40·0 (18·1)	41·9 (17·0)	44·1 (13·8)						
t-test, P value	−0·47, 0·64	−1·46, 0·15	−0·48, 0·63						

*Statistically significant at $P < 0·05$.
**Statistically significant at $P < 0·01$.

other dimensions (Lok 1995). The limitations placed on their physical activities also served to limit their social activities, thus making them feel less satisfied with their lives. Although telephone interviews cannot offer direct improvement in physical function, nurses could use the medium to offer support to patients in dealing with minor, self-limiting conditions and reassurance about physical health problems that might influence their functional abilities. Pain reduction and adherence to medication and treatment regimens are quality indicators of the effectiveness of telephone nursing intervention (Larson-Dahn 2001). The function of telephone interviews using the motivational approach is to empower patients and reinforce self-management. Other than to encourage or promote medication adherence for pain reduction, the nurses in our study also conducted telephone assessment of the Tenckhoff catheter to rule out signs of infection that may have caused bodily pain. The prevalence of pain in long-term, non-malignant conditions is frequently underestimated and represents a large area of unmet medical need (Langford 2008). Despite CAPD, patients' general fatigue is due to nature of the disease, and successful pain reduction helps ease the difficulties faced in performing household chores and other activities of daily living. The reduction in pain resulting in less interference with normal work activities resonates with the improvements in emotional wellbeing and social functioning.

Statistically significant effects demonstrated in the disease-specific dimensions of KDQOL-SF$^{\text{TM}}$ included effects of kidney disease on daily life, symptoms, sleep, encouragement from staff, and patient satisfaction. Sleep disturbances could create anxiety and mood disturbance, while long-term insomnia can accompany psychiatric disorders such as anxiety and alcohol abuse (Fisher & Valente 2009). Researchers in a study conducted in Asia concluded that

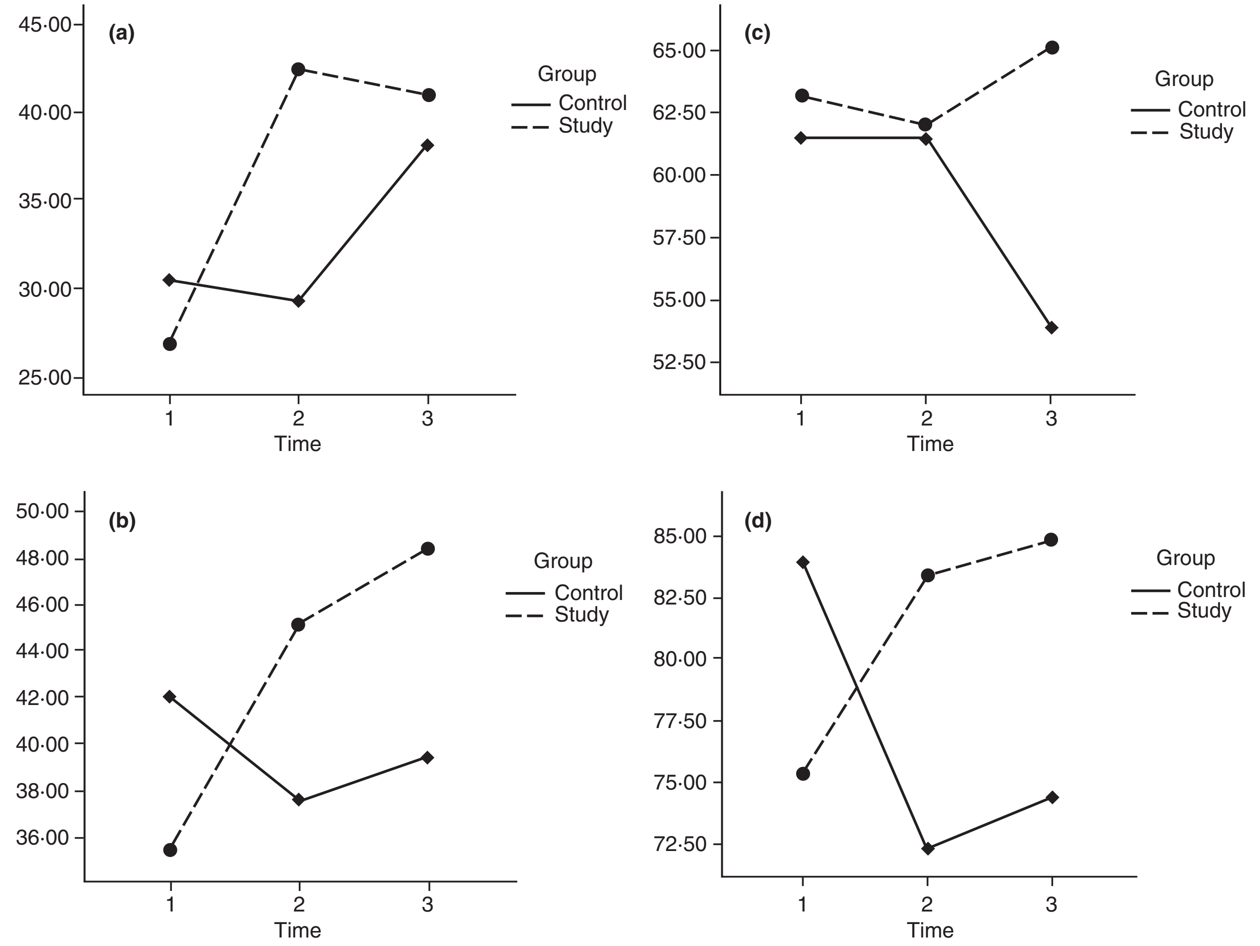

Figure 2 (a) Social Function. (b) Quality of sleep. (c) Patient Satisfaction. (d) Encouragement from dialysis staff.

patients having PD often described themselves as 'poor sleepers' (Edwards 2008). Compared to good sleepers, poor sleepers reported more depressive symptoms and lower health-related quality of life. Other studies have also illustrated that the number of hours of sleep reported for the previous night is highly predictive of the subsequent day's pain frequency, and that good sleep is a marker of good functioning in old age (Driscoll *et al.* 2008, Edwards 2008). Early detection and intervention for sleep disturbance among older adults can help reduce the financial burden associated with sleep-related accidents and illness and promote better quality lives (Brassington 2000, Symth 2008). It is therefore important for a nurse responsible for telephone intervention to identify any sleep disturbance and to provide support and referral if needed. As sleep quality is an important parameter of health-related quality of life in older adults, patient assessment should include risk factor evaluation, a sleep diary and any history of substance abuse (Fisher & Valente 2009). Successful management of sleep disturbance includes patient education, counselling and treatment of the underlying causes of insomnia. Follow-up appointments should be scheduled to monitor treatment effectiveness.

Despite the capacity for nursing interventions to effect changes in patients' quality of life, other dimensions, such as biological and physiological factors and comorbid conditions, cannot be addressed solely through nursing strategies. Other related factors including blood albumin and haemoglobin levels, and the type of treatment given could seriously influence the clinical outcomes (Kerkus *et al.* 1997, Frank *et al.* 2003, Lausevic *et al.* 2007, Liem *et al.* 2007). One of the important roles of nurse-led case management is to encourage patients and their families to adopt meaningful behavioural change, using a patient-centred and motivational approach. Compliance in diet and medication regimens leads to improved serum albumin and haemoglobin levels and a concomitant improvement in quality of life. Studies have shown that low levels of albumin and haemoglobin in the

What is already known about this topic

- Quality of life is an issue of concern for patients with end-stage renal failure.
- The nurse case management model has gained a positive effect for patients suffering from chronic diseases.
- Nurse-initiated telephone follow-up care is effective in increasing self-efficacy in symptom management.

What this paper adds

- The nurse case management model of care was particularly useful for enhancing the wellbeing of patients with end-stage renal failure in transition from hospital to home.
- Nurse telephone follow-up using motivational interviewing is able to offer support to patients in dealing with minor, self-limiting conditions and hence increases their quality of life.

Implications for practice and/or policy

- Training to reinforce telephone communications using motivational interview skills to engage patients fully after hospital discharge will improve the quality of life of patients with end-stage renal failure.
- Managers and clinicians should promote an institutional culture of nurse-patient partnership and collaboration in chronic disease management.

blood are associated with low quality of life (Valderrabano *et al.* 2001, Baiardi *et al.* 2002, Bakewell *et al.* 2002). Other variables that influence the quality of life of patients with end-stage renal failure include number of years on the PD regimen and frequency of hospital admissions (Martin & Thompson 2000, Bakewell *et al.* 2002). The majority of patients in our study group also had other chronic, ESRF-related conditions. These comorbidities into account increase the risk of hospital utilization, which may negatively affect quality of life. Lastly, people who are in paid employment generally have more social network connections and support. Employment has been found to be an important factor that can improve quality of life of patients with ESRF (Niu & Li 2005). Being employed engenders a sense of self-worth and being able to contribute; however, only 10% of our study sample was in the workforce. The combination of kidney disease and the dialysis regimen, which often leaves patients home-bound with inadequate social networks, is associated with a reduction in quality of life.

Nurse-led case management is essentially a humanistic approach in which patients' concerns and needs are the primary agenda of the intervention. Telephone intervention is used as a means to discuss previously identified problems, identify new ones and to find mutually acceptable solutions. These interventions are promising in terms of decreasing the impact of serious illnesses that threaten patients and their families after hospitalization. If patients and their families have adequate support from the healthcare team, an important improvement in their emotional well-being is likely to result, along with an increased perceived health status. Similarly, through the continuous and comprehensive intervention of the case management programme, patients feel less disturbed by the kidney disease, which is reflected in reduced feelings of anxiety, increased confidence, the ability to better cope with fluid and dietary restrictions and increased ability for daily functions. These changes promise not only to improve patients' quality of life but also to enhance their self-perceived health.

Conclusion

When compared with the control group, the study group patients demonstrated higher quality of life, particularly with regard to psychosocial issues and reported feeling more energetic. The goals of long-term care are to control symptoms and promote a lifestyle that will delay disease progression. The model of care described in this study, which includes motivational interviewing techniques, before and after discharge, has the potential to humanize contemporary medical technologies by responding to clients' experiences of illness and integrating the demands of therapeutic regimens into their own lifestyles. Encompassing a supportive and empowering environment for patients having PD, this case management model encourages patient autonomy and increases rapport between nurse and client, to engender behaviour change and ultimately improve quality of life. Furthermore, a collaborative approach with other healthcare staff for referral is able to reduce the fragmentation of care delivery and improve the quality of life of patients with complex needs. This new model of care is applicable across a variety of healthcare settings and may be generalized to other renal or chronic disease populations. The results of this study serve as a starting point for evaluating the effectiveness of a nurse-led case management model using a collaborative approach on mutually agreed goals to improve quality of life for this group of patients.

Author contributions

SC and FW were responsible for the study conception and design. SC performed the data collection. SC performed the data analysis. SC was responsible for the drafting of the manuscript. FW made critical revisions to the paper for important intellectual content. SC provided statistical expertise. FW obtained funding. SC provided administrative, technical or material support. FW supervised the study.

Acknowledgements

We would like to thank the renal nurses and patients who contributed to the study, with the facilitation of Ms Bonnie Tam, Nurse Specialist, Ms Rosaline Yip and Ms Lam Woon Or, Ward Managers, and Ms Helen Lee, Nursing Officer of the study centers. We would like to thank Dr Tony Chan for statistical advice.

Funding

The source of funding of this project was Research Grants Council of Hong Kong (PolyU 5435/05H).

Conflict of interest

No conflict of interest has been declared by the authors.

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