

## Effect of Integrated Follow-up in Patients with Chronic Kidney Disease

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### ABSTRACT

**Purpose:** To examine the effect of integrated follow-up (a nephrologist, nurse and dietician) in patients with chronic kidney disease (CKD).

**Method:** A total of 1,500 CKD patients enrolled from the out-patient department of West China Hospital were randomly allocated to the integrated follow-up group (n=750) and the traditional follow-up group (n=750). Patients were followed up for 1 year. The outcome indexes in the study included the main lab indexes, compliance to follow-up, quality of life, and patient satisfaction.

**Results:** Scores on compliance and patient satisfaction in integrated follow-up group was significantly higher than those in traditional follow-up group. The blood pressure control in integrated follow-up group was better compared to those in traditional follow-up group. In addition, although renal function decreased in both group during follow up, eGFR in integrated group was significantly higher.

**Conclusion:** Integrated follow-up is beneficial to improving patient compliance and satisfaction, controlling blood pressure and slowing down the progress of CKD. The findings in the study pointed out a new model for CKD management.

**Keywords:** Chronic kidney disease, compliance, integrated follow-up, quality of life.

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## **INTRODUCTION**

Chronic Kidney Disease (CKD) is one of the most common chronic diseases. It can develop to end-stage renal disease (ESRD) eventually, which can result in lower physical and mental health, and poorer quality of life. As the high prevalence of high blood pressure and diabetes, and population aging, CKD has become the major public health problem in China. It has been reported that, the prevalence of CKD in China was 10.8% in 2010 (1). Although the diagnosis and therapy of CKD have improved recently, there is still lack effective treatment method for end-stage CKD patients. Moreover, the results of several previous studies indicated that, healthy diet and lifestyles could improve patients' prognosis effectively. In addition, it has been demonstrated that, physician follow up after discharge was another helpful method to improve patients' clinical outcomes. Generally speaking, traditional follow-up for out-patients was conducted by physicians only, who provided medical consultation and adjusted treatment protocol. Patients cannot obtain adequate self-care knowledge and skills during the process. Therefore, the aims of the study were to develop an integrated follow up model including a nephrologist, nurse and dietician, and to evaluate its effectiveness.

## **METHODS**

### **Samples**

This was a randomized controlled trial conducted in West China Hospital of Sichuan University. A total of 1,500 CKD (stage 1-5) or pre-hemodialysis patients were recruited from Jan 2013 to Jan 2014. After obtaining a written informed consent from each patient, all the

participants were randomly allocated to the integrated follow up group (intervention group) (n=750) and the traditional physician follow up group (control group)(n=750).

### **Follow-up Protocol**

The follow-up was carried out every 2 or 4 week. In the intervention group, this program was delivered by a nephrologist and a nurse working in the department of Nephrology, as well as a dietician. The standardized intervention strategies during every follow-up were as follows: (1) a nurse collected patients' basic information and provide consultation after their arrival for outpatient services; (2) a nephrologist offered medical follow-up and adjusted therapy protocol according to patients' symptoms and signs; (3) the nurse provided specific self-management knowledge and skills, and responded to patients' questions on time. Moreover, the nurse was in charge of guiding patients' diet and lifestyles every month. Also, the dietician was responsible for diet consultation and adjustment every 1 to 3 month. In addition, a group educational conference was held every month, which included the concept of kidney disease, prevention of kidney disease, prevention and management of complications of kidney failure, kidney disease replacement therapy, and healthy diet and lifestyles. Telephone follow-up was conducted every 2 week, which aimed at monitoring disease progress and reminding patients of timely outpatient visits to hospitals. Meanwhile, an online Wechat group was established in the study to deliver health management information timely. On the other hand, the control group in the study received follow-up from a physician in the department of Nephrology, who was in charge of therapy adjustment and providing limited diet and lifestyles advice.

### **Evaluation of quality of life**

The kidney disease quality of life instrument-short form (KDQOL –SF™) was used to assess the quality of life in the study. It is a widely used tool evaluating quality of life in CKD patients. In the study, this measure was used to test quality of life at baseline, 6 month and 12 month, respectively, in order to evaluate whether differences existed in before-after intervention or between two groups.

### **Clinical outcome**

Clinical outcome indexes in the study included blood pressure, Hb, WBC, count of PLT, Alb, BUN, Scr, eGFR, TG, CHOL, Glu, Ca, P, K, Urine(Protein, RBC, WBC), PTH.

### **Patient satisfaction**

A self-designed questionnaire was developed to assess patient satisfaction for medical services in the study. The tool is composed of 5 aspects: (1) overall satisfaction for medical services; (2) convenience of medical appointments; (3) timeliness of receiving medical services; (4) convenience of medicalconsultation; and (5) timeliness of receiving medicalconsultation. Each item was ranked from 1 to 10 and the total score is 50 with higher scores indicating better satisfaction. The score was compared between two groups after a 1 year follow-up.

### **Statistical analysis**

The statistical analysis software used in the study was SPSS 19.0. For the data normally distributed, the mean and standard deviation was used. For the data that did not follow a normal distribution, the median and interquartile was used. Two independent t tests were performed to compare the differences between two groups.

## RESULTS

### Sample characteristics

This study has recruited 1,500 CKD patients or pre-dialysis patients in department of Nephrology of West China Hospital from Jan 2013 to Jan 2014. After receiving a written informed consent from each patient, all the participants were randomly allocated to the intervention group (n=750) and the control group (n=750). The intervention group received the integrated follow-up and the control group received traditional physician follow-up. Sample characteristics were presented in Table 1. No statistically differences in base-line indexes have been found between two groups.

TABLE 1: Sample characteristics at baseline

	Integrated follow-up group (n=750)	Traditional physician follow-up group (n=750)
Gender (male/female)	358: 392	342: 408
Age (years)	41±13	43±16
CKD classification		
1	315	305
2	166	186
3	161	144
4	87	90
5	21	25
Mean arterial BP (mmHg)	99.5±14.4	97.6±17.3
BMI	23.0±3.5	23.8±4.1
Proteinuria (g/24h)	1.74±2.36	2.01±2.41
SCr (μmol/L)	137.4±75.1	141±87.2
Egfr (ml/min)	63.1±33.5	64.1±34.5
TG (mmol/L)	1.82±1.33	1.93±1.51
CHOL (mmol/L)	5.10±1.89	4.89±2.01
Hb (g/L)	130.5±19.3	124.5±22.8

## Follow-up

During the 1-year follow-up, 42 patients (5.6%) in the intervention group and 113 patients (15.1%) in the control group dropped out. The dropout rates in the intervention group were significantly lower than those in the control group ( $p < 0.05$ ). Of the 42 missed patients in the intervention group, 28 received therapy in another hospital and 14 lost to follow up due to the change of their contact information. Meanwhile, among the 113 missed patients in the intervention group, 32 received therapy in another hospital and 81 lost to follow up due to the change of their contact information.

## Clinical outcomes

The results showed that, after 1-year follow-up, MAP control in the intervention group was significantly better as compared to those in the control group. The eGFR value in the intervention group was significantly higher than those in the control group. However, TG and CHOL values in the intervention group were significantly lower than those in the control group (Table 2).

Table 2: Clinical outcomes between two groups

	Integrated follow-up group		Traditional physician follow-up group	
	Baseline	One year follow-up	Baseline	One year follow-up
MAP (mmHg)	99.4±14.3	93.5±24.6*#	97.6±17.3	96.2±25.7
sCr(μmol/L)	140.0±81.5	156.7±77.0*#	141±87.2	162.3±74.7*
eGFR(ml/min)	62.7±32.4	60.1±27.6*#	61.1±34.5	58.4±32.3*
TG(mmol/L)	1.75±1.17	1.56±0.77*#	1.93±1.51	1.89±1.02
CHOL(mmol/L)	5.05±1.83	4.48±1.06*#	4.95±2.12	5.11±1.98
Hb(g/L)	129.5±19.2	128.4±20.4	124.5±22.8	125.3±23.7

\*:  $p < 0.05$ , compared with baseline group; #:  $p < 0.05$ , compared with Traditional physician follow-up group

## Quality of life

KDQOL-SF was used to assess the quality of life in CKD patients. The findings indicated that, scores on all the dimensions of KDQOL-SF after 1-year follow-up in the intervention group were significantly higher than those at baseline. Although scores on most dimensions after follow-up in the control group were higher, scores on role-physical and social functioning did not show statistically significant difference before-after study (Table 3).

Table 3: Clinical outcomes between two groups

	Integrated follow-up group		Traditional physician follow-up group	
	Baseline	One year follow-up	Baseline	One year follow-up
Physical functioning	51.4±22.5	57.5±21.3*	49.8±24.6	54.4±32.5 <sup>#</sup>
Role physical	34.1±26.7	39.2±22.5*	35.9±29.3	38.5±25.9
Pain	54.6±24.5	63.4±25.7*	54.8±26.8	61.7±22.9 <sup>#</sup>
General health	28.5±17.3	39.5±21.6*	31.9±27.8	37.9±21.9 <sup>#</sup>
Mental health	50.8±19.2	59.5±23.6*	47.9±22.8	55.3±31.4 <sup>#</sup>
Role-emotional	48.3±29.3	56.2±23.6*	44.9±23.6	51.3±21.8 <sup>#</sup>
Social functioning	54.8±21.0	62.2±25.7*	52.6±24.8	56.8±31.7
Vitality	41.3±24.2	55.3±28.6*	45.7±25.8	54.8±27.1 <sup>#</sup>

\*:  $p < 0.05$ , compared with baseline group in Integrated follow-up group; #:  $p < 0.05$ , compared with baseline group in Traditional physician follow-up group

## Patient satisfaction

A self-devised tool was developed to test patient satisfaction. The outcomes suggested that, after 1-year follow-up, scores on overall satisfaction for medical services in the intervention group were significantly higher compared to those in the control group. Meanwhile, scores on timeliness of receiving medical services, convenience of medical consultation and timeliness of receiving medical consultation in the intervention group were significantly higher than those in the control group. Furthermore, patients in the intervention group proposed that, they

were satisfied with this multidisciplinary collaboration model, especially satisfied with dietician and nurse's health management.

Table 4: Patient satisfaction between two groups

	Integrated follow-up group	Traditional physician follow-up group
Overall satisfaction for medical services	8.12±1.00	7.94±1.30
Convenience of medical appointments	8.94±0.66*	6.89±1.32
Timeliness of receiving medical services	8.76±0.66*	6.65±1.32
Convenience of medical consultation	8.82±0.81*	6.65±1.46
Timeliness of receiving medical consultation	8.65±0.79*	6.59±1.42
Total score	43.29±3.31*	34.71±5.53

\*:  $p < 0.05$ , compared with Traditional physician follow-up group

## Discussion

CKD is one of the most common chronic diseases in China with prevalence of 10.8%. It is known that renal function in CKD patients will deteriorate gradually with disease progressing, and some patients will develop into ESRD finally. Therefore, how to delay the deterioration of renal function and reduce the morbidity of ESRD is becoming a focus of research recently (2). The findings of previous studies have demonstrated that, in addition to medical treatment, healthy lifestyle is vital to protect renal function. For instance, weight management, blood pressure control, blood sugar control and blood lipid management have been demonstrated as effective ways to postpone the decreasing speed of eGFR (3, 4). Nevertheless, traditional outpatient services cannot change patients' lifestyles effectively due to less time for outpatient visits and fewer communications between physicians and patients. During this



process, physicians focus on browsing patients' inspection results and adjusting treatment protocol if necessary. They have little time to manage patients' unhealthy diet and lifestyles.

In order to develop effective intervention strategies for CKD management and postponing the deterioration of renal function, many scholars and physicians have established a multidisciplinary collaboration model and evaluated its effectiveness. For example, it has been demonstrated that, a multidisciplinary collaboration model in Taiwan significantly reduced renal function deterioration in CKD patients (5, 6). It is also reported that, after the wide implementation of this model, the morbidity of ESRD in Taiwan is significantly lower than those before, which demonstrated the benefits of an integrated follow-up model in CKD patients(7). However, to date, no multidisciplinary collaboration model has been established among CKD patients in China. The findings related to integrated follow-up group composed of nephrologist, nurse and dietician in our research team have been reported previously (8-10).

It was found that compliance to follow-up in the intervention group was better than those in the control group. Our results indicated that only 42 patients (5.6%) in the intervention group dropped out after intervention. Of those, 28 patients received medical services in another hospital and 14 patients lost to follow up because they cannot be contacted. In contrast, 113 patients in the control group (15.1%) dropped out. Of those, 32 patients received medical services in the other hospitals and 81 patients lost contact information. It was also found that, scores on overall satisfaction for medical services, timeliness of receiving medical services, convenience of medical consultation and timeliness of receiving medical consultation in the intervention group were higher than those in the control group.

This may be ascribed to the integrated model. Nurse's positive participation in the follow-up was the main reason for the improvement of compliance. Nurse is responsible for providing advice for healthy lifestyles and diet, informing patients of group educational conferences, conducting telephone follow-up every 2 week and reminding patients of timely outpatient visits to hospitals. Moreover, an online Wechat group was established to help follow-up. All the strategies are beneficial to increasing patients' compliance, improving follow-up procedure and reducing dropout rates.

To date, there is no specific treatment for CKD. Therefore, leading a healthy lifestyle is vital to delay the deterioration of renal function in CKD patients (stage 3 and above). Related guidelines recommend that, CKD patients (stage 3 and above) should have a low protein diet with protein intake volume ranging from 0.6 to 0.8g/kg. Low protein intake can reduce kidney burden, postpone the decreasing speed of eGFR, and prolong the progress to ESRD. Nevertheless, it is difficult for physicians to instruct patient low-protein diet due to limited communication time in traditional model. Our study implemented a nephrologist, nurse and dietician cooperated follow-up model. Nurse and dietician were in charge of offering diet advice such as specific diet prescription, 3-day diet diary and illustration of protein content in common food. As a result, compliance to low protein diet in the majority of patients has improved. The results in our study showed that, eGFR reduction in the intervention group was lower than those in the control group. Meanwhile, eGFR value in the intervention group was higher than those in the control group after 1-year follow-up. Moreover, it was found that blood lipid level in the intervention group was lower than those in the control group after 1-year follow-up.

As a multidimensional and patient-centered concept, quality of life comprises physical, emotional and social health. Meanwhile, quality of life has become an important clinical outcome index for chronic disease with the development of bio-psycho-social model. CKD will impact all the aspects of quality of life in patients with disease progressing (11, 12). Thereby, it is necessary to develop effective intervention strategies to improve patients' quality of life, and increase their physical, mental and social health (13). Our findings indicated that, quality of life in both groups improved after intervention. Moreover, scores on all the dimensions of KDQOL-SF in the intervention group were higher than those before intervention. However, scores on most dimensions of KDQOL-SF except role-physical and social functioning in the control group were higher than those before intervention. These results showed that, traditional follow-up model paid more attentions to disease treatment with patients' psychological and social needs neglected. As we know, patients tend to face many barriers to social and emotional adaptation after physically recovering, which may have effect on their quality of life. Integrated follow-up model overweigh traditional model. The nurse in the new model can make better communication with patients, reduce their senses of anxiety and depression and help them have better understanding of disease, which can improve their social adaptation, mental health and quality of life eventually.

## **CONCLUSION**

Integrated follow-up model including a nephrologist, a nurse and a dietician is a recommendable model which can improve patients' compliance to follow-up and their over

satisfaction for medical services, help developing favorable doctor-patient relationship, postpone the deterioration of renal function and improve quality of life.

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