Research Article

Systematic Review and Meta-Analysis Program Based on Effectiveness of a Multidisciplinary Model of Care for Patients with Chronic Kidney Disease

Qinger Wang, Mengyuan Ge, Huimin Sun, Qingwen Xu, Hui Li, and Guilan Lv (iD)

Nanjing Glomerulonephritis Registry, National Clinical Research Center for Kidney Diseases, Jinling Hospital, Nanjing 210000, China

Correspondence should be addressed to Guilan Lv; 2021111125011010@zcmu.edu.cn

The effectiveness of the multidisciplinary nursing model in the nursing of chronic kidney disease (CKD) by using meta-analysis is explored. Relevant literatures that are in line with the multidisciplinary nursing model for CKD intervention are searched and screened from domestic and foreign literature databases such as Wanfang Medical Center, CNKNET, VIP, and PubMed, and Meta-analysis is conducted with RevMan 5.2 software. A total of 6 literatures are included, and the publication bias of the included literatures is low. Meta-analysis shows that the multidisciplinary group had a better Hb compliance rate, Hb level, Scr, eGFR, SBP, and DBP than the traditional group. The experimental results show that multidisciplinary nursing intervention can improve the nursing effect of patients with CKD and help to improve Hb, Scr, blood pressure, and glomerular filtration function of patients.

1. Introduction

The incidence of Chronic Kidney Disease (CKD) increases with a change of people's living habits. According to an epidemiological survey, the incidence of CKD in China is more than 10%. This disease is a lifelong disease, and bad living habits will increase the risk of disease and deterioration [1, 2]. The primary principle for clinical treatment of CKD disease is to actively control blood pressure levels based on primary disease treatment, to control the disease by strengthening renal function and so on. Reasonable planning of diet and living habits is of great significance to control the disease of patients [3]. Multidisciplinary nursing is a diversified nursing intervention model based on the construction of professional nursing teams and the collaborative nursing of professionals from multiple disciplines. In recent years, the application of the multidisciplinary nursing model in the nursing of CKD disease has achieved certain results and has been verified by a number of studies [4, 5]. At present, there is no medical evidence of multidisciplinary intervention in CKD disease. Therefore, this study aims to systematically evaluate the specific effects of multidisciplinary nursing intervention in CKD disease and provide evidence-based evidence for clinical, CKD disease control and nursing optimization.

The rest of this paper is organized as follows. Section 2 discusses related work. Section 3 is quality evaluation and statistical treatment. Section 4 shows the experimental results, and Section 5 concludes the paper with a summary and future research directions.

2. Related Work

The disease was CKD induced by a variety of risk factors for CKD, patients may suffer kidney structure changes and kidney function decline, the symptom of kidney function can appear serious but his entire condition does not deteriorate, so reasonable control of high glomerular filtration and albuminuria in patients with symptoms was the effective measure to alleviate illness development [6]. In keeping the drug therapy based on thorough follow-up supervision and management of the patient's diet medication can control the

condition by playing a positive role, and multidisciplinary care was joint doctors, dietitians, and nursing staff of multiple categories, such as the professional and systematic nursing management mode has certain guiding significance for the nursing of patients with CKD [7].

EGFR and SCr were sensitive indicators that can directly reflect patients' renal function. The abnormal decrease of eGFR and the abnormal increase of SCr and Hb can both reflect patients' renal function decline and indicate that patients may have kidney injury [8]. Chen found that the application of multidisciplinary care can be in the same period by different professionals in the field of diet, disease of the patients with cognitive, illness, such as integrated management intervention, in a multidisciplinary collaborative involvement with advantages of promoting patient rehabilitation, helping to improve the patient's clinical symptoms, and delaying the patient condition [9]. The results of this study showed that multidisciplinary nursing intervention could effectively improve the levels of eGFR, SCr, and Hb in patients with CKD, which was consistent with the above research conclusions. Although the improvement effect of Hb was not obvious, it indicated that the implementation of multidisciplinary management could effectively improve the renal function and blood circulation function of patients with CKD. The reason may be that the application of multidisciplinary nursing can establish corresponding personalized medical records for CKD patients and provide data support for clinicians' one-to-one health education and lifestyle planning, and the establishment of a multidisciplinary follow-up information database can dynamically monitor the changes in patients' clinical indicators and adjust the nursing plan appropriately. In this way, reasonable and effective special personal care programs were provided for patients, so that patients can eventually establish good living habits, fundamentally control patient's conditions, and then effectively improve patients renal function and control hemoglobin levels [10].

Hypertension was a common clinical manifestation of renal disease, and active control of hypertension level was the first choice of treatment for renal disease control. Some studies have pointed out that professional nurses and clinical pharmacists, after systematic training, can effectively control the blood pressure level of CKD patients to a certain extent, help the blood pressure level of patients reach the normal standard, and delay the progression of patients' disease [11]. In this study, the improvement of blood pressure of patients with multidisciplinary nursing was significantly better than that of the other group with conventional nursing, suggesting that multidisciplinary nursing can actively control the blood pressure level of patients with CKD and has certain benefits for disease control. Speculated that the mechanism may be to enhance the multidisciplinary care patients diet, medication nursing measures such as regulatory strength, and improve the patient's nursing adherence, indirectly to enhance the nursing service quality as well as the effect of blood pressure control; In addition, multidisciplinary care regularly educates patients on health and patients with self-cognition of the disease will actively cooperate with nursing at the same time, so as to achieve the clinical nursing goals of blood pressure control [12].

3. Quality Evaluation and Statistical Treatment

3.1. Literature Retrieval. The literature types are clinical controlled trials and dissertations. The effect of the multidisciplinary nursing mode on CKD intervention is in the direction of retrieval, which is searched according to the Chinese and English keys in accordance with the research direction in Wanfang Medical Science, CNKI, VIP, and foreign PubMed. Including Scr, eGFR, CKD, multidisciplinary nursing, blood pressure, renal function, creatinine, glomerular filtration rate, systolic and diastolic blood pressure, chronic kidney disease, nursing, hemoglobin, blood pressure, renal function, and so on, the literature retrieval time is nearly 6 years, and a meta-analysis is conducted based on the selected literature.

3.2. Quality Evaluation. The selected literature treatments are assessed using a modified Jadad score scale with an overall score of 1–7, with ≤ 3 being low quality and ≥ 4 being high quality.

3.3. Statistical Treatment. RevMan5.2 statistical software is used to analyze the study data, and the counting data are expressed as risk ratio (RR). The weighted mean difference is selected as analysis statistics, weighted mean difference (WMD), or standard mean difference (SMD). All effect sizes are expressed with a 95% confidence interval (CI). The heterogeneity between the results of each study is tested by the Chi-square test. When the heterogeneity between studies is statistically significant $P < 0.1$ and $I^2 \geq 50\%$, subgroup or sensitivity is used to analyze the source of this property. When the heterogeneity between studies met the conditions of $P > 0.1$ and $I^2 < 50\%$, the heterogeneity had no statistical significance, and the fixed effect model is used for meta-analysis. When the source of heterogeneity is not clear, the random effect model and descriptive analysis of obvious clinical and methodological heterogeneity are used in the analysis.

4. Experimental Results

4.1. Literature Screening Results. After searching and screening in terms of keywords and research directions in the Chinese-English donation database, a total of 6 literatures are included, including 5 Chinese literatures and 1 English literature. The specific retrieval process is shown in Figure 1. A total of 2 articles of low quality and 4 articles of high quality are included. The basic characteristics and quality evaluation results of the included articles are shown in Table 1. In Table 1, ① represents Hb success rate, ② represents Hb, ③ represents eGFR, ④ represents SCr, ⑤ represents SBP, and ⑥ represents DBP.

Figure 2 is the overall literature publication bias. Figure 3 is the publication bias of single literature. It is clearly evident from Figures 2 and 3 that there is no significant publication bias in the 6 included articles.
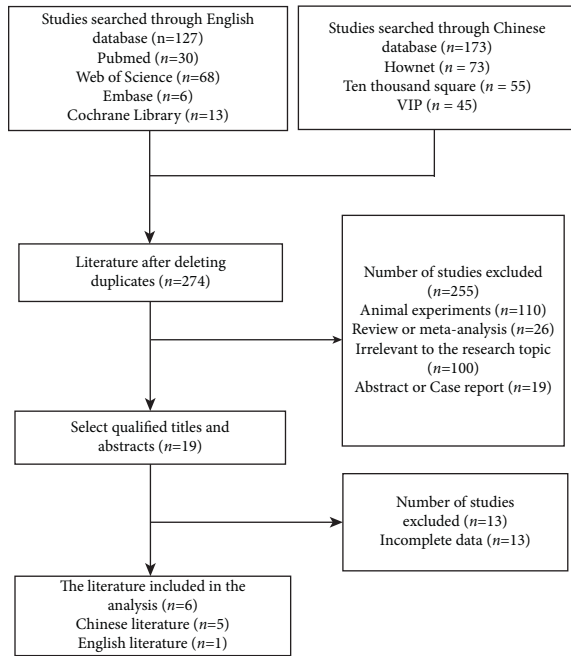
Figure 1: Flow chart of literature screening.

Table 1: Basic characteristics of literature.

Author	The year of publication	Outcome index	Quality score
D. Ma [13]	2019	①③④	4
H. Zhong [14]	2021	②③⑤⑥	5
Y. Shi [15]	2019	①	2
Song Y. [16]	2018	②③④⑤⑥	6
Imamura [17]	2016	②③④⑤⑥	6

4.2. Difference Comparison of Hb Compliance Rate. Two literatures are included, and the heterogeneity test shows that there is heterogeneity among literatures ($I^2 = 20.0\%$, $P = 0.23$). According to the fixed-effect model analysis, the Hb compliance rate of the multidisciplinary group is higher than that of the traditional group, and there is no statistically significant difference between the combined studies (RR: 1.21, 95% CI: (0.98, 1.49), $P = 0.07$) [18, 19]. Figure 4 is the forest plot of the HB compliance rate. It is clearly evident from Figure 4 that multidisciplinary nursing can improve the rate of Hb compliance, but the effect is not obvious.

4.3. Comparison of Differences in Hemoglobin Levels. Four references are included, and the heterogeneity test shows that there is heterogeneity among the references ($I^2 = 93.0\%$, $P < 0.0001$). Random-effects model analysis shows that Hb in the multidisciplinary group significantly is lower than that in the traditional group, and the differences are statistically significant after all studies are combined (RR: 1.43, 95% CI: (0.79, 2.06), $P < 0.0001$). Figure 5 is the forest map of hemoglobin levels. It is clearly evident from Figure 5 that multidisciplinary nursing can increase Hb in patients with CKD.
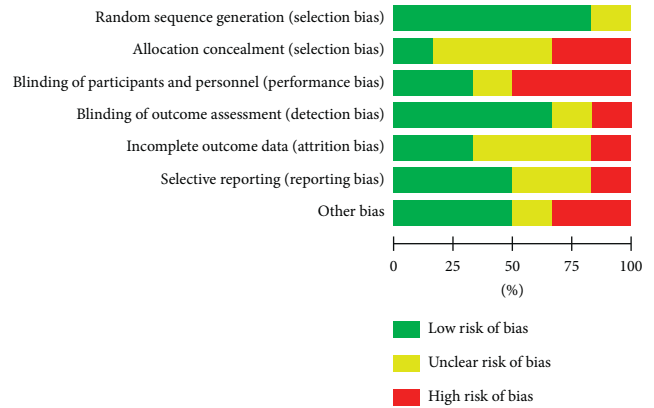
Figure 2: Overall literature publication bias.
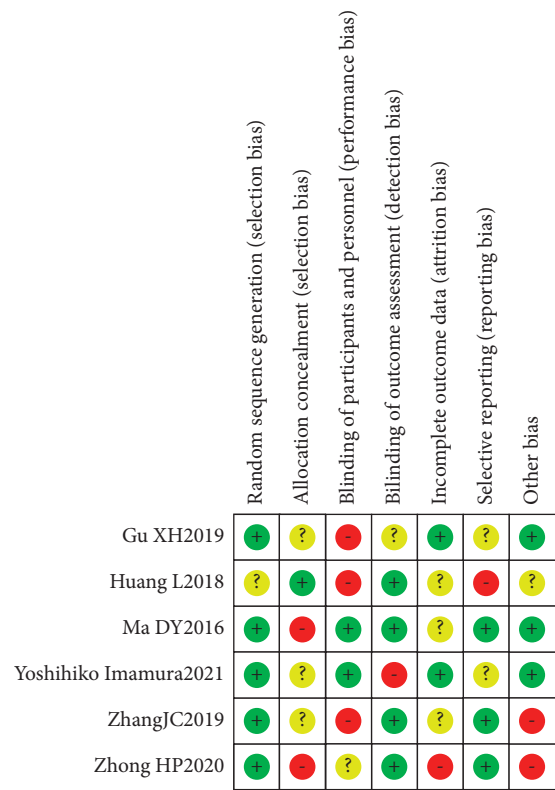
Figure 3: Publication bias of single literature.

4.4. Comparison of Differences in the Level of Glomerular Filtration Rate. Five references are included, and the heterogeneity test shows that there is heterogeneity among the references ($I^2 = 99.0\%$, $P < 0.0001$). eGFR in the multidisciplinary group significantly increased than that in the traditional group, with statistically significant differences between the combined studies (RR: 6.84, 95% CI: (6.25, 7.43), $P < 0.00001$). Figure 6 is the forest plot of the glomerular filtration rate level. It is clearly evident from Figure 6 that multidisciplinary nursing can increase eGFR in patients with CKD.

4.5. Comparison of Creatinine Levels. Three references are included, and the heterogeneity test shows that there is heterogeneity among the references ($I^2 = 94.0\%$, $P < 0.00001$).
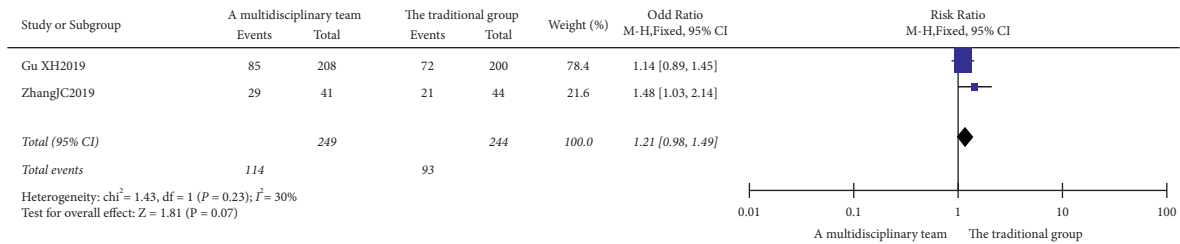
Study or Subgroup	A multidisciplinary team		The traditional group		Weight (%)	Odd Ratio M-H,Fixed, 95% CI	Risk Ratio M-H,Fixed, 95% CI
	Events	Total	Events	Total			
Gu XH2019	85	208	72	200	78.4	1.14 [0.89, 1.45]	
ZhangJC2019	29	41	21	44	21.6	1.48 [1.03, 2.14]	
Total (95% CI)		249		244	100.0	1.21 [0.98, 1.49]	
Total events	114		93				

Heterogeneity: chi^2 = 1.43, df = 1 (P = 0.23); I^2 = 30%
Test for overall effect: Z = 1.81 (P = 0.07)

0.01   0.1   1   10   100
A multidisciplinary team   The traditional group

FIGURE 4: Forest plot of HB compliance rate.

Study or Subgroup	A multidisciplinary team			The traditional group			Weight (%)	Mean Difference IV, Fixed, 95% CI	Mean Difference IV,Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Huang L2018	135.24	18.45	62	119.75	12.36	62	1.3	15.49 [9.96, 21.02]	
Ma DY2016	111.79	18.16	100	110.32	19.97	100	1.4	1.47 [-3.82, 6.76]	
Yoshihiko Imamura2021	10.6	16	53	9.5	1.9	59	96.0	1.10 [0.45, 1.75]	
Zhong HP2020	88	16.96	70	76.33	17.26	70	1.3	11.67 [6.00, 17.34]	
Total (95% CI)			285			291	100.0	1.43 [0.79, 2.06]	

Heterogeneity: chi^2 = 38.38, df = 3 (P < 0.00001); I^2 = 92%
Test for overall effect: Z = 4.41 (P < 0.00001)

-100   -50   0   50   100
A multidisciplinary team   The traditional group

FIGURE 5: Forest map of hemoglobin levels.

Study or Subgroup	A multidisciplinary team			The traditional group			Weight (%)	Mean Difference IV, Fixed, 95% CI	Mean Difference IV,Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Gu XH2019	52.6	4.76	208	35.6	6.27	200	29.4	17.00 [15.92, 18.08]	
Huang L2018	88.75	10.47	62	69.78	14.36	62	1.8	18.97 [14.55, 23.39]	
Ma DY2016	88.27	11.59	100	68.54	17.55	100	2.0	19.73 [15.61, 23.85]	
Yoshihiko Imamura2021	15.2	8.8	53	11.3	7.79	59	3.6	3.90 [0.81, 6.99]	
Zhong HP2020	7.07	2.38	70	5.54	2.07	70	63.2	1.53 [0.79, 2.27]	
Total (95% CI)			493			491	100.0	6.84 [6.25, 7.43]	

Heterogeneity: chi^2 = 606.19, df = 4 (P < 0.00001); I^2 = 99%
Test for overall effect: Z = 22.83 (P < 0.00001)

-100   -50   0   50   100
A multidisciplinary team   The traditional group

FIGURE 6: Forest plot of glomerular filtration rate level.

Study or Subgroup	A multidisciplinary team			The traditional group			Weight (%)	Std. Mean Difference IV, Fixed, 95% CI	Mean Difference IV,Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Gu XH2019	191.5	111.6	208	289.8	122.6	200	20.1	-98.30 [-121.08, -75.52]	
Huang L2018	100.14	32.45	62	119.47	54.18	62	42.1	-19.33 [-35.05, -3.61]	
Ma DY2016	100.25	26.37	100	128.56	80.37	100	37.8	-28.31 [-44.89, -11.73]	
Total (95% CI)			370			362	100.0	-38.57 [-48.77, -28.37]	

Heterogeneity: chi^2 = 33.65, df = 2 (P < 0.00001); I^2 = 94%
Test for overall effect: Z = 7.41 (P < 0.00001)

-100   -50   0   50   100
A multidisciplinary team   The traditional group

FIGURE 7: Forest map of creatinine levels.

After random-effects model analysis, the multidisciplinary group has significantly decreased creatinine than the traditional group, with statistically significant differences between the combined studies (RR: −38.57, 95% CI: (−48.77, −28.37), P < 0.00001). Figure 7 is the forest map of creatinine levels. It is clearly evident from Figure 7 that multidisciplinary nursing can reduce the Scr of CKD patients.

4.6. Systolic Blood Pressure Level Comparison. Three references are included, and the heterogeneity test shows that there is heterogeneity among the references (I^2 = 93.0%, P < 0.00001). The SBP of the multidisciplinary group significantly is decreased than that of the traditional group, with
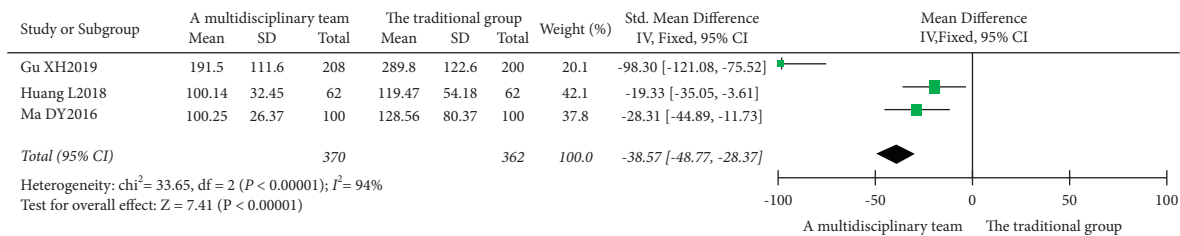
statistically significant differences between the combined studies (RR: −15.14, 95% CI: (−17.56, −12.72), P < 0.00001). Figure 8 is the forest plot of systolic blood pressure levels. It is clearly evident from Figure 8 that multidisciplinary nursing can reduce SBP in patients with CKD.

4.7. Diastolic Blood Pressure Level Comparison. Three references are included, and the heterogeneity test showed that there is heterogeneity among the references (I^2 = 96.0%, P < 0.00001). According to the random-effects model analysis, the DBP of the multidisciplinary group significantly decreased than that of the traditional group, with statistically significant differences between the combined studies (RR:
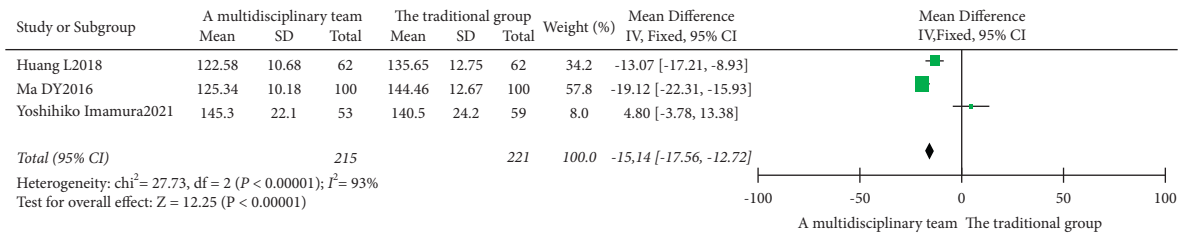
Study or Subgroup	A multidisciplinary team			The traditional group			Weight (%)	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Huang L2018	122.58	10.68	62	135.65	12.75	62	34.2	-13.07 [-17.21, -8.93]	
Ma DY2016	125.34	10.18	100	144.46	12.67	100	57.8	-19.12 [-22.31, -15.93]	
Yoshihiko Imamura2021	145.3	22.1	53	140.5	24.2	59	8.0	4.80 [-3.78, 13.38]	
Total (95% CI)			215			221	100.0	-15,14 [-17.56, -12.72]	

Heterogeneity: chi^2 = 27.73, df = 2 (P < 0.00001); I^2 = 93%
Test for overall effect: Z = 12.25 (P < 0.00001)

-100 -50 0 50 100

A multidisciplinary team   The traditional group

FIGURE 8: Forest plot of systolic blood pressure levels.

Study or Subgroup	A multidisciplinary team			The traditional group			Weight (%)	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Huang L2018	79.64	8.2	62	95.47	10.58	62	38.6	-15.83 [-19.16, -12.50]	
Ma DY2016	78.95	11.13	100	99.58	11.42	100	43.9	-20.63 [-23.76, -17.50]	
Yoshihiko Imamura2021	72.7	13.7	53	71.8	12.9	59	17.5	0.90 [-4.04, 5.84]	
Total (95% CI)			215			221	100.0	-15.00 [-17.07, -12.93]	

Heterogeneity: chi^2 = 52.44, df = 2 (P < 0.00001); I^2 = 96%
Test for overall effect: Z = 14.20 (P < 0.00001)

-100 -50 0 50 100

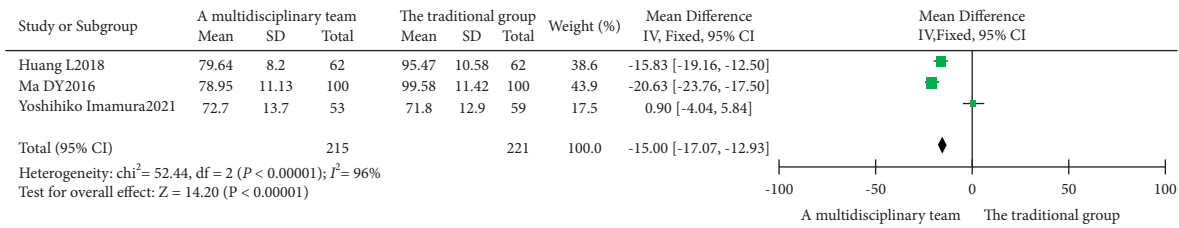A multidisciplinary team   The traditional group

FIGURE 9: Forest plot of diastolic blood pressure levels.

−15.00, 95% CI: (−17.07, −12.93), $P < 0.00001$). Figure 9 is the forest plot of diastolic blood pressure levels. It is clearly evident from Figure 9 that multidisciplinary nursing can reduce DBP in patients with CKD.

5. Conclusion and Future Work

There are still some deficiencies in this study. For example, the literature screening scope is small, resulting in a relatively small number of included literature compared with previous studies of the same type, which may increase the risk of research results error and further literature heterogeneity. In addition, CKD has multiple disease types, and its clinical symptoms are relatively complex and diverse. As a validation of multidisciplinary care intervention in quality of care for patients with CKD and the improvement of symptoms of one of the research ideas, such as the quality of life for patients with CKD, and survival condition such as prognostic indicators can be as a new research direction for further analysis, the design idea of this study has further improved space. The follow-up study should further expand the scope of searching literature in order to ensure that sufficient literature samples are obtained, and meta-analysis conducted based on them is of great guiding significance for obtaining higher quality information data, and it can improve the reference value of meta-analysis results.

In conclusion, the application of multidisciplinary nursing intervention in patients with CKD can effectively improve the nursing effect and meanwhile can improve the patients' blood pressure, renal function indicators, and hemoglobin level. The multidisciplinary nursing mode has the value of promotion and implementation in the nursing work of CKD.

Data Availability

The simulation experiment data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Mengyuan Ge and Qinger Wang made equal contributions.

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