

A Multilevel Model for Services Provided to Patients With Chronic Kidney Disease

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Chronic kidney disease (CKD) is a general health problem with high rates of mortality and morbidity. The increasing prevalence of CKD has led to the recognition of the fact that it needs special care. One approach to CKD management is to present a model of care for the disease. A model of care for CKD was developed by drawing on the literature, including guidelines for CKD care, and by using previous experiences in providing care for patients with diabetes mellitus and CKD. The model focuses on training, identification of patients, care, follow-up, and evaluation of patients. In this study, two levels were defined for providing care to patients with CKD. The first level involves care provided by family physicians, while the second level was defined as community health services for CKD. Establishment of at least 1 CKD community health service at each capital city of any province seems to be an effective factor in improving services provided to patients with CKD.

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INTRODUCTION

Chronic kidney disease (CKD), with a prevalence of 10% to 15% and high rates of morbidity and mortality,^{1,2} imposes large costs on the national health service.³ Diabetes mellitus and hypertension are among the most common risks of end-stage CKD.³⁻⁵ The Kidney Disease Improving Global Outcomes guideline,⁶ includes recommendations for CKD patients with acute kidney injury, stages 4 and 5 of CKD, significant albuminuria, progressive CKD, urinary casts, refractory hypertension, persistent hyperkalemia, recurrent or extensive nephrolithiasis, and hereditary kidney disease. It suggests that CKD patients should be managed in multidisciplinary care setting.

In 2005, the Iranian National Primary Health Care Service consolidated 2 previously separated programs for managing hypertension and diabetes mellitus. However, the program appears ineffective in management of CKD patients, as it does not provide proper infrastructure for healthcare at different levels for referral of patients identified with CKD. In 2008, the authors implemented a study to examine CKD frequency distribution among the rural population

of Shahreza.² Once the project was completed, we presented the Department and Transplantation and Special Diseases with a proposal recommending a consolidated CKD program. Upon the approval of this proposal, a team was established to address this requirement. A set of standards for this consolidated program was developed by the team in cooperation and coordination with the Health Network Development Center. Once the standard care was approved in 2010 and associated training materials were developed, a number of areas were selected as targets for pilot studies, which covered 4 cities.⁷⁻⁹ After the completion of the pilot plan in rural areas, pilot initiatives were launched at noncommunicable disease centers in Tehran University of Medical Sciences to deliver the program to urban areas. Since 2011, the scope of roles and responsibilities of these centers have been extended to cover CKD, and doctors, nurses, and nutritionists at these centers started taking care of patients with CKD based on the pre-established guidelines. A drawback of this program is that CKD patients cannot be properly referred to receive appropriate care for stage 4 and stage 5. Given the considerable costs of care for these

two stages, CKD patients cannot afford the related expenses. In addition, performing follow-ups at these stages is extremely important in preventing progress, reducing complications, and improving quality of life for patients.¹⁰

A major problem in providing CKD care in both rural and urban areas in Iran was the failure in patient referral. This largely stemmed from lack of centers that could provide standard care. Therefore, the present study was proposed and implemented as a measure to create a multilevel model for CKD care and set the stage for proper referral of patients.

MATERIALS AND METHODS

The present study falls into the category of action research and attempts to provide a multilevel model for provision of CKD care in the Iranian system for provision of primary health care. Different levels for CKD care in primary healthcare system were identified by reviewing the literature; diabetes and hypertension programs; 3 guidelines, namely the National Institute for Health and Care Excellence,¹¹ Kidney Disease Outcomes Quality Initiative,⁶ and the Caring for Australians with Renal Impairment¹²; as well as the results reported by the United States Renal Data System.¹³

RESULTS AND DISCUSSION

Table 1 presents a multilevel model for CKD care. The model is the result of the authors' experience in implementing CKD programs together with the review of literature and guidelines and seeking consultation from experts. The first level covers the general population. This group receives training on

self-care and improving lifestyle in order to prevent noncommunicable diseases. The second level includes patients with a CKD risk factor who receive primary care. These risk factors include sedentary lifestyle, salt intake, obesity, hypertension, diabetes mellitus, smoking, hyperlipidemia, cardiovascular disease, and high-risk pregnancy which can be effectively prevented from causing CKD through self-care. Treatment of this group focuses on improving or minimizing the adverse effects of CKD risk factors. Level 3 targets patients with diabetes mellitus and hypertension, and there is ample evidence that identification of patients in this group is cost effective. It is recommended that individuals in this group should receive care based on the guidelines, while CKD patients should be identified on annual basis. Level 4 covers CKD patients in stages 1 to 3a who need special CKD-related care for improvement in their lifestyle, identification and care for risk factors, and drug prescription for slowing down CKD progression.

Level 5 is intended for patients with moderate proteinuria (albuminuria in excess of 300 mg per gram of creatinine in urine or proteinuria in excess of 500 mg per gram of creatinine in urine) or with a glomerular filtration rate less than 45 mL/min/1.73 m². Level 6 covers patients in stages 4 and 5 CKD or with acute kidney failure requiring hospitalization and high healthcare expenses. Therefore, they should receive care from nephrologists. A team consisting of a nephrologist, a hemodialysis or peritoneal dialysis nurse, a transplant nurse, a social worker, a nutritionist, and other professionals, as may be required, should take care of the patient.

Table 1. A Multilevel Model for Primary Health Services Provided to Patients With Chronic Kidney Disease (CKD)⁹

Level of Care	Person or Organization in Charge	Target Group	Required Action
1	Self-care	General population	Improving lifestyle
2	General practitioner, nurse, assistant nurse	Patients with CKD risk factors ^{15,16, 17}	Change in lifestyle, prescription
3	Primary healthcare team Noncommunicable disease team	Diabetes mellitus and hypertension	Evaluation and diagnosis of CKD ¹⁸
4	Primary healthcare team Noncommunicable disease team	CKD stage 1 and 2 with mild albuminuria CKD stage 3a with no proteinuria	Change in lifestyle including training for nutrition programs, weight management, recommendation exercise, controlling blood pressure and sugar, recommendation to quit smoking, prescription
5	CKD community health service Nephrologists or expert internists	CKD with moderate albuminuria CKD stage 3	Prescription, follow-up for complications
6	Hospital CKD community health service Nephrologists	CKD stages 4 and 5 Acute kidney deficiency Moderate proteinuria with hematuria Severe proteinuria	Prescription, diagnostic and therapeutic interventions

Systematic follow-up plays a significant role in mitigating complications.

Based on the literature review,¹⁴⁻¹⁸ findings of the pilot studies, and expert opinion, 2 primary healthcare levels are proposed as described in Table 2. Major activities at each level include training, identification of patients, treatment, follow-up, planning, and research on CKD. Training consists of public training as well as training for patients and healthcare staff. Patient identification is conducted on diabetes mellitus and hypertension populations. Treatment is intended to prevent disease progress or to stop reduction in

kidney function. Follow-up is performed regularly based on the guidelines over the phone or through text messages. Planning covers activities related to the healthcare center and patient management. Interventions vary depending on the type and severity of the disease and social and economic conditions of patients. The intervention team can improve health conditions of the patients by taking into account these factors. Scientific development requires research and investigation based on particular skills, which should be acquired by the staff at both levels. It is also important to evaluate training, identification of

Table 2. Activities at the Proposed Levels for Primary Healthcare⁹

Level 1	Level 2
General practitioner, health care professionals	Nephrologists, counselors, health care professionals
Training	Training
Patient identification	Screening for complications
Treatment	Treatment
Referral	Development of an alternative kidney program
Follow-up	Follow-up
Planning	Planning
Research	Research
Evaluation	Evaluation
Health care and treatment centers	Hospitals and kidney research institutes

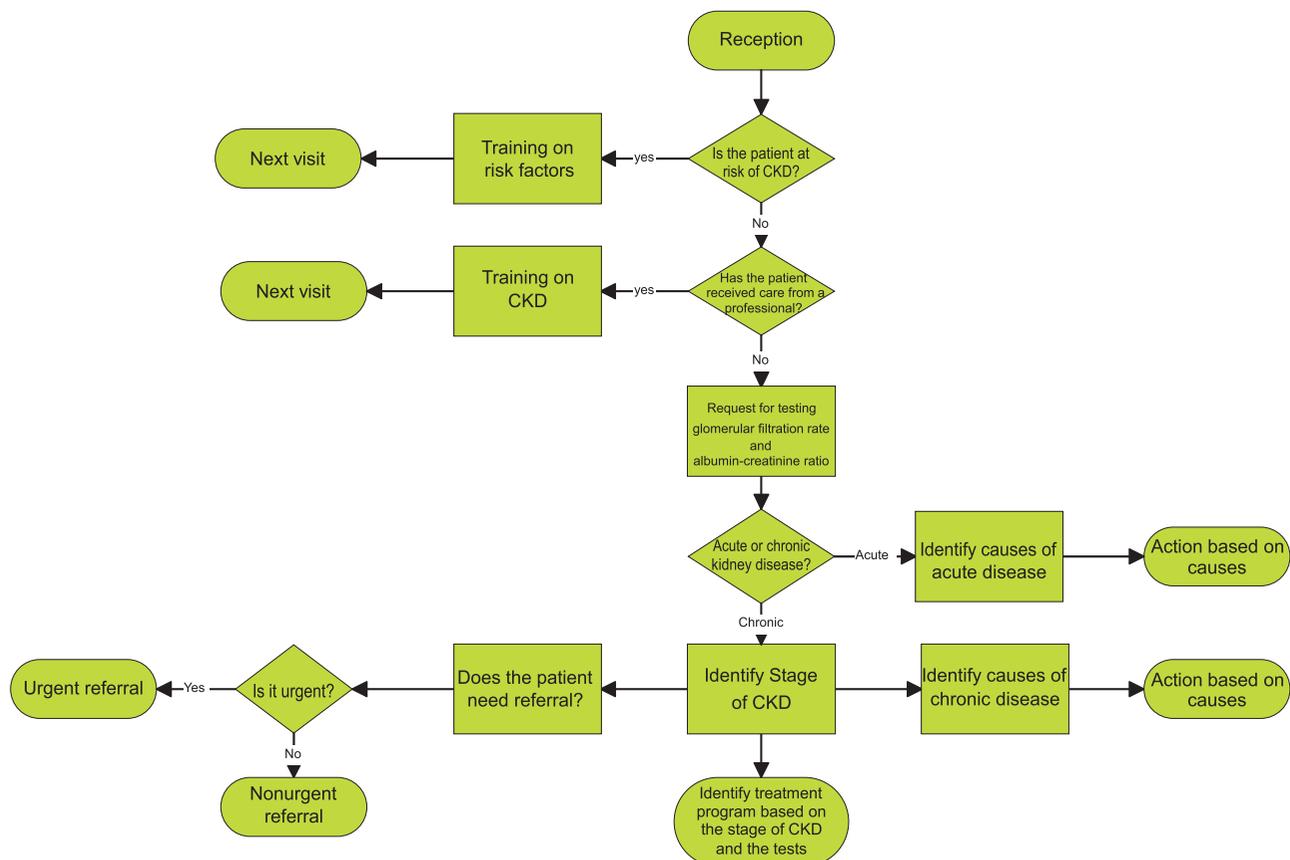


Figure 1. Chronic kidney disease (CKD) care algorithm for the first level of health service.⁹

patients, treatment, disease progress, complications, planning, and research.

By drawing on the available literature, a list was prepared for activities required in a CKD program. Since description of roles and responsibilities of healthcare staff at healthcare centers and noncommunicable disease centers were previously

prepared for rural and urban areas,⁹ at this step, a description of roles and functions was prepared for community health services. Figure 1 illustrates CKD-related care at Level 1.

Once the list of roles and functions was prepared, an algorithm was developed for CKD care. With the table of activities at hand (Table 3), an algorithm

Table 3. Description of Administrative Process for Chronic Kidney Disease (CKD) Care at Community Health Services⁹

Item	Title	Description
1	Establishment of care center	By establishment we mean presence of healthcare service team at a place designated for community health service. The team must be employed based on a contract made with a team member and all members should receive initial trainings. All required equipment and software must be in place and ready for use.
2	Call for CKD referral from noncommunicable disease centers	Notices and letters are sent to noncommunicable disease centers, general practitioners, and medical specialists within the area covered by the program to call for referral of CKD patients to the community health service.
3	Referral to the center	...
4	Preparing record	The record form contains information about the referring organization, demography, family background, CKD risk factors, CKD classification, medications, weight, height, waist measurement, and blood pressure.
5	Urgent action needed?	In case of patient's poor general conditions, the assistant or the nurse inform the physician who will examine the patient and refer him/her to hospital. If no referral is required, the process will proceed to classification and the rest of the steps.
6	Patient classification	Based on the referral form, initial examination, and the paraclinical tests, patients are classified and receive required intervention. Patients who need diagnosis and supportive intervention will be classified as "supportive intervention." Others will be classified as "transplant candidate," "hemodialysis candidate," or "peritoneal dialysis."
7	Is the patient willing to receive care?	For several reasons, including the following, the client may be reluctant to receive care: <ul style="list-style-type: none"> • The client does not believe that CKD has serious health consequences; • The client does not believe in effectiveness of medical interventions; • The client does not care much about health and improvement in his/her health conditions; • The client is concerned about medical expenses and thinks that he/she may not be able to afford these costs; and • The client is already under another physician's care and does not want to change his/her doctor.
8	Training for being under care	Based on the reason identified for the client's reluctance to be placed under care, attempts should be made to convince him/her for receiving care.
9	Convinced?	The answer is "no" only when the client is not convinced despite sufficient efforts made to convince him/her.
10	Medical file	...
11	Start/continue treatment	Treatment should be based on health services provided to the client.
12	Next appointment	Scheduling a date for the next appointment based on treatment guidelines
13	Call to remind the client of the next appointment	Calling the client for reminding him/her of the next appointment leads to regular visits and reinforces adherence to the care program
14	The client is on time?	...
15	Call the client and ask why he/she has not shown up	Through a phone call, the client is asked about his/her no-show. Most common causes include the followings: <ul style="list-style-type: none"> • The client has forgotten to show up; • The appointment overlapped a more important task; • Negligence: the patient does not care about these issues; • The client is dissatisfied with the CKD community health service; • The client has not yet made his/her mind to receive care; or • The client is willing to see another doctor.
16	Is the client willing to come?	Based on the reason of no-show, it will be determined whether the client is willing to come to the center.
17	Try to convince the client for the next appointment	Based on the reason of no-show, continual effort must be made to convince him/her. This may require several phone calls.
18	Was he/she convinced?	The answer is "no" only when the client is not convinced despite sufficient efforts made to convince him/her.

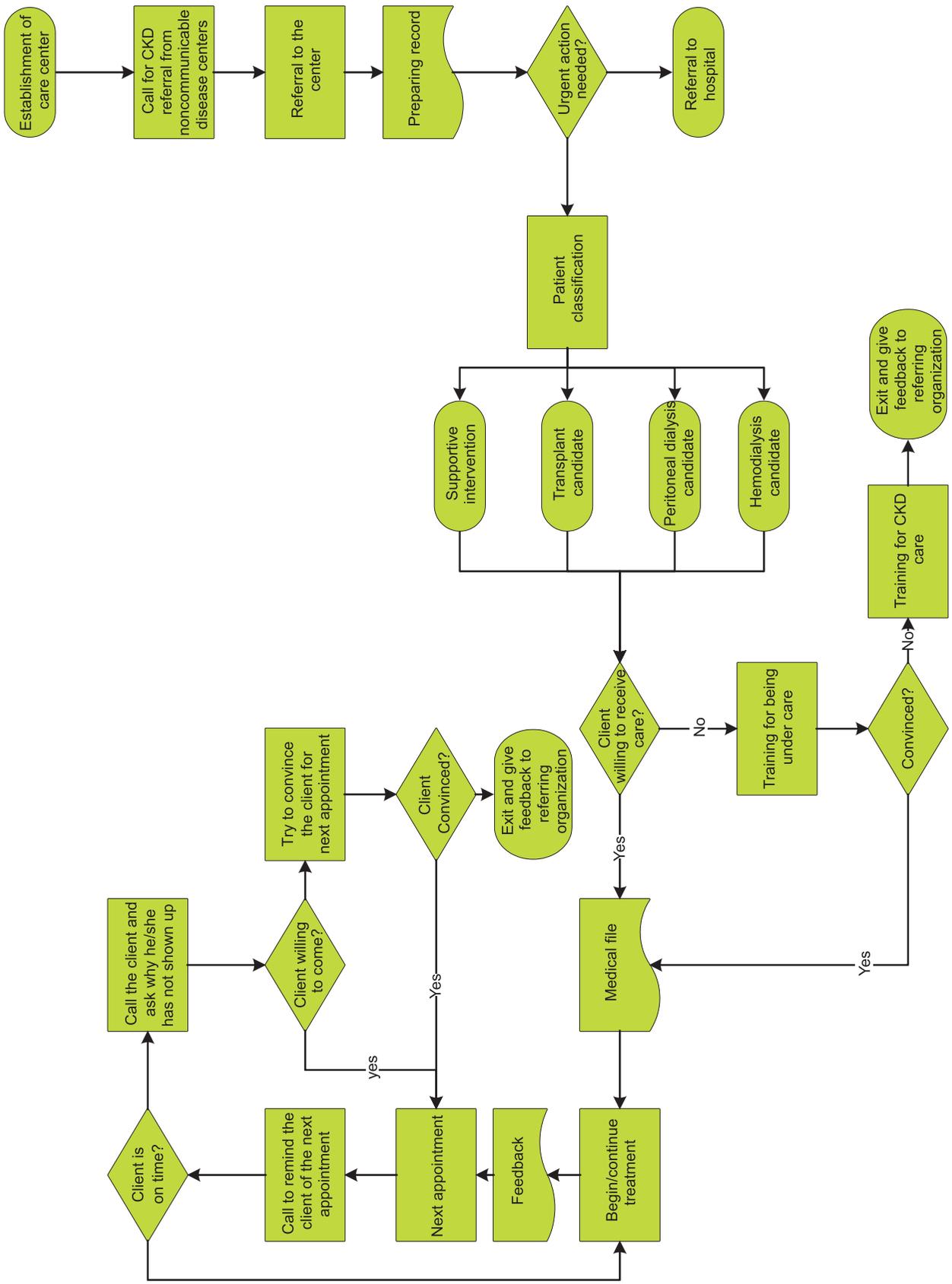


Figure 2. Algorithm for chronic kidney disease (CKD) care at stage 2.⁹

was developed for the administrative process to be used by CKD community health services. Chronic kidney disease care for stage 2 requires proper physical settings for the patient as well as the personnel. The staff at the CKD community health service consists of a nephrologist, a nurse coordinator, a dialysis nurse, a transplant nurse, a nutritionist, a social worker, and an assistant. At this center, all CKD patients at stages 4 and 5 and those CKD patients who need referral are covered by the health service (Figure 2). After registration, initial procedures including write-up preparation and physical examination by a physician are carried out, and in cases where the patient requires urgent action, he or she is referred to a physician, training nurse, or nutritionist. These patients receive regular care based on the guidelines and follow-ups will be performed through phone calls as prescribed by the physician. Training on CKD care, preventing complications, using medications, side effects and contraindications, and different types of alternative interventions are provided to the patients according to the guidelines. The center also offers services for peritoneal dialysis, outpatient (ambulatory) care for hemodialysis patients, and transplant-related cares. Patients placed under private physician's care are also provided with access to these training programs while receiving interventions from their own physician. Employees will participate in staff training programs at least once a year and treatment guidelines are reviewed annually based on the available evidence.

It is estimated, based on the available statistics in Iran,^{9,19} that 400 out of every 100 000 individuals over the age of 30 years needed CKD care at community health services in 2014, which in total is 140 000 patients needing CKD-related care in this year. Assuming that a nurse can provide care to 1500 patients per year, 100 CKD care centers will be needed. By increasing the number of employees at such centers, at least 1 CKD center in each capital city will be sufficient to cover the need for CKD-related care.

CONCLUSIONS

It is possible to deliver care to CKD patients through primary health care services. For this purpose, it seems necessary to describe roles and responsibilities of staff at different levels involved in provision of CKD-related care. It has been shown,

at least in rural areas, that delivery of the first level of CKD-related care can effectively prevent CKD. Unfortunately, the primary healthcare service is not efficient at the referral level. Establishment of at least 1 CKD center for community health service at each university of medical sciences seems to be helpful in terms of enhancing the quality of life for CKD patients as well as reducing treatment expenses. Out-of-pocket costs and expenses associated with medical interventions can be effectively reduced if insurance policies at community health services cover the fees paid in exchange of reception, counseling, training and nursing care, nutritionist services, social work, psychological services, and other types of services provided at these centers to improve health conditions of clients. This will facilitate the development of these medical centers to the extent required, thereby paving the way for preventing CKD and reducing mortality and morbidity.

CONFLICT OF INTEREST

None declared.

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