

Review Article

Caring for Patients with CRF: Rewards and Benefits

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Patients with CRF usually progress through different stages before they reach ESRD and require special medical, social and psychological care and support during the pre-ESRD and following renal replacement therapy (RRT). Early referral of patients with CRF has the advantage of receiving adequate management and regular followup, with significant reduction in cardiovascular morbidity and mortality, attending an education program, prepared psychologically, participate in the decision of type of RRT, preemptive kidney transplantation, early creation of dialysis access, and adequate training in selected modality of RRT. During the early stages of commencement of RRT, psychological support and social care with rehabilitation program are mandatory. The degree of involvement and interaction must be individualized according to the needs of patient and type of RRT. A multidisciplinary team is crucial for implementation of a variety of strategies to help staff intervene more effectively in meeting the care needs of CRF patients.

1. Introduction

Chronic renal failure (CRF) or chronic kidney disease (CKD) is characterized by a gradual and sustained decline in renal clearance or glomerular filtration over many years resulting in permanent kidney failure. The Kidney Disease Improving Global Outcomes (KDIGO) statement has defined CKD as either kidney damage or glomerular filtration rate (GFR) of $<60 \text{ mL/min/1.73 m}^2$ for ≥ 3 months [1]. Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies. Furthermore, the KDIGO has classified CKD into five stages from mild renal failure to end-stage renal disease (ESRD) as shown in Table 1.

Patients at risk of developing CKD include those with family history of renal disease, older age group, diabetes mellitus, hypertension, kidney stones, and chronic urinary tract infections [1]. The risk is increased in patients with poor glycemic control, uncontrolled hypertension, and in patients with high levels or progressive proteinuria and rapid deterioration of renal function. Patients at risk of CKD need to be screened and monitored yearly for blood glucose, blood pressure, urine analysis for microalbuminuria, and

serum creatinine, and renal function should be expressed as estimated glomerular filtration rate (eGFR) using the Modification of Diet in Renal Disease (MDRD) equation [2]. Ideally, caring for CRF patients requires integrated and systematic approach from an integrated renal team [3, 4].

Early detection and management of CKD, which is a major risk factor for cardiovascular disease, has been shown to be cost-effective and can reduce the risk of CRF progression and cardiovascular disease by 20% to 50% [5, 6]. Referral of patients with early stages of CRF to nephrologist would benefit from adequate conservative management of general health and change of lifestyle, which includes cessation of smoking, weight reduction and dieting and physical fitness, and reduce the specific risk effect on kidneys by strict glycemic and blood pressure control and the use of angiotensin converting enzyme inhibitors (ACE-I) and angiotensin receptor blockers (ARB), lipid-lowering agents, correction of anemia and management of bone and mineral metabolism [7]. These measures can help in preserving functioning nephrons, delaying the progression of kidney disease, and consequently delay the requirement of RRT, and reducing the cardiovascular morbidity and mortality [5]. Furthermore, early referral would benefit such patients

TABLE 1: Stages of chronic kidney disease: KDIGO classification of CKD (1).

Stage	Description	GFR (mL/min/1.73 m ²)
(1)	Kidney damage with normal or ↑ GFR	≥90
(2)	Kidney damage with mild ↓ GFR	60–89
(3)	Moderate ↓ GFR	30–59
(4)	Severe ↓ GFR	15–29
(5)	Kidney failure	<15 (or dialysis)

Chronic kidney disease is defined as either kidney damage or GFR <60 mL/min/1.73 m² for ≥3 months. Kidney damage is defined as pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

KDIGO: The Kidney Disease Improving Global Outcomes; CKD: Chronic kidney disease; GFR: Glomerular filtration rate.

by having the time to be educated about the type of their disease and ways to delay its progression, psychological and social support, the different types and options of RRT and early preparation and creation of suitable dialysis access [8]. In order to achieve adequate care of referred patients with CKD, the renal unit should be equipped with all facilities of integrated modalities of renal replacement therapy options and have an experienced and well-trained renal team.

The role of multidisciplinary team, which should include primary health care physician, nephrologist, renal nurse, dietitian, social worker and psychologist/psychiatrist, is quite essential in approaching and preparing CRF patients in predialysis stage and in explaining and demonstrating the available options of renal replacement therapy, and providing continuous care and support during the dialysis stage and following kidney transplantation [9]. Equally important is the participation of the next of kin/family where such support is vital in providing care and great deal of understanding the chronicity of the disease and its demanding needs [10].

A well-trained and experienced renal team is the cornerstone in the management and care of patients with CRF. The potential renal team should be introduced to the social, psychological and medical concepts of CRF, the specific needs of these patients at different stages of their disease and the indications and advantages of treatment modalities of RRT [11]. The renal team should also receive continuous training on implementation of different forms of RRT and how to provide care. This should include extra months of exposure to outpatient HD and PD and postkidney transplant patients, and official rounds with an attending nephrologist and senior nursing staff on dialysis patients [12].

The aim of this communication is to demonstrate the invaluable role of the multidisciplinary team in approaching and preparing CRF patients in predialysis stage and the supportive care in postdialysis stage, and outline the benefits of early referral of patients with CKD to nephrologist.

2. Early Referral of CRF Patient

It is expected that primary healthcare physician should ideally consult and/or refer patients with CRF at stage 1

if haematuria or significant proteinuria present, at stage 2 if eGFR declines >4 mL/min/year and at stage 3 for all patients with CKD, where eGFR <60 mL/min/1.73 m² [1, 13]. Special attention should also be directed for early referral of adolescent renal patients [14]. There are many valuable benefits of early referral of patients with CKD to nephrologist, which are outlined in Table 2.

2.1. Optimization of Treatment of CRF. Early referral of patients with CKD to nephrologist/renal team will help in close monitoring of general health and renal function. This should include advice and guidance about change of lifestyle with cessation of smoking, weight reduction, dieting and physical fitness. Regular and planned visits to renal clinic will ensure better glycemic and blood pressure control, the appropriate use of ACE-I and ARB, lipid-lowering drugs, maintenance of acid-base balance, and proper management of anemia and mineral and bone metabolism. These measures will assess in preserving the remaining functioning nephrons, delaying the progression of renal failure towards the end stage and can reduce the cardiovascular morbidity and mortality [2, 13].

2.2. Access to Structured Education Program. The disease of CRF, whether primary or secondary to systemic disease, takes long course of followup and probably the whole of patient's life. Chronic kidney disease usually passes through different stages until it reaches over years the end stage of kidney failure [1]. Once patient reaches the ESRD another journey starts into the dialysis-dependent life of either haemodialysis (hospital or home) or peritoneal dialysis (CAPD or APD), or kidney transplantation. Furthermore, many patients may fail one or more modality of these treatments and require switching to another form of renal replacement therapy. Thus, in order for these patients to cope with this disease and its consequences, it is essential for them to understand and become aware of their disease and the different types of renal replacement therapies. Structured educational programs have been shown to be of great benefit of promoting self-care dialysis modality [15, 16], which can help in providing treatment for more patients with restricted resources, and improve treatment outcomes, reduced anxiety, greater prospect for continued employment and reduction of costs of treatment [17]. Implementation of effective educational programs, however, is of paramount importance [18] and would benefit from the participation of psychologist from the renal team [19].

2.3. Adaptation of CRF Patient. Adaptation is one of the most important tasks that a renal (multidisciplinary) team should focus on and accomplish in the clinic with CRF patient prior to dialysis onset [11]. This is because once they reach ESRD and started on dialysis, and if not well prepared, CRF patients usually go through a stage of denial, shock, grief and anger, and if not coped well with, it will lead to psychological distress and depression. Therefore, psychological support should be professionally approached through an integrated renal team together with next of kin/close relative at different

TABLE 2: Benefits of early referral of patients with chronic kidney disease.

- (1) Prevention and management of CKD modifiable risk factors
- (2) Optimization of treatment of CKD
- (3) Preservation of functioning nephrons and delaying the progression of renal failure
- (4) Access to structured psychoeducational program
- (5) Adaptation of CKD patient to RRT treatment
- (6) Preparation and creation of suitable dialysis access with less temporary vascular access
- (7) Training on selected modality of RRT with better compliance
- (8) Preemptive kidney transplantation
- (9) Reduction of cardiovascular morbidity and mortality
- (10) Reduction of costs

Primary healthcare physician should ideally refer patients with CKD at stage 1 if haematuria or significant proteinuria present, at stage 2 if eGFR declines >4 mL/min/year and at stage 3 for all patients with CKD, where eGFR <60 mL/min/1.73 m².

CKD: chronic kidney disease; RRT: renal replacement therapy; eGFR: estimated glomerular filtration rate.

visits in a specific counseling clinic [10, 11, 19, 20]. Our team, which includes a well-trained and experienced social worker, retrieves from patient/relatives some background about the patient such as level of education, current or previous job and his/her likes and dislikes, in addition to the detailed social and family history. This usually helps in a better understanding of the background of the patient and in choosing the easiest way of approaching him/her with pleasant and easy communication way.

A recommended approach for preparing CRF patient for RRT is that it should be delivered by well-trained and experienced multidisciplinary team and should include (1) explanation and demonstration of how normal kidneys function and why the kidneys fail or stop working, (2) what are the risk factors for CKD and cardiovascular disease and how and what are the measures to preserve the remaining function of the kidneys, (3) what are the likely signs and symptoms of late CKD and what are the possible consequences if no action is taken, (4) what are the available treatment options and how are they integrated, and the advantages and disadvantages of each RRT option and what is the best available option for each patient, and (5) reassurance that RRT is to bring their life back to close to normal. Patients should be encouraged to ask questions, and the team should discuss and answer all queries and concerns in simple, pleasant and satisfactory way.

2.4. Creation of Suitable Dialysis Access and Training on Selected Modality of RRT. Once the renal patient has approached ESRD and accepted his/her disease, and in the absence of preemptive kidney transplantation option, and is willing to be treated by either PD or HD then peritoneal catheter insertion or creation of arteriovenous vascular access and adequate training is required, especially for home haemodialysis patients.

Our recommended guidelines for preparing ESRD patients for HD and PD include reassurance of patients, clear explanation of the different available options of RRT and preparation requirements and the time needed, education of patients using audiovisual, booklets and leaflets materials, visits to HD and PD units, meeting patients and discuss the experience of some patients with postkidney transplant, and choice of dialysis treatment and location (home or hospital) taking in consideration their clinical, psychological and employment needs. Preemptive kidney transplantation should be explained and encouraged. It is advisable that individualized interaction should be implemented according to patient's specific needs. Well trained and experienced renal nurses and social workers are uniquely positioned to build a strong relationship with ESRD patients and help in achieving these goals.

Peritoneal dialysis (PD) is an established program in our unit where over one hundred patients have been managed by continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD). PD should be considered as first RRT option if there are no contraindications. The concept and principles of PD should be fully explained in simple and easy way of understanding. This should be aided by booklets, leaflets, video tape/DVD instructions, illustration of variable pictures and posters and possibly with a mannequin demonstrating the way PD catheter is inserted. This should be delivered primarily by the well-trained and experienced PD nurse and by the treating nephrologist. Patients should also be encouraged to raise questions and the team should try every way to help the patient understand all his/her concerns. Patients should also clearly understand that there are some complications to this treatment that can usually be dealt with without serious sequels. Potential PD patients must be fully aware that proper hygiene and sterility in connecting and disconnecting solutions and performing PD is very crucial in preventing peritonitis, which is the major obstacle to this modality. Potential PD patient should be admitted to hospital and arrangements should be made with the general surgeon, or an interventional nephrologist, to specify a date for PD catheter insertion. The managing PD nurse should accompany the patient to theater for post operative catheter site care. Patient should be instructed on how to take care of the catheter site insertion and prevent exit site infection. PD nurse should start training PD patient on how to introduce and drain PD fluids according to either CAPD or APD. In the case of APD patient should have an idea on the performance of the automated machine and the required PD prescription and program. The process of the practical training may take 2-3 weeks. PD patients require continuous care and support in the PD dialysis clinic and possible reevaluation of their clinical setting and readjustment of their PD prescription. Extra-care should be offered for PD patients once have one or more of PD complications including peritonitis. Finally, patients who fail PD treatment can be reintroduced to HD modality or possible future kidney transplantation.

Haemodialysis (HD) service has been provided for more than thirty year, where there are currently over three hundred fifty patients under our care. Our practice ensured that the

concept and principles of HD should be fully explained in simple and easy way of understanding. This should be aided by a tour to HD unit and discuss with HD patients their experience with this modality of RRT. This should be delivered primarily by an experienced HD nurse and by the treating nephrologist. Patients should also be encouraged to raise questions and the team should try every way to help patient understand all his/her concerns. Patients should clearly understand the need of a vascular access, usually in patient's arm, of AVF. Patients should be taught how to take care of that arm before the creation of AVF, by avoiding blood pressure measurement and blood sampling from that arm. Patients should also be taught how to take care of that arm after the creation of AVF, by avoiding blood pressure measurement, blood sampling from that arm and lifting heavy objects. They are encouraged to perform squeezing exercises of spongy ball in the hand of the AVF arm in order to speed maturation of the AVF. Potential HD patient should be admitted to hospital and arrangements should be made with the vascular surgeon for the creation of the AVF. Potential HD patient should be instructed that they will usually require three sessions of HD and each should last a minimum of four hours. Hospital HD does not need much of training as most of its technique is passive. However, home HD should be aware of the required procedures, possible side effects and ways of achieving remedies.

2.5. Preemptive Kidney Transplantation. One of the major benefits of early referral of CRF patient to nephrologist is the ability to complete the pretransplant work up and assess the suitability of CRF for preemptive kidney transplantation. The sufficient time will help in evaluation and suitability of the live-related kidney donor and achievement of adequate matching between the recipient and the donor. Furthermore, the kidney transplantation surgery will be planned and performed according to the needs of the patient and before the appearance of signs and symptoms of uremic toxicity.

2.5.1. Caring for Renal Transplant Patient. Patients who receive a kidney transplant not only have many learning needs, but also require education and lifestyle changes related to the transplant [15]. Previous experiences with renal diseases and complications, different health care systems, beliefs about health, language and reading skills, cultural influences, education preparation, and disabilities are a few of the factors that influence how each patient learns post transplantation, and ability to adjust to a new lifestyle. Staff nurses/renal team approaches for patient learning on transplant unit should be individualized and take these factors into consideration when developing various concrete teaching tools that include a book, medication card, color-coded medication guide, audiocassette, computer printouts and clinical pathways. Furthermore, education of postkidney transplant patients, by the renal team, about the types, doses and side effects of their new medications and keeping up with the regular visits to postkidney transplant clinic is essential in looking after the renal allograft.

3. Consequences of Late Referral of CRF Patient

Late referral (<3 months before initiation of dialysis) of patients with CKD will deprive them from adequate control of diabetes mellitus, hypertension, management of anemia and mineral and bone disease, lipid abnormalities, malnutrition, and could lead to rapid deterioration of renal function and increased cardiovascular morbidity and mortality [21–23]. They will also miss the regularity of predialysis monitoring, access to education program, longer consultation period and psychological preparation to cope with dialysis, take part in clinical decision regarding their dialysis option, less compliance, increased morbidity with increased number of hospitalization and number of days stay in hospital [24]. This has been associated with increased management costs [25], increased urgent dialysis start and more hospitalization for symptomatic uremia [24], lack of transplant evaluation and preemptive kidney transplantation, and the improved transplant survival [26], miss the chance of possible initial RRT with PD with less selection of self-care dialysis modality [16], and enforce urgent creation of temporary vascular access [8, 27]. In fact, late referral to nephrologist has been associated with 45% increased risk of temporary percutaneous catheter insertion [28] and increased the risk of luminal thrombosis, infection, inadequate blood flow rates, central venous stenosis, shorter use life, and tunneled catheters have been associated with a 39% increased risk of death [29].

4. Postrenal Replacement Therapy Care

Once they approach ESRD and are on dialysis, CRF patients experience further stresses which may include restriction in their choices of occupation, hobbies and leisure activities, type of job and may lose family and community support. This situation is further complicated by the uremic symptoms of the disease, the multiple side effects of dialysis (HD and PD) treatment and the complexity of medications and their side effects. Therefore, following the onset of dialysis ESRD patients require and would benefit most from a well-trained and experienced social worker and psychologist/psychiatrist. Many of these patients have medical, social and psychological problems. These include loss of libido, poor or lack of erection, inability to have children or inability to conceive, lack of strong well being and reduced ability to concentrate and perform properly. In addition, these patients have to cope with ingestion of many medications, which leaves many unable to comply, and to control their fluid intake especially in summer and hot weather times. Others have lost their jobs, faced difficulties in transportation and some experienced poor financial situations. These difficulties have put, at least, some of our patients at frequent outbursts of verbal and/or physical aggression towards our staff. In this regard, it has been noticed that regular visits/sessions by the social worker and psychiatrist, building strong relationships and connectedness with HD patients and individualized involvement and interaction according to specific needs played an important role in helping these patients [10, 21, 30]. Furthermore, the care and support of next of kin/family

TABLE 3

(a) HD treatment goals or HD clinical performance measures

(1)	Prevalance of AV Fistula
(2)	Dialysis ≥ 3 times/week
(3)	Dialysis duration ≥ 4 hr
(4)	Arterial blood flow rate (QB) ≥ 300 mL/min
(5)	Kt/V ≥ 1.4
(6)	Intradialytic body weight gain $< 4\%$
(7)	Mean arterial BP ≤ 105 mmHg
(8)	Transferrin Saturation = 30–50%
(9)	Serum Ferritin = 200–500 ng/mL
(10)	Hemoglobin = 10–12 gm/dL
(11)	Phosphorus = 3.5–5.5 mg/dL
(12)	Calcium = 8.8–10 mg/dL
(13)	Calcium X Phosphorus < 55 mg ² /dL ²
(14)	PTH = 150–600 pg/mL
(15)	Serum albumin > 3.5 gm/dL
(16)	Bicarbonate > 20 mEq/L
(17)	Hepatitis B & C seroconversion = 0%

HD: hemodialysis; AV Fistula: arteriovenous fistula; Kt/v: hemodialysis adequacy; BP: blood pressure; PTH: parathyroid hormone.

(b) PD treatment goals or PD clinical performance measures

(1)	Total (residual kidney + peritoneal) Kt/Vurea ≥ 1.7 per week or total creatinine clearance ≥ 50 L/week/1.73 m ²
(2)	Peritoneal net ultrafiltration in anuric patients ≥ 1.0 L/day
(3)	Albumin ≥ 3.5 g/dL
(4)	Hemoglobin ≥ 10.0 and ≤ 12.0 g/dL
(5)	Transferrin saturation = 30–50%
(6)	Serum ferritin ≥ 200 and ≤ 500 μ g/L
(7)	Phosphorus ≥ 3.5 and ≤ 5.5 mg/dL
(8)	Calcium \times Phosphorus < 55 mg ² /dL ²
(9)	Intact PTH ≥ 150 and ≤ 600 pg/mL
(10)	Predialysis mean arterial blood pressure < 105 mmHg
(11)	Clinic peritonitis rate < 1 episode/24 patient-months
(12)	Hepatitis B & C seroconversion = 0%

PD: peritoneal dialysis; Kt/v: hemodialysis adequacy; PTH: parathyroid hormone.

is very helpful and should not be overlooked [10, 20]. In our unit, where these measures have been advocated, providing comfortable atmosphere for patients in their dialysis room, such as providing private TV connected to favorable channels, newspapers, books and magazines, providing meals and regular hot and cold beverages, arranging for charity sponsored transportation from and to dialysis centre, and seeking charities' financial help have added to the support of patients on dialysis and reflected on their compliance with their treatment.

Our practice, in fact, has been based on monitoring referred patients with CKD in the low clearance clinic. This has almost always ensured the implementation of

measures of optimizing treatment for patients with deranged renal function, an access to structured education program, adaptation to different forms of RRT, early creation of suitable dialysis access and training on selected modality of RRT with a view to preemptive kidney transplantation. Our aim has been to plan to achieve, as much as possible, the maximum percentage of the treatment goals or the clinical performance measures, as shown in Tables 3(a) and 3(b), among patients reaching ESRD and in need of RRT.

Our results show that the goals of clinical performance measures have been achieved in $> 75\%$ of our patients on hemodialysis and peritoneal dialysis. Specifically, adequate management of anemia in pre and postdialysis stages resulted in maintaining Hb concentrations between 10–12 gm/dL in $> 80\%$ of patients on dialysis. Furthermore, early preparation of our CRF patients who selected, and were more suitable for, hemodialysis as first-choice modality of RRT, resulted in early creation of fully functioning arteriovenous (A-V) fistula in more than 85% of patients with less than 10% permanent catheters. Likewise, early vaccination against hepatitis B virus, together with education and training of nursing staff on strict implementation of infection control policies and procedures, resulted in achieving 0% seroconversion rates in both hepatitis B and C during the past 10 years [31, 32]. Moreover, education and training of CRF patients who selected and preferred peritoneal dialysis as first-choice modality of RRT resulted in better performance and compliance, significantly lower incidence of infectious and non-infectious complications, better chance of kidney transplantation and higher survival rates [33].

In conclusion, CRF is an illness for which long-term management is required. A well-trained and experienced renal (multidisciplinary) team together with the availability of integrated renal replacement therapy program is vital for providing proper help and support for CRF patients. Education and training of CRF patients and understanding their disease and how best can be coped with, and continuous help and support of the relatives/family would help in avoiding or alleviating the psychological distress and the side effects of modalities of renal replacement therapy and improves the compliance of dialysis patients. Finally, predialysis care is an essential part of management of CRF that would positively reflected on the general outcome.

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