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Welcome to the premier issue of *Renal Digest*. This quarterly newsletter is an educational initiative of the Institute of Kidney Lifescience Technologies (IKLT). We at IKLT are a group of community nephrologists with a vision to improve renal care through education.

CKD is on the rise in Canada. We believe it is possible to reduce the number of patients who end up on dialysis or the transplant wait-list, but **early detection** is key. Ontario laboratories recently began reporting eGFR values that can be used to stage kidney disease, which should allow for earlier detection of CKD. We hope that by increasing awareness of CKD and its management among our colleagues in primary care that more patients will be treated in the earlier stages of the disease. This will lead to better patient outcomes.

In this issue, we discuss the use of eGFR values in screening for CKD, as well as the role of the patient and the healthcare team in managing CKD. We end off with an inspiring interview with Brian Quinlan, a kidney transplant recipient.

eGFR: What It Means to You and Your Patients

Ontario laboratories now report eGFR values for adult patients for whom serum creatinine has been ordered. This article discusses the reasons for the change, how eGFR is calculated, and what eGFR values mean to you and your patients.

Chronic Kidney Disease: A Growing Epidemic

Approximately 11% of Canadians have chronic kidney disease (CKD), and this number is increasing at an alarming rate.¹ Diabetes is the leading cause of renal failure, and evidence suggests that tight control of blood sugar and pressure will slow the progression of CKD.

Considerable morbidity and mortality are associated with CKD. CKD increases the risk of cardiovascular disease (CVD) by 10 times that of the general population, and more CKD patients die from CVD than kidney failure.²

Why Use eGFR?

Serum creatinine alone is a poor indicator of kidney function and often doesn't identify patients in the early stages of CKD, who are often asymptomatic.^{3,4} Early diagnosis and treatment of CKD can slow down the loss of renal function and reduce the risk of adverse events. The importance of early and repeated screening of high-risk patients cannot be over-stated.

Because age, gender, and race influence GFR, eGFR values can vary widely among individuals with the same serum creatinine values (Table 1). GFR estimates are the best indices of kidney function and allow for staging of patients according to their level of kidney function (Table 2).⁵ Using this classification of CKD, it should be easier to identify, evaluate, and manage patients with CKD.

■ **TABLE 1. Age, Gender, and Race Influence GFR**

Age	Gender	Ethnic Group	S _{Cr} (μmol/L)	eGFR (mL/min/1.73 m ²)	CKD Stage
20	M	B*	115	91	1
20	M	W†	115	75	2
55	M	W	115	61	2
20	F	W	115	56	3
55	F	B	115	55	3
50	F	W	115	46	3

S_{Cr} = serum creatinine; eGFR = estimated GFR *B = black; †W = all ethnic groups other than black

■ TABLE 2. Stages of CKD

Stage	Description	eGFR*	Action Plan
--	At increased risk for CKD	>60 (with risk factors for CKD)	Screening, reduction of risk factors for CKD
1	Kidney damage with normal or elevated GFR	90	Diagnosis and treatment, treatment of comorbid conditions, interventions to slow disease progression, reduction of risk factors for CVD†
2	Kidney damage with mildly decreased GFR	60 to 89	Estimation of disease progression
3	Moderately decreased GFR	30 to 59	Evaluation and treatment of disease complications
4	Severely decreased GFR	15 to 29	Preparation for kidney replacement therapy (i.e., dialysis, transplantation)
5	Kidney failure	<15 (or dialysis)	Kidney replacement therapy if uremia is present.

*mL/min/1.73 m² †CVD causes higher mortality than kidney failure in CKD patients

Adapted from Johnson *et al.*, 2004

How is eGFR Calculated?

In Ontario, the MDRD (Modification of Diet in Renal Disease) equation is used to calculate eGFR. The MDRD equation is the best and most thoroughly evaluated equation for estimating eGFR.^{2,5,6} Because the equation takes age and gender into account and the result is normalized to a standard body surface area, the normal range is the same for all patients, which simplifies interpretation of the results.

$$\text{eGFR}^\dagger = 186 \times (S_{Cr})^{1.154} \times (\text{Age})^{0.203} \times (0.702 \text{ if female}) \times 1.21 \text{ (if of African descent)}$$

†mL/min/1.73 m²

Online eGFR calculator

http://www.kidney.org/professionals/kdoqi/gfr_calculator.cfm

■ TABLE 3. Specific Intervention for Complications of CKD

Complication	Intervention	Target Goal
Diabetes	Glycemic control	Pre-prandial glucose 5.0-6.9 mmol/L A1C <7%
Hypertension	BP control	≤130/80 mmHg
Hyperphosphatemia	Dietary modification, phosphate binders*	Phosphate <1.5 mmol/L
Dyslipidemia	Maintain lipids to target	LDL-C <2.6 mmol/L TG <1.7 mmol/L HDL-C >1.0 mmol/L
Anemia	Reach hemoglobin goal	Hemoglobin 110-120 g/L

*Consult a dietician or nephrologist

My Patient's eGFR Is Low —What Do I Do Now?

Many conditions can cause transient reductions in eGFR, and many patients will show improvement or normalization of kidney function upon retesting. Therefore, no decision about investigation, treatment, or referral should be made on a single screening value. Always re-test.

As a family physician, you can manage patients with stable or slowly-progressing CKD. One of the first steps should be the development of a clinical action plan based on the patient's stage of renal disease (Table 1). Specific interventions for complications of CKD are given in Table 3.

When to Refer

- ▶ Acute renal failure
- ▶ eGFR <30mL/min
- ▶ eGFR decrease >5 mL/min/year
- ▶ Inability to reach treatment targets

Managing the CKD Patient

Managing patients with CKD will very likely involve managing comorbidities and risk factors.

Blood Pressure and Blood Sugar Control

Hypertension is a significant risk factor for CKD, and more than 70% of patients with stages 3 and 4 CKD have high blood pressure (BP). Patients with early stage CKD (stage 2) should be treated to a BP target of 130/80 mm Hg. ACE inhibitors or ARBs should be used for diabetic or nondiabetic kidney disease if the spot urine albumin to creatinine ratio (microalbuminuria) is >2.5 mg/mM, since clinical evidence suggests that these medications can slow down the progression of azotemia. Patients with proteinuria >1 g per day (>50 - 100 mg/mM of spot urine protein to creatinine ratio) should have their BP controlled to below 125/75 mm Hg.⁷ You should advise patients that they will likely need to take two or more medications to get their BP under control.

Albuminuria and Proteinuria

Albuminuria or proteinuria define CKD and influence treatment regimes, including BP targets. In patients with eGFR >90 mL/min, microalbuminuria >2.5 mg/mM or proteinuria (spot urine protein to creatinine ratio >20 mg/mM) over a period of three months define kidney damage and indicate underlying endothelial dysfunction. Patients with proteinuria >50 mg/mM probably have diabetic nephropathy or glomerular diseases and should be referred to a nephrologist, even if the eGFR is well preserved. Higher proteinuria indicates faster progression of renal failure and increases the risk for CVD. Strict BP control and the use of ACE inhibitors or ARBs are effective measures to use to retard the progression of azotemia in patients with high baseline proteinuria.

**CKD = GFR <60 mL/min
for 3 months**

Medication Management

- ▶ **Metformin:** avoid with significant renal insufficiency
- ▶ **NSAIDs:** avoid; may exacerbate renal insufficiency
- ▶ **Glyburide:** prolonged half-life; consider alternate or reduce dose
- ▶ **Allopurinol:** consider reducing dose
- ▶ **Diphosphonate:** contraindicated in advanced renal failure
- ▶ **IV contrast:** consider alternate imaging technique or prophylaxis

Hyperlipidemia

More CKD patients die of CVD than of renal failure. Stage 5 patients are almost 20 times more likely to die than stage 2 patients and have cardiovascular comorbidities that further increase the risk of death. Stage 4 patients still have a 15-fold higher mortality rate than stage 2 patients. Statin therapy is effective for the primary and secondary prevention of cardiovascular comorbidities common to patients with CKD.

Anemia

More than half of patients with stage 4 CKD have Hb <120 g/L. Treating anemia with recombinant erythropoietin will enhance the quality of life of these patients and may help reduce the symptoms of congestive heart failure. Refer patients with Hct <30 to a nephrologist to consider erythropoietin treatment.

Secondary Hyperparathyroidism

Hyperphosphatemia increases the mortality of CKD patients. Early treatment of secondary hyperparathyroidism will prevent renal osteodystrophy and retard arterial calcification.

Patient Adherence is Critical

The best therapy in the world will only work if the patient is adherent. You need to help your CKD patients understand that good adherence can help prevent or delay decline in kidney function and other adverse outcomes associated with CKD.

Patients need to know that good adherence reduces the likelihood that they will need dialysis, transplantation, or open heart surgery. It also greatly reduces their risk of stroke. In short, good adherence will afford them a better quality of life. You also need to ensure that patients are advised of programs that will allow them to access adequate financial resources for treatment.

Towards Patient Self-Management

As the primary care physician, you can help patients and families come to terms with the diagnosis and to learn about kidney disease. The ultimate goal for the patient is self-management, because people with CKD have better outcomes when they can take an active role in managing their condition.⁸ The second article in this issue of *Kidney Digest* focuses on patient empowerment and self-management.

Early detection and treatment can often prevent or delay some adverse outcomes of CKD

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CKD: Whose Disease Is It?

Denise LeBlanc, RN, BScN, MA (Ed), Patient Care Manager, Scarborough Regional Dialysis Program

Who is responsible for the management of chronic kidney disease (CKD)? The medical team? The patient? A little of both? Before we answer this, let's review a few facts about CKD and why it has become such an important health care issue.

CKD Is on the Rise

CKD is rapidly becoming one of the world's most significant health problems. An estimated 1.9 million Canadians suffer from CKD.¹ In the greater Toronto area (GTA), the number of patients with end stage renal disease (ESRD) is increasing at the rate of 12% per year. More than 2000 patients are currently enrolled in the Scarborough Regional Dialysis Program (SRDP) (Figure 1). The health care system as it currently exists is not equipped to handle this patient volume. In the first article in this issue, the reporting of eGFR values for the staging

of kidney disease was discussed. Ideally, such a system will decrease the number of referred patients with advanced kidney disease, particularly those requiring dialysis or transplantation.

CKD Is For Life

CKD is irreversible and progresses to ESRD if left untreated. Without appropriate long-term intervention, the outcome is often fatal. Mortality among dialysis patients is about 10% per year, and more patients with CKD die from cardiovascular disease than any other cause.²

CKD is life changing. Most patients are fearful and overwhelmed when they learn their kidneys are failing—especially if they have been asymptomatic—and that they will have to tailor their lifestyle to manage the disease. Medical, social, and emotional issues all impact on the patient with a chronic illness.³

Understandably, patients generally move through a grieving process after diagnosis and have to deal with their fear, anger, and depression.

Managing CKD

Optimal chronic care is possible when a prepared, proactive health care team interacts with an informed, activated patient.³ Therefore, CKD management has to be *shared* between the health care team and the patient. A good relationship between patients and their health care team is critical for success.

Managing CKD: The Multidisciplinary Health Care Team

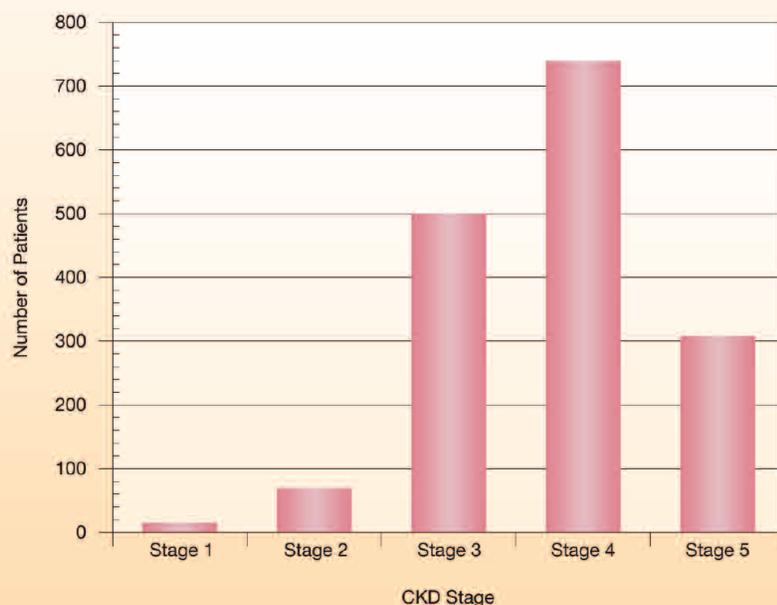
Although the primary responsibility for CKD management rests with the patient, the health care team—including nurses, nephrologists, the family physician, dietitians, pharmacists, and social workers—needs to be actively involved. All team members need to agree that patients must actively participate in managing their own disease.

Managing CKD: The Patient

Patients are the only ones who make the daily decisions about exercise, diet, and medication use that will help them remain as healthy as possible. Therefore, they need to be helped and encouraged to make the best decisions to manage their condition.

The new treatment paradigm involves developing a healthy patient–health care team relationship that concentrates on patient empowerment and patient self-education to help the patient develop self-efficacy.⁴ The process starts with patients learning about their disease, modifiable risk factors such as blood pressure and weight control, and the prescribed treatment with the assistance of their health care team.

■ FIGURE 1. Distribution of CKD Patients at SRDP by Stage of Illness*



*Includes only patients for whom GFR has been calculated

Source: SRDP database

Managing CKD: Patient Empowerment

Patient empowerment recognizes that while health care professionals are experts on the disease state, patients remain experts on their own lives. Patient empowerment encourages patients to manage their conditions and solve problems on their own with information—not orders—from their health care team. As power is transferred from the health care team to the patient, the patient's self-efficacy increases, and he or she feels more capable of accomplishing a given task.

In contrast to traditional disease management education—the “nuts and bolts” of the disease state—self-management education teaches problem solving skills. Patients learn how to identify problems as well as techniques to solve them and take appropriate actions. Self-management education complements, rather than replaces, traditional patient education.³

Key to the development of self-efficacy is the establishment of action plans, in cooperation with patients, that help give patients confidence in their ability to manage their disease. Success in following their action plans can motivate patients to achieve even greater success.³ Additionally, the chance for patients to maintain their lifestyles as closely as possible to normal can motivate them to learn about kidney disease and become active partners in their care.

When the patient becomes the principle illness manager, he or she is more apt to adhere to the prescribed therapy. When faced with making a decision about a treatment modality, the empowered patient is more able to make an informed decision in a timely manner.

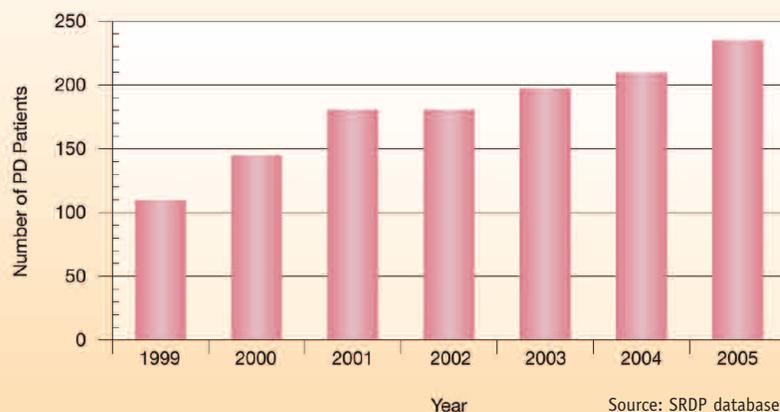
A Patient Empowerment Success Story: The Scarborough Regional Dialysis Program

The SRDP has been using the multidisciplinary team approach and disease self-management model since the program was formalized in 1998 and has become the largest home peritoneal

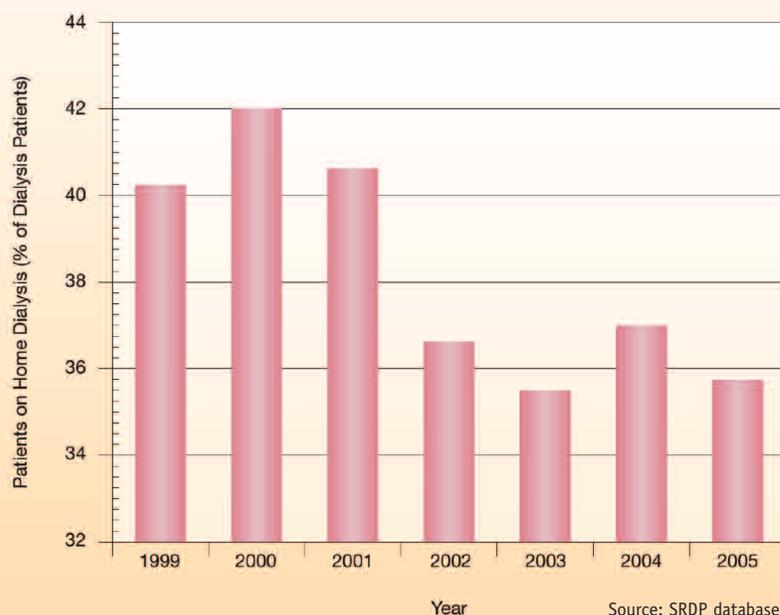
dialysis (PD) program in Canada. In Ontario, only 17% of CKD patients are on home PD. More than double this number (37%) of the total dialysis patient population in the SRDP are on home PD, and this number has been increasing steadily (Figure 2). Figure 3 shows that a significant proportion of dialysis

patients in the SRDP have opted to continue their treatment using home dialysis units. Clearly, SRDP's patients who have gained autonomy through self-management and have been empowered to make informed decisions wish to continue to do so by carrying out their treatment modality at home.

■ **FIGURE 2. SRDP Peritoneal Dialysis (PD) Patients**



■ **FIGURE 3. Percentage of Home Dialysis Patients**



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Patient Empowerment: A Success Story



Patient empowerment is not just a theory. Many empowered patients are doing very well with CKD. Brian Quinlan, a “graduate” of the SRDP, is one such patient.

Brian, a 43-year-old high-energy individual who has worked for a major gas company for the last 20 years, exudes a zest for life and has big plans for his future—despite the fact that he was diagnosed six years ago with CKD and received a new kidney two years ago. Brian exemplifies what a positive attitude, knowledge about his disease, and a remarkable health care team can mean for someone living with CKD.

Q How were you diagnosed with CKD?

During a routine physical to upgrade my driving license about six years ago, my GP found protein in my urine. After a nephrologist ran some tests, it turned out I had lost 60-80% of my kidney function.

Q Did you have any symptoms of CKD? What about risk factors?

Sometimes my hands would swell up like balloons. My doctor ran a lot of tests but nothing showed up until I went for my physical. I don't have diabetes and there is no family history of CKD. I had high blood pressure when I was 19 or 20, but it has been managed with medication ever since.

Q How long were you on dialysis?

I was on dialysis for four years before I got my new kidney. I was on PD for two years and then switched to overnight dialysis. My health care team was fantastic in getting me set up for this and my nurse was outstanding. She came to my house to train me on the machine.

Q Did you work through all of this?

Yes. My employer was extremely understanding and accommodating. They set me up with a room at work so I could do my PD. The only time I didn't work was for six months while I stabilized on dialysis, and for six months after I received my donor kidney. Other than that, I've worked every day since my diagnosis.

Q There must have been some tough times for you. How did you get through them?

Sure, there were days that were tough. Especially after my surgery, when I was in bed a lot. But you know, if you're serious about getting better, you need to set goals and tasks for yourself. I would wake up and make myself a goal, like “today, I'm going for a walk.” I needed to find something productive to do. Once I was walking, I might decide to go to the store to pick up the lottery tickets. Being able to set and achieve goals helped keep me going. And the walking was great exercise that helped with my recovery after surgery.

You know, I didn't do this all by myself. My wife, Lynn, stood by me through all of this. Her being there was really important in my recovery. And my medical team at Scarborough General. They saved my life, and they're the best team I know.

Q What advice would you give to CKD patients facing or currently on dialysis?

Listen to your team. They're there to help you, and they give you a ton of very important information. If you “play by the rules,” you can do very well. It's the patients that don't accept the power that is given to them that tend to do poorly. The health care team can't do it for you—you have to be in charge of your own treatment.

Brian hasn't let his CKD slow him down. He recently bought a Harley Davidson motorcycle and this summer he intends to ride the Cabot Trail.

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