

Management of chronic kidney disease and dialysis in homeless persons

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End-stage renal disease and dialysis are complicated illnesses to manage in homeless persons, who often suffer medical comorbidities, psychiatric disease, cognitive impairment and addictions; descriptions of this population and management strategies are lacking. A retrospective review of dialysis patients who were homeless or unstably housed was undertaken at an urban academic Canadian center from 2001 to 2011. Electronic hospital records were analyzed for demographic, housing, medical, and psychiatric history, dialysis history, adherence to treatment, and outcomes. Two detailed cases of homeless patients with chronic kidney disease are presented. Eleven homeless dialysis patients with a mean age of 52.7 ± 12.3 years, mostly men and mostly from minority groups were dialyzed for 41.1 ± 29.2 months. Most resided permanently in shelters, eventually obtained fistula access, and were adherent to dialysis schedules. Patients were often nonadherent to pre-dialysis management, resulting in emergency starts. Many barriers to care for homeless persons with end-stage kidney disease and on dialysis are identified, and management strategies are highlighted. Adherence is optimized with shelter-based health care and intensive team-oriented case management.

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INTRODUCTION

The number of patients with chronic kidney disease (CKD) who are homeless is not precisely known. In one cohort of homeless persons in Boston, the prevalence of CKD was 0.4% as defined by a serum Cr $\geq 177 \mu\text{mol/l}$ ($\geq 2.0 \text{ mg/dl}$).¹ The homeless are known to suffer from a higher burden of chronic disease than their housed counterparts,² and it is likely that the incidence of renal disease is also higher than in the general population if risk factor data are extrapolated, for example, hypertension is found in 20% and diabetes in 7–9%,^{2,3} and both are undertreated in homeless persons.^{4,5} Screening for renal disease is problematic, as many homeless persons do not receive regular medical care or have a family doctor⁶. Emergency care is often episodic and crisis-driven with difficulties in completing follow-up. Furthermore, CKD in the general population is frequently diagnosed during routine blood testing, and even housed patients are known to be under-referred for renal evaluation⁷; so it is likely that lab testing, referral and follow-up by specialists would be further hampered by poor social circumstances. Once reaching end-stage renal disease, the homeless are more likely to present in renal failure ‘ultra-late,’ requiring urgent and sub-optimal starts to dialysis.⁸ CKD is a strong risk factor for death in homeless persons, carrying a 18.4-fold greater risk for mortality.¹ The mortality risk after initiating dialysis is similarly higher in the homeless.⁸

Even after homeless patients with CKD or dialysis dependence are identified, care is seldom straightforward.⁹ Homeless persons are known to suffer additionally from psychiatric disease, cognitive impairment, drug and alcohol addiction, and often have mistrust of health-care providers.¹⁰ Circumstances may preclude adherence with therapy: affording and keeping track of medications and dosages is challenging, shelter food is heavily salted, dietary compliance is difficult,⁹ and judgment and executive function may be poor. The homeless often live in crisis environments and don’t understand the concepts of health promotion and illness prevention. Transportation to appointments and following a schedule can also be difficult to organize. Family supports are frequently lacking, and these patients often do not have the resilience to succeed on their own.

The Ottawa Inner City Health Project (ICHP) is a shelter-based health project for homeless individuals with complex health needs. The project includes shelter-based care units

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and a total of 122 beds, allowing homeless patients to live in-shelter; it employs support workers, nurses and a doctor to help patients manage medications, transportation, diet and hygiene.^{11–13} We present and characterize a case series of homeless persons with chronic and end-stage renal disease, some of whom were cared for at the ICHP. Specific challenges in caring for this population are identified, with proposed management solutions.

RESULTS

Eleven homeless patients with a mean age of 52 years, mostly men (82%) and mostly from minority groups (36% Black, 46% Aboriginal) were dialyzed for an average of 3 years (Table 1). Most patients resided permanently in shelters, and reasons contributing to homelessness included alcohol and drug addiction in five (crack, cocaine, marijuana and intravenous drugs not specified). Schizophrenia contributed to homelessness in one patient. Homelessness was also an issue in Aboriginal patients from northern Canada who were not able to obtain dialysis in their region and who were poor, unable to work or had no family or social support. Two further patients suffered dementia and poverty, and one patient arrived unstably housed as a refugee claimant. Apart from the need for dialysis, secondary medical diagnoses were seen in all patients. All of the patients had a suboptimal or 'crash' start to dialysis despite five having been known to nephrologists and followed for CKD beforehand. From the medical chart notes, it appeared that many were in denial regarding the severity of their renal disease.

Once on dialysis (Table 2), seven of the patients went on to obtain fistula access, however fraught with much rescheduling due to missed appointments. Adherence to dialysis, estimated by the number of skipped dialysis, and vascular access appointments revealed seven patients to be generally compliant, missing some appointments over the years, two were very compliant, and two missed sessions regularly and required emergency dialysis for pulmonary edema on several occasions. Adherence appeared to be facilitated when someone from the shelter could accompany the patient and stay with them for appointments or procedures such as angioplasty. Similarly, for one frequently absent dialysis patient, arrangements were made for a shelter worker to accompany him, and no further sessions were missed. The time of day for dialysis was also noted, and most of the patients chose to be dialyzed in the afternoon or evening. Transportation issues and paperwork appeared to occupy much of the social worker's time, and paratransit vans, buses, and taxis were used. One patient was noted to have periods of confusion and wandering after dialysis resulting in his missing paratransit rides, so arrangements were made for an orderly to escort the patient to a waiting spot, or for the patient to take a taxi back to the shelter.

Five of the dialysis patients were stable enough to be referred for renal transplantation, and two ultimately received a renal transplant, one from a cadaveric donor and

Table 1 | Patient characteristics at dialysis initiation

	N=11
<i>Age</i>	
Range	30–70
Mean (s.d.)	52.7 ± 12.3
<i>Sex</i>	
Male	9
<i>Race</i>	
Black	4
Caucasian	2
Aboriginal	5
<i>Housing</i>	
Homeless in shelter	7
Unstably housed	4
<i>Renal disease</i>	
Hypertensive	2
Diabetic	2
Glomerulonephritis	4
HIV nephropathy	1
Acute tubular necrosis	2
<i>Other diagnoses</i>	
Diabetes	5
Hypertension	9
HIV	2
Hepatitis C	3
Tuberculosis (active)	1
Ejection fraction < 50%	2
Schizophrenia or depression	4
Alcoholism	3
Drug addiction	4

Table 2 | Outcomes on dialysis

	N=11
<i>Months on dialysis</i>	
Range	0.25–91
Mean (s.d.)	41.1 ± 29.2
<i>Access</i>	
Fistula	7
Catheter	4
Followed in pre-dialysis clinic	5
Crash/suboptimal dialysis start	10
<i>Renal transplant</i>	
Evaluated for transplant	5
Not evaluated/suitable	6
<i>Outcomes</i>	
Prevalent– on dialysis	5
Renal function recovery	1
Transplanted	2
Moved	1
Died	2

one from a living anonymous donor. Five patients were not suitable for renal transplantation and the reasons were in keeping with current selection criteria, including active tuberculosis, addictions, overall poor health, and insufficient adherence to medication or treatment.

Patient behavioral issues hampered care in a few patients; these included anger, agitation, dementia, aggression, and patients arriving at the emergency room with drug intoxication. Charting indicated patience and conciliation on the part of the staff, and as months on dialysis progressed, problems appeared to lessen or resolve in most cases.

Two patients in this cohort died; a young man with severe drug addiction and routine nonadherence to dialysis collapsed at the shelter; cause of death was surmised to be hyperkalemia from missed dialysis or cardiac arrest due to known severe dilated cardiomyopathy. The second patient had many comorbidities, developed pneumonia, and elected to stop dialysis, dying in the palliative care hospice for homeless persons.¹²

CASE 1—CKD PROGRESSING TO DIALYSIS AND RENAL TRANSPLANTATION

A 36-year-old homeless man with paranoid schizophrenia presented with proteinuria, hematuria, and Cr 170 $\mu\text{mol/l}$ (1.92 mg/dl). He was lost to follow-up and 2 years later returned with anasarca, proteinuria of 13.5 g/day and Cr 390 $\mu\text{mol/l}$ (4.4 mg/dl), but declined renal biopsy. A year later he was brought to a hospital with uremic encephalopathy and was urgently started on thrice-weekly hemodialysis via a permcath. He was then referred and housed at the Salvation Army, in a 'convalescent' bed of the Inner City Health Project¹¹, and the support workers were educated in chronic hemodialysis, complications of a tunneled vascular access catheter, fluid management, diet and medications. Communication was established between the dialysis unit and the ICHP. The patient was compliant with medications (rocalrol, atorvastatin, ramipril, CaCO_3 and vitamins B + C), which were administered to the patient by the shelter staff. Blood pressure was well-controlled 130/70 mm Hg, interdialytic weight gain averaged ~ 2 kg, hemoglobin on an erythrocyte-stimulating agent increased from 86 to 120 g/l, albumin from 27 to 36 g/l, and calcium and phosphate control were adequate. Creation of an arteriovenous (AV) fistula was complicated by the patient's mental illness, and episodes of paranoia resulted in refusal of surgery on three occasions. Case-based management and communication between the ICHP staff, the patient, and the vascular access coordinator resulted in successful AV fistula surgery. Missed and late appointments to dialysis were communicated to the ICHP worker, physician or nurse. The patient had an episode of violent behavior, threatening to harm his mother with a knife and was brought to hospital by police, and admitted under psychiatry. He was stabilized with long-acting haloperidol, and under Community Treatment Order was discharged with the requirement to comply with antipsychotic treatment. His psychiatric disease was stabilized and he remains on medication. Four years after starting dialysis, he was housed in a group home, and was worked up for renal transplantation. He was felt to be a suitable candidate as he was in stable health, suffered no addictions, and was adherent to dialysis and medication. He received a cadaveric kidney

transplant the following year. He is managed on tacrolimus, mycophenolate and prednisone, and continues to do well 5 years after transplant, with a Cr of 155 $\mu\text{mol/l}$ (1.76 mg/dl).

CASE 2—CKD IN A HOMELESS ALCOHOLIC WOMAN

A 53-year-old Aboriginal woman with a history of chronic alcoholism presented with urosepsis and acute kidney injury requiring intensive care and urgent hemodialysis. She subsequently recovered renal function and 3 years later was hospitalized with acute pancreatitis and acute kidney injury, again requiring urgent intermittent hemodialysis. She partially recovered renal function and is followed for hypertension and CKD (creatinine clearance 27 ml/min). Her alcoholism is managed within the ICHP Managed Alcohol Program,¹³ and her medications prepared and administered by shelter staff. Blood pressure is checked and regular blood work procured at the shelter by an ICHP nurse, and she is followed in the progressive renal insufficiency clinic by a nephrologist. She is accompanied to clinic appointments by shelter staff, and is administered benzodiazepines before appointments, to avoid alcohol withdrawal symptoms.

DISCUSSION

We describe the course and the potential barriers to management of homeless patients with CKD and on dialysis treatment. Our study has limitations; this is a cohort of homeless patients known to nephrology and ICHP staff, but omits homeless persons with CKD who are undiagnosed in the community, or who are followed by other physicians.

The provision of housing is tantamount to improving health care in homeless persons. In doing so, relationships with social or caseworkers are established, and entitlements such as a health card, drug card, and transportation can be arranged, and rebates for nutritional support usually require a fixed address. However, housing is often not available or possible for a given homeless patient.

When a patient is not housed, shelter-based health-care services can effectively bring services to the homeless in a patient-centered team-based collaborative practice (Table 3). Shelters are generally moving beyond the model of providing only food and shelter, and health and social services may be available to shelter clients, providing an opportunity for the hospital social worker to connect with the social or caseworkers associated with the dwelling(s) of the homeless person.

Adherence to treatment and scheduling from a patient perspective can be facilitated by liaison between the hospital and shelter (Table 3). Appointments and dialysis transportation can be arranged by communication with shelter administrators. Many shelters have vans, which can be recruited for patient transfer for hospital appointments or dialysis. In this cohort, it appeared that patients were far more likely to attend appointments if they were accompanied by shelter staff, a volunteer, or a friend from the shelter. Shelters can also help with administration of medication, and

Table 3 | Strategies to improve adherence to appointments, dialysis and therapy

Issue	Management strategy
Medication adherence	Use long-acting preparations of antihypertensives, e.g., atenolol, bisoprolol, long-acting ACEI or ARBs; dispense medications and administer after dialysis Treat infections with IV after dialysis (rather than outpatient p.o.) using long-acting antibiotics, e.g., cefazolin Fax prescriptions to pharmacy and have delivered to shelter, have shelter store and administer medications
Clinic appointments	Arrange for patient to be accompanied by shelter volunteer or family member See homeless patients as soon as they arrive in waiting room; do not make them wait (see text)
Missing appointments	Involve hospital and shelter social workers early in end-stage renal disease and for vascular access Arrange for patient to be accompanied by a shelter volunteer, family or friend, especially for vascular access appointments or procedures Always reschedule missed appointments
Contact information	Identify and write all possible shelter numbers in chart, as well as number for case worker and family/friends Obtain Medic Alert bracelet for patient
Denial of end-stage kidney disease	Schedule frequent visits Establish therapeutic alliance with patient, improve understanding, explain treatments. Explain slowing of disease by adherence to antihypertensives Have a nurse to obtain blood pressures and bloodwork in shelter where possible and fax results to ordering physician Always have volunteer or family member accompany patient to appointments
Late to dialysis	Schedule dialysis for last shift Early involvement of social work to help with transportation Explain expectations to patient
Difficult or disruptive patients	Use nonjudgmental approach, establish mutual respect Educate patient in terms comprehensible to patient Negotiate behavior contract; abuse not to be tolerated See also Hashmi and Moss ¹⁴ , Johnson <i>et al.</i> ¹⁵
Alcohol addiction	Pre treat with benzodiazepines before appointments or dialysis to prevent withdrawal
Pain syndromes	Use nonopiates (acetaminophen), coanalgesics (gabapentin, amitriptyline) (see text) Use IV opiates on dialysis as per guidelines For p.o. prescriptions, chose long-acting meds over short-acting; less chance of diversion for sale Treat anxiety, depression as these often present as pain syndromes Beware of codeine nonmetabolizers, especially Aboriginal population
Diet adherence	Team approach, involve shelter, see Holley <i>et al.</i> ⁹

prescriptions faxed to a single designated pharmacy, delivered to the shelter, and then kept in a safe location and administered on-site; this was part of the services provided by the ICHP. In the case of patients with CKD not on dialysis, regular lab work may be done at the shelter by visiting nurses and results sent to the attending nephrologist. Education of the patient and shelter workers regarding diet and fluid restriction can continue to reinforce what has been explained to the patient in hospital.⁹ Established shelter-based health care such as the ICHP may not be available in every city; however the creation of routines and relationships between hospital and shelter may greatly improve adherence to therapy and the outcomes of these patients.

As health-care providers, nephrologists and the entire multidisciplinary team must attempt to establish compassionate, nonjudgmental relationships with the patient. The nurses and doctors may self-select with regard to their ability to form a trusting therapeutic relationship with a given patient. Understanding that homeless patients often have families and had careers before their first mental breakdown is helpful in appreciating a patient's circumstances. Asking patients what they hope for themselves is also useful information for the clinician; most homeless persons don't have a long-term vision, addictions make patients short sighted, and cognitive deficits, fetal alcohol syndrome, or attention deficit disorder may also be present.

Many homeless persons find it difficult to attend morning clinics or dialysis shifts due to day-night sleep reversal, so when possible, afternoon appointments should be offered. Owing to addictions and the possibility of drug withdrawal symptoms while awaiting appointments (and then the patient leaving), as well as the common feelings the homeless have of alienation at a hospital,¹⁰ it is good practice to be mindful in seeing these patients as soon as they arrive in the waiting room, even if they are late. These patients often lack insight as part of the constellation of diseases they have and circumstances that they are in, and arriving at an appointment and then leaving without being seen benefits no one, as crucial care opportunities may be lost. As noted by others, mere nonadherence must not lead to denial of treatment by a physician.¹⁴ Similarly, if patients attend clinic drunk or high, it is important to remember that their addiction is a disease, and provided that they are not disruptive, to still try to assess the patient with CKD, to obtain their blood work and to arrange follow-up. As health-care providers, we have the responsibility to provide care that is considered to be the best for our patients. Here, providing care in an integrated care model linked to supportive housing was considered to be effective, and while not evaluated in the setting of CKD, the program in general was shown to save costs when compared with traditional approaches.¹¹⁻¹³

Patients in this series were generally cooperative and not abusive, however noncompliant and disruptive behavior did occur. Various strategies for dealing with such behavior when it occurs have been described for dialysis patients,^{14,15} and include taking a nonjudgmental approach, identifying goals for treatment and using behavior contracts (Table 3).

Five patients were followed for end-stage renal disease in this series, yet still had a 'crash start' to dialysis, arriving uremic to the emergency room and requiring urgent temporary access placement. It appeared that denial of disease and lack of insight were significant factors in access and dialysis planning. It is possible that more frequent clinic visits, early social work intervention, and enlisting a companion or volunteer to accompany the patient to the appointments may be effective. The ICHP provided shelter workers as 'surrogate family members' in this context, which greatly aided compliance in general.

Medication adherence on dialysis can be improved by using intravenous medications, while on dialysis wherever possible, such as vitamin D, vitamin B12, erythropoietin and iron. Renally cleared antibiotics given thrice weekly on dialysis ensures compliance. Hypertension was effectively managed using thrice weekly long-acting agents such as atenolol or perindopril, which were provided to patients from the hospital pharmacy at the end of dialysis sessions.

Addiction to alcohol is very common in the homeless, and withdrawal symptoms can begin within hours of cessation of drinking. Dialysis effectively removes alcohol, and addiction to alcohol will need to be assessed, as benzodiazepine administration in adequate doses at the beginning of dialysis may be a logical step to prevent alcohol withdrawal symptoms in alcoholic patients. Dose titration of the benzodiazepine to blood pressure, heart rate and subjective symptoms of restlessness or anxiety are reasonable treatment goals, and depending on the severity of alcohol addiction, some patients may require larger doses than usual of diazepam, lorazepam, or chlorthalidone. Prescription of alcohol while on dialysis may also be considered.

Many homeless persons have chronic pain syndromes, often due to trauma, and should be treated in keeping with established guidelines. Anxiety and depression also frequently present as pain, and also must be addressed. Coanalgesics, such as gabapentin and amitriptyline, may help reduce opiate doses. If pain is severe, intravenous opiates are convenient to use on dialysis. Codeine analgesia is due to its metabolism to morphine by the enzyme CYP2D6, which has significant genetic variation in activity and is known to be reduced in several populations including Aborigines¹⁶. Homeless persons may request outpatient prescriptions for opiates and it is reasonable to consider provision of prescriptions on a case-by-case basis; however diversion of medication for sale on the street is a risk. Percocet (oxycodone) and Dilaudid (hydromorphone) are rapidly acting analgesics, which are known to have high street value, and we would advise against providing prescriptions for these medications. Long-acting preparations are less likely to produce euphoria, and are preferable.

The patient should ideally have only one prescriber for opiates, whether it is a nephrologist or a physician in the community. Prescriptions should be faxed directly to the pharmacy and kept there for daily or weekly dispensing, or should be stored in a locked area of the shelter, and dispensed by staff.

Psychiatric illness, particularly affective disorders and anxiety is common in the homeless, and long-term connection with a dialysis unit may provide an opportunity for the patient to obtain psychiatric assessment and treatment. It may also be feasible to administer injectable long-acting antipsychotics in the dialysis unit as part of the psychiatric care plan.

Unified record keeping is often difficult, with patients accessing multiple emergency rooms and health-care providers. Patients in the ICHP were cared for in the shelters and charting accomplished with an electronic health record linked to the hospital system. While ideal, this unfortunately is not routine in most centers. Several of the patients were provided with Medic Alert bracelets to identify caregivers/hospital of care and to provide basic medical history information. These can be inscribed with the patient's diagnoses and the name and number for the hospital providing dialysis care.

Renal transplantation has not been previously described in the homeless, and was accomplished successfully in two of the patients in this series. Selection criteria were the same as in the general population, with consideration of physical and psychological stability.¹⁷ Both patients were free of addiction throughout their time on dialysis, and both were housed in boarding homes by the time of transplant surgery.

In conclusion, for homeless patients with CKD on dialysis treatment, intensive case-based management strategies are needed to optimize patient care. Shelter operators, having already demonstrated competence in caring for the homeless, should be integrated into the care model. Future research would be aided by a database of homeless persons with chronic diseases, to quantify disease burden and improve management in this growing population, and models of shelter-based health-care delivery to homeless persons, such as the ICHP, are also important areas for future research.

MATERIALS AND METHODS

A retrospective chart review was performed of all homeless or unstably housed dialysis patients at the Ottawa Hospital, Ottawa Canada between 2001 and 2011. Patients were identified by recall of nephrologists at the Ottawa Hospital, and physicians and nurses at the ICHP. Patients were considered homeless if they lived exclusively in the shelter system and were considered unstably housed if they lived part of the time in the shelter system during their time on dialysis. Electronic hospital and dialysis records, as well as the ICHP electronic records were analyzed for demographic, housing, medical and psychiatric history, dialysis history, vascular access information, adherence to treatment, and long-term outcomes of dialysis modality, transplant or death. Pre-dialysis records were also reviewed. Two detailed cases are presented to highlight issues arising in homeless patients with end-stage renal disease who

go on to require dialysis. Ethics approval was obtained from the institution's research ethics board.

DISCLOSURE

JT has received consulting fees from Corrections Services Canada and Canadian Medical Association. TP declared no competing interests.

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