# Increasing Rates of Kidney Failure Care in Canada Strains Demand for Kidney Donors

Michael Terner, Noura Redding and Juliana Wu


## Abstract

**The number of patients with kidney failure is on the rise in Canada, leading to a higher need for dialysis treatment and greater demand for kidney transplants, which have superior patient outcomes and lower healthcare system costs than dialysis treatments. This study examines the incidence and prevalence of kidney failure and renal replacement therapies between 2005 and 2014. The number of patients on dialysis has increased by 31% over this decade. The number of annual kidney transplants performed has also increased along with the waiting list for a kidney transplant, resulting in a persistent 2.5 times gap between patients on a waiting list for a kidney and the number of kidney transplants performed. New programs to increase organ donation to kidney failure patients have led to improvements, but have not been able to close this gap. Continued innovations are needed to preserve kidney function for patients with chronic kidney disease and to promote and increase donation rates in Canada to improve the quality of life and survival of thousands of patients, as well as save hundreds of millions of dollars to healthcare systems in Canada.**


## Introduction

Kidneys are responsible for a variety of bodily functions, including removing waste from the blood, regulating water and mineral levels, and producing hormones. End-stage kidney disease, or kidney failure, takes place when there is little to no kidney function without renal replacement therapy, i.e., either dialysis or a kidney transplant. A kidney transplant is the optimal form of therapy for patients eligible to receive a transplant because of its association with better patient outcomes, improved survival and lower costs to the healthcare system.

The Canadian Organ Replacement Register (CORR) – a pan-Canadian information system for organ failure – collects data from hospital dialysis centres, regional transplant programs and organ procurement organizations. Using CORR data, this article presents 10-year trends on end-stage kidney disease and renal replacement therapies. A better understanding of the prevalence of kidney failure is important in improving donation policies and, ultimately, the quality of life of patients living with this condition.

## Data and Methods

Data submitted to the CORR database at the Canadian Institute for Health Information (CIHI) was used to calculate incidence and prevalence rates of patients with end-stage kidney disease, who received either dialysis or a kidney transplant. The number of deceased and living donors, as well as the number of kidney transplants performed compared with the number of patients on the waiting list, was also analyzed. The data included in this article spanned a decade, from 2005 to 2014, and included all Canadian provinces and territories (except Quebec, due to under-reporting between 2011 and 2014). Rates were calculated using the Statistics Canada published population estimates.

## Findings

In Canada, the number of patients with kidney failure starting dialysis (referred to as "incidence patients") increased steadily between 2005 and 2014, rising from 4,244 patients (172 rate per million) in 2005 to 5,269 patients (193 rate per million) in 2014 (Table 1). The age group that has been the largest driver of this increase is the 45–64 age cohort,

which had a 37% increase over the 10-year period. Patient survival up to five years has also been increasing slightly from 41.4% in 2005 to 43.2% in 2009. With the increase in incidence and survival of dialysis patients, it is not surprising that the total number of patients on dialysis (referred to as "prevalence patients") has increased from 15,827 patients (642 rate per million) in 2005 to 20,690 patients (757 rate per million) in 2014. Dialysis is a very costly treatment; the total annual cost to care for a patient on dialysis ranges from $56,000 to $107,000 depending on the type (referred to as "modality") of dialysis treatment (Klarenbach et al. 2014). Using published dialysis costs estimates as well as expenditure and dialysis statistics from 2014 (CIHI 2015, 2016), expenditures for dialysis treatments for the prevalence population total approximately $1.9 billion or 1.1% of total health expenditures in Canada (excluding Quebec).

**TABLE 1.**
**Ten-year incidence and prevalence of dialysis in Canada (excluding Quebec), by year and patient characteristic**

| Characteristics | 2005 | 2014 | 10-year change |
|---|---|---|---|
| **Incidence of dialysis** | | | |
| Number of patients (RPMP)* | 4,244 (172) | 5,269 (192.8) | 24% (12%) |
| Age 0–19 | 84 (13.7) | 61 (9.9) | −27% (−28%) |
| Age 20–44 | 514 (56.7) | 591 (62.9) | 15% (11%) |
| Age 45–64 | 1,337 (211.4) | 1,835 (240.6) | 37% (14%) |
| Age 65–74 | 1,090 (653.4) | 1,345 (573.7) | 23% (−12%) |
| Age 75+ | 1,219 (810.6) | 1,437 (783.3) | 18% (−3%) |
| Dialysis modality, *N* | | | |
| HD | 3,260 | 4,069 | 25% |
| PD | 855 | 1,047 | 22% |
| **Prevalence of dialysis** | | | |
| Number of patients (RPMP) | 15,827 (641.5) | 20,690 (757.1) | 31% (18%) |
| Dialysis modality, *N* | | | |
| HD | 12,732 | 16,746 | 32% |
| PD | 3,095 | 3,944 | 27% |

RPMP = rate per million population; HD = haemodialysis; PD = peritoneal dialysis.
Source: Canadian Organ Replacement Register, 2015, Canadian Institute for Health Information.

Dialysis is an expensive treatment with poor patient outcomes and significant impacts on quality of life (CIHI 2016; Klarenbach et al. 2014; Landreneau et al. 2010). An alternate treatment for patients with kidney failure is to receive a kidney transplant. Kidney transplants have much better patient outcomes than dialysis (CIHI 2016). In 2014, 81% and 91% of kidneys (from deceased and living donors, respectively) were still functioning after five years. The costs over time to the healthcare system of a kidney transplant are also significantly lower than dialysis; the one-year cost of a kidney transplant is approximately $100,000 (including both donor and recipient costs), with follow-up treatment costs to the transplant recipient of approximately $20,000 per year (Barnieh et al. 2011); this is significantly lower over time than the approximate $100,000 per year patient costs of an in-centre haemodialysis patient (the most common dialysis treatment in Canada) (Klarenbach et al. 2014).

A major limiting factor for kidney transplants is the availability of organ donors. Canada has similar numbers of deceased and living donors, though a deceased donor can donate both kidneys. The number of deceased-donor kidney transplants has increased steadily by 54% over the past 10 years, from 242 in 2005 to 373 in 2014; whereas, the increase in the number of living-donor kidney transplants has been much smaller (6%) (Figure 1). The demand for kidneys can be estimated from eligible patients on waiting lists. In 2014, there were 2,665 Canadians (excluding Quebec) waiting for a kidney – an increase of 630 since 2005 (Figure 2). Even though the number of transplants performed has increased steadily over these 10 years, there is still an approximate 2.5 times differential between the number of transplants performed and the number of patients on a waiting list. This gap has been persistent over the decade (Figure 2). The result is that the median time that a patient is on dialysis before receiving a first kidney transplant from a deceased donor is four years (excluding patients that received a transplant before starting dialysis). Given the low survival numbers for patients on dialysis, this is a very long time to wait. Between 2005 and 2014, 714 patients died while waiting for a kidney.

**FIGURE 1.**
**Number of kidney transplant organ donors by donor type, Canada (excluding Quebec), 2005–2014**

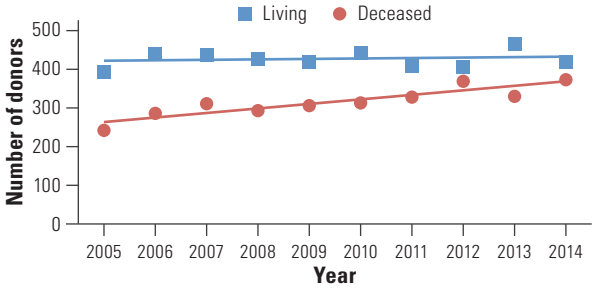
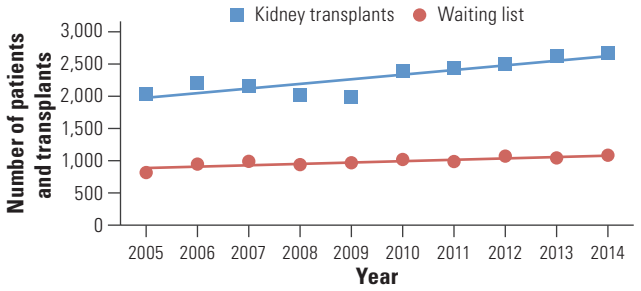


**FIGURE 2.**
**Number of kidney transplants performed and patients on waiting list on December 31, Canada (excluding Quebec), 2005–2014**




## Discussion and Conclusion

Kidney failure rates are on the rise in Canada. More patients with kidney failure have led to an increased demand for renal replacement therapies. Kidney transplantation is a superior treatment option for patients than dialysis treatments (CIHI 2016; Landreneau et al. 2010); however, increases in the number of transplants performed have not kept pace with demand. Increases in the number of deceased donors over the past 10 years are a positive sign, but the number of living donors has been stagnant.

Efforts to increase organ donation from living donors (for example, the creation of the kidney paired donation program) have shown success, but have not significantly increased the overall living donor rate in Canada. For strategies that could be implemented to improve donation rates, Canada can learn from other countries that have had success in increasing donation rates (e.g., Spain). Pursuing policies and practices that could increase donation – for example, increasing organ donations from cardiac death patients, allowing older organ donors and improving the conversion of potential donors to become actual donors (CIHI 2014) – could help improve the survivability and quality of life of the thousands of patients waiting for a kidney, and could save hundreds of millions of dollars to healthcare systems in Canada. HQ

## References

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## About the Authors

**Michael Terner**, MSc, is a program lead for the CORR at CIHI. He has previously worked as a medical writer in the clinical research industry and as a researcher at several federal government agencies.

**Noura Redding**, MSc, is a coordinator for the CORR at CIHI. She is responsible for providing support to analytical projects and reports.

**Juliana Wu**, BA, is a manager for the CORR at CIHI. She has over 10 years of management and analytic experience working with Canadian health data holdings and registries, and in decision support services.