Body size, not sex, is responsible for differences in type of dialysis

Christine Florakas, BSc, MD; Marshall Godwin, MD; Ross Morton, MD; Ruth Wilson, MD; Edwin Toffelmire, MD

See related article page 828

The treatment of end-stage renal disease differs, depending on whether the patient is a man or a woman.[1,2] We previously reported that the type of long-term dialysis differs between men and women.[3] When we analysed data from the Canadian Organ Replacement Registry (CORR) for the period 1981–1991, we found that men were more likely than women to receive hemodialysis.[3] During that period CORR did not collect reliable data on weight and height. We now have CORR data for 1993 and 1994, which include height and weight.

We were interested in whether differences in weight or body surface area between men and women could explain the differences we found in the allocation of dialysis treatments. Estimates of body size are used to determine the fill volume for the peritoneal dialysate.[4–6] A large fill volume makes peritoneal dialysis less tolerable. It is possible that the apparent difference between sexes found previously was related to the nephrologists' estimate of the patients' size and thus the appropriateness of peritoneal dialysis. Women tend to have lower weight and smaller body surface area than men, and this difference in body size might explain our previous observation.

All patients with chronic end-stage renal disease registered with CORR whose treatment began in 1993 and 1994 and who were being treated with peritoneal dialysis or hemodialysis 3 months after the diagnosis of end-stage renal disease were included in our analysis. Three months is the time at which it is thought that a patient's condition will have stabilized with the initial form of therapy. As in our previous study,[3] continuous ambulatory peritoneal dialysis, continuous–cyclic peritoneal dialysis and intermittent peritoneal dialysis were combined as a single category, called peritoneal dialysis, and home-care, hospital and self-administered hemodialysis were grouped as hemodialysis. Body surface area was calculated with the Dubois formula.[6]

Complete data were obtained from CORR for 4467 new patients, who were registered in 1993 and 1994. Of these, 2484 (55.6%) were undergoing hemodialysis and 1983 (44.4%) peritoneal dialysis. There were 2628 men (58.8%) and 1839 women (41.2%). Table 1 shows the cross tabulation of sex as a function of type of dialysis. The type of dialysis offered was significantly associated with sex, men being more likely than women to undergo hemodialysis (unadjusted odds ratio [OR] 1.18 [95% confidence interval 1.06–1.34], $p = 0.006$).

The mean age of the men (58.9 years) was not significantly different from that of the women (58.1 years). Men were significantly heavier than women (mean weight 72.3 v. 62.1 kg) (Student's t-test, $p < 0.001$). In addition, the men had significantly greater mean body surface area than the women (1.82 v. 1.62 m^2, $p < 0.001$).

Logistic regression, with type of dialysis (hemodialysis or peritoneal dialysis) as the dependent variable and sex, weight and body surface area as independent variables, showed that the type of dialysis was not independently associated with sex (adjusted OR 1.09 [95% CI 0.95–1.24], $p = 0.20$). Body surface area was also not associated with type of dialysis (OR 0.86 [95% CI 0.53–1.40], $p = 0.20$). However, the weight of the patient was associated with type of dialysis (OR per kilogram of body weight 1.01 [95% CI 1.007–1.020], $p = 0.001$).

When we controlled for weight and body surface area,

Table 1: Type of dialysis, by sex, for 4467 patients who entered the Canadian Organ Replacement Registry in 1993 and 1994

	Type of dialysis; no. (and %) of patients		
Sex	Hemodialysis	Peritoneal dialysis	Total
Female	978 (53.2)	861 (46.8)	1839 (41.2)
Male	1506 (57.3)	1122 (42.7)	2628 (58.8)
Total	2484 (55.6)	1983 (44.4)	4467 (100.0)

Note: Percentages given for the first 2 rows of the columns headed "hemodialysis" and "peritoneal dialysis" relate to the total number of women and men respectively; percentages given for the column and row headed "total" relate to the total number of patients.

the apparent differences in treatment for men and women with end-stage renal disease disappeared. These results suggest that when nephrologists make decisions about the form of dialysis most appropriate for a patient, they take into account the patient's body size rather than his or her sex and are likely to recommend that larger patients undergo hemodialysis.

At the time the study was conducted, Dr. Florakas was a third-year medical student at Queen's University, Kingston, Ont.; she is now a second-year resident in family medicine, McGill University, Montreal, Que. Drs. Godwin, Morton and Toffelmire are Associate Professors and Dr. Wilson is Professor and Head of Family Medicine, Queen's University, Kingston, Ont.

The assistance of the Canadian Organ Replacement Register (CORR) in supplying the data for this study is gratefully acknowledged. However, the interpretation and reporting of these data are the responsibility of the authors and should in no way be seen as an official policy or interpretation of CORR.

Competing interests: None declared.

References

1. Kjellstrand C. Age, sex and race inequality in renal transplantation. *Arch Intern Med* 1988;148:1305-9.
2. Kjellstrand C, Logan G. Racial, sexual and age inequalities in chronic dialysis. *Nephron* 1987;45:257-63.
3. Florakas C, Wilson R, Toffelmire E, Godwin M, Morton R. Differences in the treatment of male and female patients with end-stage renal disease. *CMAJ* 1994;151(9):1283-8.
4. Diaz-Alvarenga A, Abasta-Jimenez M, Braba B, Gamba G, Correa-Rotter R. Serum albumin and body surface area are the strongest predictors of peritoneal transport type. *Adv Perit Dial* 1994;10:47-51.
5. Keshaviah P, Emerson PF, Vonesh EF, Brandes JC. Relationship between body size, fill volume, and mass transfer area coefficient in peritoneal dialysis. *J Am Soc Nephrol* 1994;4(10):1820-6.
6. DuBois D, DuBois EF. Clinical calorimetry: a formula to estimate the approximate surface area if height and weight be known. *Arch Intern Med* 1916;17:836-71.

Reprint requests to: *Dr. Marshall Godwin, Department of Family Medicine, 220 Bagot St., PO Bag 8888, Kingston ON K7L 5E9; fax 613 544-9899; godwinm@post.queensu.ca*