Clin Transplant 2008: 22: 405–410 DOI: 10.1111/j.1399-0012.2008.00797.x

Clinical Transplantation

Predictors of employment after successful kidney transplantation – a population-based study

Bohlke M, Marini SS, Gomes RH, Terhorst L, Rocha M, Poli de Figueiredo CE, Sesso R, Irigoyen MC. Predictors of employment after successful kidney transplantation – a population-based study. Clin Transplant 2008: 22: 405–410. © 2008 Wiley Periodicals, Inc.

Abstract: Introduction: Kidney transplantation is currently the treatment of choice for end-stage renal disease. As the successful transplantation improves the physical and mental quality of life, it is expected that the transplant recipient should play a productive role in the society. The present study evaluates the occurrence and predictors of employment after kidney transplantation.
Methods: Population-based cross-sectional study in which 272 adult kidney recipients assisted in a Brazilian Southern state were evaluated.
Results: At the moment of the interview, 29% of the patients were employed. After analysis with logistic regression, the predictors of employment were male sex (OR 4.04; 95% CI 1.99–8.23), pre-transplant employment for non-diabetic (OR 4.35; 95% CI 3.79–4.99), diabetes for individuals who worked while on dialysis (OR 0.06; 95% CI 0.008–0.5), high educational level for individuals with mental quality of life scores above the 25th percentile (OR 3.06; 95% CI 2.98–3.14 for 50th percentile of mental quality of life). The Hosmer–Lemeshow test was of 3.33 ($p = 0.91$).
Conclusion: The participation of the kidney transplant recipients with functioning graft into the work force in the Brazilian state of Rio Grande do Sul is low, being predicted mainly by sociodemographic factors. It was not detected any influence of patient perception of his/her physical conditions or other clinical variables, except for the presence of diabetes.

Maristela Bohlke[a,b], Stela Scaglioni Marini[b], Rafael Hissé Gomes[b], Lisoneide Terhorst[b], Marcos Rocha[b], Carlos Eduardo Poli de Figueiredo[d], Ricardo Sesso[a], Maria Claudia Irigoyen[a,c]

[a]Postgraduation Program in Nephrology, Federal University of São Paulo, São Paulo, Brazil, [b]School of Medicine, São Francisco de Paula Hospital, Catholic University of Pelotas, Pelotas, Brazil, [c]Hypertension Unit of INCOR, FMUSP, São Paulo, Brazil and [d]Postgraduation Program in Clinical Medicine -- Nephrology, São Lucas Hospital, Pontific Catholic University of Rio Grande do Sul, Rio Grande do Sul, Brazil

Key words: employment – kidney transplantation – population-based – predictors

Corresponding author: Maristela Bohlke, Rua Canoas, 1054 – Laranjal, Pelotas – Rio Grande do Sul, CEP 96090-130 – Brazil. Tel/Fax: +55 53 32293865; e-mail: mbohlke@conesul.com.br

Accepted for publication 29 November 2007

Kidney transplantation is currently the treatment of choice for end-stage renal disease. Besides the advantages in terms of survival (1), transplantation is more cost-effective (2–4) and provides a better quality of life (3–5) when compared with dialysis.

The current literature diverges, however, about the degree of rehabilitation obtained with kidney transplantation. Most studies indicate an increase in the rate of employment after transplantation (6, 7), but the described percentage of patients who work has a wide variation, between 18% and 82% (8). Certainly this variation is due in large extent to the heterogeneous nature of the populations observed and the use of different definitions of employment. Some studies include housewives and students as if they were employed (6, 8, 9), while others do not describe the classification of these individuals. Certain data include only subpopulations to which different levels of employment are attributed as, for example, only men (10) or diabetic patients.

According to a systematic review recently published, most available studies concerning the issue lack sufficient internal and external validities (8). There is no report of population-based study with random sampling regarding employment after kidney transplantation.

There are few studies evaluating predictors of employment after kidney transplantation. Most publications describe pre-transplant work as a positive predictor for employment after transplantation (6, 7, 11). Concerning other predictors, the results are conflicting. Some authors associate younger age, white race and male sex with a higher occupation rate (7), while others describe lower percentages of reintegration to the work market among diabetic subjects (6). The present study aims to evaluate the employment status and its predictors in a representative sample of the population of adult kidney transplant recipients in the Brazilian state of Rio Grande do Sul.

Patients and methods

Patients

This study constitutes a partial analysis of the data obtained from a multicenter cross-sectional survey that evaluated all adult kidney transplant recipient (> 18 yr.) with functioning graft who were assisted in the Southern Brazilian state between March 2003 and March 2004. During this period, a total of 1512 kidney transplant patients were treated in the 11 transplantation centers of the state Rio Grande do Sul.

Sample size calculation

Our objective was to collect data of approximately 20% of the available transplant recipients in that period, corresponding to approximately 300 individuals. In a previous estimation that approximately one-third of the transplant recipients would be working, with an alpha error = 5%, beta = 20% and an error of the estimate of 15–20%, the estimated sample size for the survey would be 224. We decided to collect data of 280 individuals; these additional individuals were chosen to cover occasional losses or refusals.

Sampling technique

The sample was stratified among the transplantation centers. The systematic random sampling technique was used in centers with >10 patients included in the study. In the other centers, the simple random sampling technique was applied. Chosen patients who had lost the graft (because of graft failure or death) at the moment of the interview were substituted by the next patient on the list. Those who refused were not replaced. Interviewers previously trained in the application of the questionnaires and in the quality of life measurement evaluated the patients in their hometowns.

Measures

The study included the analysis of the employment status, quality of life, demographic (age, gender, race), socioeconomic (years of formal education, household income), clinical (presence of diabetes and hypertension, donor source, sexual function and immunosuppressive protocol at the moment of the interview), and laboratory variables (hematocrit, creatinine). The sociodemographic, employment, quality of life, and sexual activity data were collected in interviews with the patient. The sexual activity was described as satisfactory or unsatisfactory. Individuals with no sexual activity in the last month were excluded from this analysis. The clinical data were obtained by the review of medical records. It was considered the average of the last three monthly laboratory measurements.

Employment status

Patients who had paid work were considered employed: the group was divided in part-time jobs (morning or afternoon) or full-time jobs (morning and afternoon). Housewives and students were included in the unemployed category. The individuals who decided not to work or those who were retired were not analyzed as separate groups.

Quality of life measures

For the evaluation of health-related quality of life, we used the *SF-36 Health Survey* questionnaire, appropriately translated and validated into the Portuguese language (12). The SF-36 is a generic instrument which attributes scores from 0 to 100, with higher scores indicating better quality of life. The measure is a multipurpose health survey that has eight domains: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. The physical and mental component summaries were used for statistical analysis. The first three domains constitute the physical component summary and the last three constitute the mental component summary. General health and vitality belong to the two summaries.

Ethical aspects

The local Ethics Committee approved the research project. All participants accepted the inclusion in the study by signing an informed consent.

Statistical analysis

The data were analyzed using logistic regression. Initially, it was evaluated the possible relation of each variable with the outcome (being employed after transplantation, dependent variable). The variables that showed a reasonable degree of association with the employment status ($p < 0.25$) were included in the multivariate model. Once the multivariate model was built, the variables that did not keep a statistically significant association with the outcome were successively excluded from the model, beginning with those which had the lowest association. The likelihood ratio test between the models with and without the variable being excluded and the β-coefficients of the remaining variables were evaluated. In the case which the likelihood ratio test showed significant change or if there were important changes in the coefficient of the other variables, the variable in process of exclusion was reinserted in the model, independently of the significance of its association with the dependent variable, considering its role as a possible confounding factor.

Once established the complete model with the main effect variables, we tested the possibility of interaction among the predicting variables. The odds ratio (OR) and the respective confidence intervals (95% CI) for the variables included in the final model were calculated. The model fitting was tested through the Hosmer–Lemeshow's (13) test. Stata 8.0 software (Stata Corporation, College Station, TX, USA) was used for statistical analysis.

Results

Data referring to a total of 272 patients were obtained, with eight losses (3%) because of refusal or impossibility of locating the patient. Among those patients, 80 had a job at the moment of the interview (29.4%), 63 full-time (23.2%), and 17 part-time jobs (6.3%). Before transplantation, 68 patients (25%) were working, 32 (11.8%) had full-time jobs and 36 (13.2%) had part-time jobs. The other characteristics of the sample are shown in Table 1.

The variables included in the initial model, as they presented a reasonable association ($p < 0.25$) with post-transplant employment in univariate analysis were: age, gender, race, monthly income, educational level, donor source, use of azathioprine, or corticosteroid, presence of diabetes or hypertension, pre-transplant employment, sexual activity, time since transplantation, hematocrit and SF-36 physical and mental component summaries.

Table 1. Patients characteristics according to post-transplantation employment status (n = 272)

	Employed (n = 80)	Unemployed (n = 192)	p-Value[a]
Age (years)	40.8 ± 11.1	44.2 ± 12	0.02
Male gender	68.7	44.8	<0.001
White	83.7	76	0.16
Married	68.7	68.2	0.9
<8 years of education	37.5	68.7	<0.001
Employment prior Tx	45	16.7	<0.001
Household monthly income (R$)[b]	1200 (240–5000)	750 (120–10 000)	0.02
PCS SF-36	48.2 ± 7.9	45.9 ± 8.9	0.05
MCS SF-36	55.6 ± 7.5	51.4 ± 9	<0.001
Good sexual function	82.5	67.2	0.02
Cadaveric donor	50	70.8	0.001
Months transplanted[b]	43 (6–366)	35 (6–252)	0.08
Creatinine (mg/dL)	1.6 ± 0.5	1.7 ± 0.6	0.3
Hematocrit (%)	39 ± 4.8	37.7 ± 5.5	0.08
Immunosuppressive regimen			
CyA	67	67	0.25
Corticosteroid	92	92	0.16
Azathioprine	64	64	0.06
Tacrolimus	16	16	0.31
MMF	43	43	0.46
Diabetes mellitus	8.7	22.4	0.008
Hypertension	65	81.2	0.004

Tx, transplantation; PCS, physical component summary; MCS, mental component summary; CyA, cyclosporin; MMF, mycophenolate mofetil.
[a]Chi-square to qualitative variables and simple regression to quantitative variables.
[b]Median (range); values refer to mean ± SD, median (range) or %.

The SF-36 physical component summary, race, sexual activity, use of azathioprine or corticoid and donor source did not keep a significant association in the multivariate analysis and were removed from the model. The variables hematocrit and time since transplantation were not significantly associated with the outcome in the multivariate analysis, but their exclusion led to significant changes in the β-coefficients of other variables and to a significant likelihood ratio test, being, therefore, kept in the model. The SF-36 mental component summary, age, diabetes, employment while on dialysis, educational level, gender, and high blood pressure kept statistically significant association in this multivariate analysis model.

The presence of interaction between the SF-36 mental component summary with educational level and with high blood pressure and interaction of diabetes with employment while on dialysis were detected. The insertion of the variables of interaction caused a significant change in the log likelihood when compared with the model only with the variables of main effect, being therefore kept in the model. The final model is shown in Table 2.

Table 2. Final logistic regression model to predictors of post-transplantation employment

Predictors	β-coefficient	p-Value[a]	95% CI
MCS SF-36[b]	1.1	0.1	−0.02–0.25
Pre Tx employment	1.5	<0.001	0.74–2.2
Age	−0.02	0.1	−0.05–0.007
Diabetes mellitus[b]	−0.55	0.3	−1.6–0.53
Time since Tx	0.005	0.1	−0.001–0.01
Hematocrit	0.02	0.6	−0.05–0.08
Educational level[b]	−2.8	0.3	−8.1–2.45
Hypertension[b]	4.47	0.2	−3.03–11.9
Male gender	1.4	<0.001	0.69–2.1
MCS × hypertension	−0.09	0.1	−0.23–0.04
MCS × educational level	0.07	0.1	−0.02–0.17
Diabetes × pre-Tx employment	−2.2	0.1	−5.2–0.8

Log likelihood −116.68; Hosmer–Lemeshow χ^2 3.33 p = 0.91
MCS, mental component summary; Tx, transplantation.
[a]Wald test.
[b]Interaction variables with odds ratio calculated for each stratum.

The final logistic model was very well adjusted, with Hosmer–Lemeshow's test for Goodness of Fitness of 3.33, p = 0.91. In this final model, age (OR 0.98; 95% CI 0.95–1.01), time since transplantation (OR 1.0; 95% CI 0.99–1.01) and hematocrit (OR 1.01; 95% CI 0.95–1.08) did not show significant association with the outcome. Male sex patients were more likely to work post-transplant (OR 4.04; 95% CI 1.99–8.23).

The analysis of interaction of pre-transplant employment with diabetes is shown in Table 3. The fact of having a paid job while on dialysis was associated with employment after transplantation only among the non-diabetics (OR 4.35; 95% CI 3.79–4.99). The negative effect of diabetes in the chance of having a job after transplantation was confirmed only among patients who worked while on dialysis (OR 0.06; 95% CI 0.008–0.5). Among the group of diabetic patients (n = 50), nine worked while they were still on dialysis: from these, eight stopped working after transplantation. Among the 41 diabetics who did not work while on dialysis, six started working after transplantation.

Table 3. Interaction analysis – effect of pretransplantation employment status among diabetic and non-diabetic patients and effect of diabetes among pretransplantation employed and unemployed patients on post-transplantation employment status

Variables	Strata	Odds ratio	95% CI
Employed pretransplantation	Non-diabetic patients	4.35	1.33–1.6
	Diabetic patients	0.49	0.05–4.56
Diabetic patients	Unemployed pretransplantation	0.58	0.42–1.28
	Employed pretransplantation	0.06	0.008–0.5

Table 4. Interaction analysis: effect of high educational level (>8 years of education) on post-transplantation employment status according to SF-36 MCS percentiles

MCS percentile	Odds ratio	95% CI
5th	0.75	0.3–1.9
10th	1.1	0.65–1.84
25th	1.83	1.57–2.13
50th	3.06	2.98–3.14
75th	4.13	3.87–4.4
90th	4.89	4.32–5.54

MCS, mental component summary.

The effect of high educational level in post-transplantation employment was significant only for patients with scores of SF-36 mental component summary above the 25th percentile, progressively increasing with the improvement in mental quality of life (Table 4). In the analysis of the effect of hypertension within each stratum of mental component summary percentiles, it was not possible to confirm the negative effect of hypertension in the employment status within any level of mental quality of life.

Therefore, the independent predictors of employment after kidney transplantation detected in this representative sample of kidney transplant recipients of Rio Grande do Sul are: male sex, pre-transplant employment (for non-diabetics), high educational level (for patients with mental quality of life above the 25th percentile), not being diabetic (among the patients who worked while on dialysis). The other sociodemographic and clinical variables did not predict post-transplantation employment status.

Discussion

The present report refers to the first population-based study evaluating employment status and its predictors among kidney transplant recipients selected by random sampling. Therefore, it constitutes a reliable picture of the employment status of functioning kidney grafts recipients in the Brazilian state of Rio Grande do Sul.

The employment rate of 29% is lower than most of the index described for similar populations in other countries (3, 6, 9, 11, 14, 15). However, the degree of comparability between the studies is poor, because of significant differences in the characteristics of the samples and in the definition of employment. Some previous studies include housework and study as employment (6, 8, 9), which enlarges the described rates. Other studies exclude patients in retirement age or analyze only

subgroups of transplant patients, as male individuals (10), diabetics or those with long time since transplantation (14, 16). It is noteworthy, however, that the present study includes only three patients who were younger than 21, age group in which the probability of involvement with formal education is higher. The opposing age extreme, period related to retirement, also was not much represented in the sample: three patients of 70 yr of age or more. Therefore, the analyzed sample in the present study is constituted mainly by individuals in the productive phase.

The predominance of male individuals in the formal work market is a social phenomenon that follows the tendencies of the general population. A large percentage of the female population is still predominantly involved with unpaid housework. In the same period of the study, the rate of paid activity in Rio Grande do Sul was of 77.4% for men and 58.9% for women (17).

Patients who already had paid activity while on dialysis, despite all difficulties related to this kind of treatment, tend to remain in the work market after transplantation, when the restrictions of available time and of quality of life tend to decrease (3, 6, 11). This finding was confirmed in the present study, except in the subgroup of the diabetic patients, who were more productive while on dialysis than after transplantation. The explanation for this unexpected finding among the diabetics is not clear. In the present sample, the group of diabetics was not classified as pre-transplantation diabetes and diabetes identified after immunosuppressive therapy. It is possible that a percentage of these individuals may have developed diabetes as a side-effect of drugs and represented a group of patients that suffered more negative repercussions from immunosuppression. According to a previous study, the rate of employment abandonment among patients who worked after the transplantation is higher in the subgroup of diabetics, who also, more frequently, have disability benefits (6). The presence of diabetes has been identified as a negative predictor of employment after transplantation (6); in the present study, diabetes had a negative association with employment among the patients who worked while on dialysis, probably because the outcome post-transplant employment was more frequent in this subgroup.

The higher educational level appears to be a significant predictor of return to work after transplantation; this relation has been described for recipients of other organs (18–20), but it has not been described in kidney transplantation. The detected interaction between educational level and the mental component of quality of life shows that individuals with unfavorable mental, psychological, and social conditions do not take advantage of higher education regarding reinsertion in the work force; or, maybe, they do not present good mental conditions because they are out of the work market. As the study has a cross-sectional design, causality cannot be established. Keeping a job certainly influences in a positive way the perception that the individual has of his/her role in the society and contributes to higher self-esteem. The fact of becoming unemployed increases the burden of kidney disease, especially if the individual was the primary source of financial income of the family. At the same time motivation is important to obtain and maintain a job. In the present study, employed patients showed mental quality of life scores much higher than patients who do not work, and the chance of being employed increases linearly with the increase of the percentiles of the mental component summary.

Previous studies describe higher employment rates among living donors kidney recipients (15). In this sample, the donor source showed significant association with the outcome in univariate analysis; however, when adjusted for pre-transplant employment, the association between living donor and post-transplant employment was not kept significant. Probably, the variable donor source worked as a confounding factor for pre-transplant employment, being detected a tendency of association between employment while on dialysis and receiving a living donor kidney ($p = 0.09$). Previous studies suggest that if the patient is employed or is able to obtain a job, he/she is more likely to obtain organs from living donors (6).

The SF-36 physical component summary did not influence in a detectable way the employment status after transplantation. This finding is according to previous studies, which describe similar or lower physical capacity in kidney, heart (20), or liver (19) recipients when employed if compared with recipients who do not work. It has been described that the post-transplant employment rates are much lower than the percentage of transplant recipients who consider themselves physically capable of working, and that a great number of patients with good physical conditions but receiving disability benefits do not return to the work market (7, 20, 21). Although the present study did not analyze the fact of receiving disability benefits, previous studies report that this support is an important negative predictor of employment after organ transplantation (7, 20), and that the fear of losing this gain is frequently mentioned as a reason not to return to the work market (7, 11).

The main strong points of the present study include the sample representative of a population of adult kidney transplant recipients with functioning graft and the low index of losses. The low index of losses is related to the logistics of the study, based on the visit to the patient at home, while most of previously reported studies are based in sending the questionnaires through mail service (6, 16, 18, 19). The cross-sectional design represents a limitation, because it does not allow an analysis of causality and hinders the dynamic analysis of joining and leaving the work market. Besides, the study does not separate the patients without a job in specific groups, such as individuals who decided not to work and those who were indeed unemployed. As a result, it was not possible to evaluate whether the person was unemployed because of the lack of capacity for work, or if it was a voluntary decision of the patient not to work or even whether there was some kind of discrimination on the part of the employer.

We concluded that the adult kidney recipients with a functioning graft who live in the south of Brazil have a low rate of reinsertion in the work market after kidney transplantation. The main predictors of employment were male sex, pre-transplant employment, having a higher educational level, better mental quality of life and not being diabetic. It is noteworthy that the perceived physical quality of life, as well as graft function measured by serum creatinine, and other laboratory variables, such as hematocrit, did not have a detectable influence in the rate of post-transplant employment.

Therefore, being economically productive after kidney transplantation seems to depend more on social matters and less on the peculiar clinical situation of the patient. This information is significant in the elaboration of policies of disability benefits and plans for reintegration of transplant recipients into the work force.

References

1. Wolfe RA, Ashby VB, Milford EL. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation, and recipients of a first cadaveric transplant. N Engl J Med 1999: 341: 1725.
2. Evans RW, Kitzmann DJ. An economic analysis of kidney transplantation. Surg Clin North Am 1998: 78: 149.
3. Laupacis A, Keown P, Pus N et al. A study of quality of life and cost-utility of renal transplantation. Kidney Int 1996: 50: 235.
4. Sesso R, Eisenberg JM, Stabile C, Draibe S, Ajzen H, Ramos O. Cost-effectiveness analysis of the treatment of end-stage renal disease in Brazil. Int J Technol Assess Health Care 1990: 6: 107.
5. Jofre R, Lopez-Gomez JM, Moreno F, Sanz-Guajardo D, Valderrabano F. Changes in quality of life after renal transplantation. Am J Kidney Dis 1998: 32: 93.
6. Matas AJ, Lawson W, McHugh L et al. Employment patterns after successful kidney transplantation. Transplantation 1996: 61: 729.
7. Raiz L. The transplant trap: the impact of health policy on employment status following renal transplantation. J Health Soc Policy 1997: 8: 67.
8. Van der Mei SF, Krol B, Van Son WJ, Jong PE, Groothoff JW, Van den Heuvel WJA. Social participation and employment status after kidney transplantation: a systematic review. Qual Life Res 2006: 15: 979.
9. Johnson JP, McCauley CR, Copley JB. The quality of life of hemodialysis and transplant patients. Kidney Int 1982: 22: 286.
10. Russell JD, Beecroft ML, Ludwin D, Churchill DN. The quality of life in renal transplantation – a prospective study. Transplantation 1992: 54: 656.
11. Markell MS, DiBenedetto A, Maursky V et al. Unemployment in inner-city renal transplant recipients: predictive and sociodemographic factors. Am J Kidney Dis 1997: 29: 881.
12. Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Brazilian–Portuguese version of the SF-36. A reliable and valid quality of life outcome measure. Rev Bras Reumatol 1999: 39: 143.
13. Hosmer DW, Lemeshow S. Applied Logistic Regression. New York: Wiley-Interscience, 1989.
14. Gorlen T, Ekeberg O, Abdelnoor M, Enger E, Aarseth HP. Quality of life after kidney transplantation – a 10–22 years follow-up. Scand J Urol Nephrol 1993: 27: 89.
15. Van der Mei SF, Groothoff JW, Van Sonderen ELP, Van den Heuvel WJA, Jong PE, Van Son WJ. Clinical factors influencing participation in society after successful kidney transplantation. Transplantation 2006: 82: 80.
16. Neipp M, Karavul B, Jackobs S et al. Quality of life in adult transplant recipients more than 15 years after kidney transplantation. Transplantation 2006: 81: 1640.
17. Instituto Brasileiro de Geografia e Estatística – IBGE [homepage on the Internet]. Brasília: Diretoria de Pesquisas, Pesquisa Nacional por Amostra de Domicilios 2003; [cited 2007 Jan 24]. Available from: http://www.IBGE.gov.br.
18. Cicutto L, Braidy C, Moloney S, Hutcheon M, Holness DL, Downey GP. Factors affecting attainment of paid employment after lung transplantation. J Heart Lung Transplant 2004: 23: 481.
19. Sahota A, Zaghla H, Adkins R et al. Predictors of employment after liver transplantation. Clin Transplant 2006: 20: 490.
20. Sahar G, Stamler E, Erez A et al. Employment is a misleading indicator for successful outcome after heart transplantation. Transplant Proc 1999: 31: 1905.
21. Manninen DL, Evans RW, Dugan MK. Work disability, functional limitations, and the health status of kidney transplantation recipients posttransplant. In: Terasaki P, ed. Clinical Transplants 1991. Los Angeles: UCLA Tissue Typing Laboratory, 1992: 193.