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Health-related quality of life and employment among renal transplant recipients

Chisholm-Burns MA, Erickson SR, Spivey CA, Kaplan B. Health-related quality of life and employment among renal transplant recipients.

Abstract: Objective: To examine the relationship between health-related quality of life (HQoL) and employment status in renal transplant recipients (RTRs).
Methods: Eighty-two RTRs met inclusion criteria: 21–65 yr of age; greater than one yr post-transplant; and received calcineurin inhibitors. A cross-sectional survey was conducted using a demographics questionnaire and the following HQoL instruments: SF-12 Health Survey version 2 (Physical Component Summary [PCS-12] and Mental Component Summary [MCS-12]) and Kidney Transplant Questionnaire (KTQ). Two multivariate logistic regression analyses (SF-12 model and KTQ model) were conducted to determine whether HQoL and demographic variables were independently associated with employment status.
Results: Seventy-five RTRs were included in the analysis. Compared with employed RTRs, a greater number of unemployed RTRs were non-white, had lower education levels, and had deceased donor transplants ($p < 0.05$). Employed RTRs had significantly higher SF-12 scores ($p < 0.05$). In the SF-12 logistic regression model, PCS-12 and education level were significant predictors of employment status ($p < 0.05$). In the KTQ model, the Fatigue subscale and education level were significant predictors of employment status ($p < 0.05$).
Conclusions: Findings suggest higher PCS-12, higher KTQ-Fatigue, and education level are independently associated with employment status. Interventions targeted to improve HQoL, decrease fatigue, and increase education level are discussed.

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Possible benefits of renal transplantation are improvement in health-related quality of life (HQoL) and a higher level of functioning and social participation (defined as active participation in activities of daily living) than what is generally associated with alternate therapies such as dialysis (1–3). Post-renal transplant employment status has been identified as a measure of social participation, and studies have examined patterns of post-transplant employment (1, 4–6). As an indicator of social participation, employment is considered to have an important association with HQoL, defined as an individual's assessment of physical, mental, and overall well-being (4, 7–12). Logic would dictate that an individual's HQoL, their sense of well-being, may influence their likelihood of pursuing employment. Yet, a literature search using PubMed (years unlimited) revealed only one prior study that considered HQoL as a predictor of employment status among renal transplant recipients (RTRs) (5).

Examination of factors, such as HQoL, that might influence employment status among working age RTRs is particularly important given the economic downturn of the last few years, exemplified by the sharp rise in unemployment.

Unemployment has consistently surpassed 9% since mid-2009 and remains more than double the unemployment rate of 10 yr ago (13). Renal transplant recipients and other individuals with chronic disease face increased risk of unemployment compared with the general population for a variety of reasons including severity of illness, work-related factors, and available social support, among others (14, 15). Given that more than $955 billion in lost productivity annually is attributable to chronic disease states, well-designed prevention and treatment efforts that increase employment opportunities and capacity are needed to reduce chronic disease burden and alleviate negative economic consequences (16). However, we must first develop a better understanding of health-related factors that may act as potential barriers to employment. Therefore, this study assesses the independent association of one such factor, HQoL, with employment status among adult RTRs.

Patients and methods

Eighty-two RTRs met the following inclusion criteria for this cross-sectional mailed survey: (i) between 21 and 65 yr of age; (ii) greater than one yr post-transplant; and (iii) receive calcineurin inhibitors from the Apothecary Shops (a chain of pharmacies based in the Southwest USA that specializes in solid organ transplant medication). As the literature reveals that 84% of RTRs who returned to work or school full time did so within the first year post-transplant, we conservatively decided to include those RTRs who were greater than one yr post-transplant to capture a greater yield of those able to work (4). Renal transplant recipients who were considered at or past retirement age (i.e., 65 yr or older) were excluded from this study to reduce bias, or the over-inclusion of individuals who are no longer employed and not in the labor force (and therefore would not be considered ''unemployed''). Participants were asked to complete a demographics questionnaire (employment status was assessed using a binary question [yes/no]) and the following HQoL instruments: SF-12 Health Survey version 2 (SF-12v2) and the Kidney Transplant Questionnaire (KTQ). Renal transplant recipients who did not return the survey packet within two wk received one follow-up telephone call reminder. This study was approved by the Institutional Review Board of the University of Arizona.

HQoL instrumentation

Because HQoL is a multifaceted concept, both a global generic measure (the SF-12v2) and a disease-specific measure (the KTQ) were utilized to comprehensively examine HQoL (17). The SF-12v2 is a generic questionnaire that assesses functional status, well-being, and health status perceptions. Two summary scores are calculated: Physical Component Summary (PCS-12) and Mental Component Summary (MCS-12). Scores are based on normative scaling and range from 0 to 100, with higher scores indicative of better functioning and well-being. Reliability coefficients for the PCS-12 and MCS-12 are greater than 0.70, and the SF-12v2 has been validated in multiple patient populations including RTRs (18, Chisholm-Burns, Erickson, Spivey, Gruessner, and Kaplan, in press). The SF-12v2 was selected for use in this study because of its provision of scores focused on both physical and psychological (mental) functioning, as well as its established psychometric properties and brevity.

The KTQ is a 25-item questionnaire that includes the following five subscales: physical, fatigue, uncertainty/fear, appearance, and emotional (19). A mean score ranging from 1 to 7 is reported for each subscale, with higher scores representing better functioning, well-being, or fewer problems. Evidence for validity and reliability of the KTQ has been reported, and the KTQ has been used previously in studies of HQoL among RTRs (8, 19–21). The KTQ was selected as the disease-specific instrument in this study because of its psychometric properties and its common use as one of the few available transplant-specific HQoL instruments.

Data analysis

Statistical analyses were performed using SPSS version 18/PASW Statistics 18 (Chicago, IL, USA). Descriptive analyses of demographic and HQoL variables were conducted. Demographic and patient characteristic variables included in analyses were age, gender, education level, employment status, race, months post-transplant, donor type, chronic disease score (CDS), and receipt of Medicare benefits. The CDS was determined using data collected from RTRs' pharmacy refill records (filled prescriptions acted as proxy indicators of comorbid disease states) and was calculated based on procedures described in Clark et al. (22). Bivariate analyses were conducted using Student's *t*-test and chi-square test to determine relationships between employment status, demographics, and HQoL. To test for non-response bias, bivariate analyses were also performed to compare demographics of survey respondents to non-respondents (using data acquired from the Apothecary Shops).

Multivariate logistic regression analyses were conducted to determine the value of HQoL variables as predictors of employment status. Demographic characteristics that were significant in the bivariate analyses were also included in the regression analyses as independent variables. Two separate models were derived, one for each HQoL instrument. The first was the SF-12v2-based model, where:

- Employment status = Intercept + PCS-12 (x) + MCS-12 (x) + Education Level (x) + Race(x) + Donor type (x)

The second was the KTQ model where all five subscales were entered in block:

- Employment status = Intercept + KTQ-Physical(x) + KTQ-Fatigue(x) + KTQ-Fear/Uncertainty(x) + KTQ-Appearance(x) + KTQ-Emotional(x) + Education Level(x) + Race(x) + Donor type(x)

Results

Seventy-five RTRs (91.5% response rate) were included in the study. There were no significant differences ($p > 0.05$) between respondents ($n = 75$) and non-respondents ($n = 7$), respectively, on the following demographics: (i) age, 47.6 yr ± 10.9 (range, 26–64 yr) vs. 50.2 yr ± 12.6 (range, 29–64 yr); (ii) male gender, 57.3% vs. 53.5%; (iii) non-white race, 53.3% vs. 56.1%; (iv) unemployed, 61.3% vs. 65.7%; (v) received Medicare benefits, 80% vs. 85.7%; and (vi) months post-transplant, 43.5 ± 32.2 vs. 42.9 ± 17.8. Table 1 presents demographics of the total sample as well as the employed vs. unemployed groups. Compared with employed RTRs, a greater number of unemployed RTRs were non-white ($p = 0.003$), had a lower education level ($p = 0.001$), and had a deceased donor transplant ($p = 0.037$). There were no other significant demographic differences between employed and unemployed RTRs. Mean PCS-12 and MCS-12 scores were greater in the employed group compared with the unemployed group ($p < 0.05$; Table 2). There were no differences between groups on the KTQ subscale scores. In the SF-12v2 logistic regression analysis, PCS-12 score and education level were the only variables significantly associated with employment status (higher or better physical functioning and higher education level were associated with being employed), accounting for 55% of the variance in the model ($p < 0.05$; Table 3). The regression model was as follows:

$$\text{Employment status} = -8.308 + \text{PCS-12}(0.076) + \text{Education Level}(1.16)$$

In the KTQ logistic regression analysis, KTQ-Fatigue score and education level were the only variables significantly associated with employment status ($p < 0.05$; Table 4). Less fatigue and higher education level were associated with greater likelihood of being employed, explaining 52% of the variance in the model. The regression model was as follows:

$$\text{Employment status} = -2.48 + \text{KTQ-Fatigue}(1.05) + \text{Education Level}(1.2)$$

Discussion

Chronic disease states such as kidney disease and transplant management represent a risk factor for unemployment and are responsible for more than $955 billion in lost productivity annually in the USA – a figure that increases to more than $1 trillion when caregivers' lost productivity is considered (14–16). Thus, interventions to bolster employment among RTRs and other individuals with chronic illnesses are needed but should only be utilized when appropriate given a patient's level of physical and/or psychological functioning. To develop such intervention strategies, it is necessary to gain a better comprehension of health-related factors that may detract from pursuit of post-transplant employment. In the current study, we examined the relationship between one possible factor, HQoL as measured by the SF-12v2 and the KTQ, and employment status among working age RTRs.

Although previous studies have established an association between employment status and HQoL, a relationship generally supported by our bivariate analyses, only one other study (i.e., Bohlke and colleagues) has examined the value of HQoL as a *predictor* of employment status among RTRs (5, 9, 10, 12, 23). Thus, our logistic regression findings build upon prior work to further elaborate the relationship between HQoL and employment status in RTRs and suggest certain aspects of HQoL, namely better physical functioning as measured by the SF-12v2 and lower fatigue as measured by the KTQ, are predictive of being employed (note, this does not establish a causal relationship between HQoL and employment status). The finding regarding fatigue is unsurprising as the association between fatigue, a

Table 1. Demographic characteristics of the employed (n = 29) and unemployed (n = 46) renal transplant recipient groups

Characteristic	Total n (%)	Employed n (%)	Unemployed n (%)	p value
Mean age ± SD	47.6 ± 10.9	45.7 ± 11.0	48.9 ± 10.8	0.229
Gender				
Male	43 (57.3)	17 (58.6)	26 (56.5)	0.858
Female	32 (42.2)	12 (41.4)	20 (43.5)	
Education				
Less than high school	14 (18.6)	1 (3.4)	13 (28.3)	0.001**
High school graduate	18 (24.0)	3 (10.3)	15 (32.6)	
Some college/associate degree	28 (37.3)	16 (55.2)	12 (26.1)	
College graduate or higher	11 (14.7)	7 (24.1)	4 (8.7)	
Other	1 (1.3)	1 (3.4)		
Missing	3 (4.0)	1 (3.4)	2 (4.3)	
Marital status				
Not married	50 (66.7)	19 (65.5)	31 (67.4)	0.967
Married	24 (32.0)	9 (31.0)	15 (32.6)	
Missing	1 (1.3)	1 (3.4)		
Race				
White	34 (45.3)	19 (65.5)	15 (32.6)	0.003**
Other	40 (53.3)	9 (31.0)	31 (67.4)	
Missing	1 (1.3)	1 (3.4)		
Received Medicare benefits				
Yes	60 (80.0)	20 (69.0)	40 (87.0)	0.058
No	15 (20.0)	9 (31.0)	6 (13.0)	
Donor type				
Living	26 (34.7)	14 (50.0)	12 (26.1)	0.037*
Deceased	48 (64.0)	14 (50.0)	34 (73.9)	
Missing	1 (1.3)			
Mean chronic disease score ± SD	2.39 ± 1.71	2.07 ± 1.6	2.59 ± 1.84	0.21
Mean months post-transplant ± SD	43.5 ± 32.2	51.3 ± 38.6	38.5 ± 26.7	0.94

*p < 0.05, **p < 0.01.

Table 2. Health-related quality of life (HQoL) mean scores of the employed (n = 24) and unemployed (n = 45) renal transplant recipient groups

HQoL variable	Total Mean ± SD	Employed Mean ± SD	Unemployed Mean ± SD	p value
PCS-12	44.4 ± 11.3	49.9 ± 8.7	40.4 ± 11.3	<0.001**
MCS-12	51.6 ± 11.1	54.8 ± 8.7	49.2 ± 11.9	0.032*
KTQ-Physical	4.6 ± 1.6	4.8 ± 1.7	4.4 ± 1.5	0.389
KTQ-Fatigue	5.5 ± 1.5	5.8 ± 1.5	5.3 ± 1.5	0.130
KTQ-Uncertainty/fear	5.3 ± 1.4	5.3 ± 1.7	5.3 ± 1.2	0.898
KTQ-Appearance	6.6 ± 1.0	6.6 ± 1.4	6.7 ± 0.8	0.647
KTQ-Emotional	5.4 ± 1.4	5.2 ± 1.5	5.5 ± 1.3	0.45

KTQ, kidney transplant questionnaire; MCS-12, mental component summary of the SF-12 health survey; PCS-12, physical component summary of the SF-12 health survey.
*p < 0.05, **p < 0.001.

common physical symptom in many disease states including transplantation, and unemployment has been documented (24–26). However, our logistic regression findings (both the SF-12v2 and KTQ models) somewhat contradict Bohlke et al. in their study examining HQoL as a predictor of employment status among Brazilian RTRs. They found that mental, but not physical, HQoL was included in their final regression model for employment status (5). The variable results found in this study and the Bohlke study indicate further research is needed to better understand the value of various aspects of HQoL (e.g., physical, psychological) as predictors of employment status.

The logistic regression analyses also indicate that achievement of higher education level is also a predictor of being employed, a finding that is uniform with several prior studies. For example, Bohlke et al. found employed RTRs were more highly educated than unemployed RTRs, and a

Table 3. Employment status logistic regression model for the SF-12 health survey version 2

Variable	*B*	Exp(*B*) (95% CI)	p value
Race[a]	1.207	3.34 (0.80,13.94)	0.097
Education[b]	1.16	3.19 (1.24, 8.20)	0.016*
Type of transplant[c]	−1.08	0.34 (0.084, 1.37)	0.129
PCS-12	0.076	1.079 (1.008, 1.155)	0.029*
MCS-12	0.046	1.047 (0.986, 1.113)	0.135

MCS-12, Mental Component Summary of the SF-12 Health Survey; PCS-12, physical component summary of the SF-12 Health Survey.
*p < 0.05. Employment status (dependent variable) coded as: 0 = not employed; 1 = employed.
[a]Race coded as: 0 = other; 1 = white.
[b]Education coded as: 1 = less than high school; 2 = high school graduate; 3 = some college/associate degree; 4 = college graduate or higher; 5 = other.
[c]Type of transplant coded as: 0 = living, 1 = deceased.

Table 4. Employment status logistic regression model for the kidney transplant questionnaire

Variable	*B*	Exp(*B*) (95% CI)	p value
Race[a]	1.375	3.956 (0.86, 18.18)	0.077
Education[b]	1.2	3.317 (1.303, 8.448)	0.012*
Type of transplant[c]	−1.271	0.281 (0.069, 1.143)	0.076
KTQ-Physical	0.224	1.251 (0.721, 2.172)	0.426
KTQ-Fatigue	1.05	2.856 (1.19, 6.855)	0.019*
KTQ-Fear	−0.657	0.518 (0224, 1.202)	0.126
KTQ-Appearance	−0.232	0.793 (0.352, 1.785)	0.575
KTQ-Emotional	−0.351	0.704 (0.287, 1.731)	0.445

*p < 0.05. Employment status (dependent variable) coded as: 0 = not employed; 1 = employed.
[a]Race coded as: 0 = other; 1 = white.
[b]Education coded as: 1 = less than high school; 2 = high school graduate; 3 = some college/associate degree; 4 = college graduate or higher; 5 = other.
[c]Type of transplant coded as: 0 = living, 1 = deceased.

positive relationship between employment status and education level has been noted in renal and other solid organ transplant populations (5, 27–30). We speculate higher level of education may provide greater access to post-transplant employment opportunities, and as a modifiable factor, education lends itself more readily to intervention compared with the remaining significant, but non-modifiable demographic factors, race and donor type. Although bivariate analyses findings suggest non-white RTRs and RTRs with deceased donor transplants may be at greater risk of unemployment and therefore may need greater assistance to facilitate post-transplant employment, neither demographic variable was independently associated with employment status in the regression analyses. Thus, the relationships between employment status, race and donor type may need further exploration.

Our results suggest that HQoL, particularly domains related to physical functioning and fatigue, and education level may be appropriate targets for interventions to improve post-transplant employment among working age RTRs. Such interventions may address multiple aspects of HQoL. For example, clinicians should consider the adverse side effects of drug therapy (e.g., increased fatigue, headaches, fine hand tremors, gingival hyperplasia, and gastrointestinal problems) that negatively impact physical and psychological HQoL. Strategies to reduce adverse drug effects include thoughtful prescribing, decreased dosages when possible, modification to dosing schedule, and providing self-care and self-monitoring instructions. Another possible intervention, provision of exercise training, is increasingly used in fatigue management in patients with cancer and other patient populations and may be an effective intervention to improve physical functioning and decrease fatigue among RTRs (31–34). Other interventions to improve HQoL may include (1, 35–39):

- Cognitive-behavioral strategies to foster coping capacities (e.g., stress management) and changes in subjective appraisals of experiences
- Individual counseling sessions and/or group discussion/support targeting those who score low on HQoL domains
- Facilitating increased participation in social/leisure activities and hobbies (e.g., volunteer work, club associations)
- Practicing a healthy diet and maintaining a healthy weight
- Practicing preventive medicine (e.g., smoking cessation)

Additionally, integrating an employment specialist into the healthcare team to provide vocational support (e.g., job skills assessment, interview/résumé assistance, identification of education/training programs, job search assistance) or referring RTRs to vocational and/or educational services may be useful strategies to directly address employment barriers (32). Given the current economic climate in the USA, this is a particularly opportune time for working age RTRs to pursue job training and/or educational advancement that may, in turn, increase employment opportunities and result in elevated socioeconomic status. In addition to socioeconomic benefits that may result from improvements in education level and employment status, there may also be a benefit to RTRs' graft health – a study by Stephens and colleagues notes that RTRs who experienced decreased employment and education deprivation were less likely to suffer acute rejection episodes (40).

There are limitations to this study. The cross-sectional nature of the study design prohibits

inference of a causal relationship between HQoL and employment; however, we can conclude that HQoL as measured by both the PCS-12 and KTQ-Fatigue is predictive of employment status. The findings may have limited generalizability to the larger US renal transplant population because of the study's small sample size. However, results provide a useful foundation for future studies of the relationship between HQoL and employment status among RTRs. Another limitation is that desire to seek employment and/or degree of social engagement or participation were not examined in relation to their possible effect on employment status. Future studies should consider the potential relationships between these variables, employment, and other factors that influence employment such as HQoL and education level.

Conclusions

Higher educational level, higher physical functioning, and less fatigue are independently associated with employment, suggesting that efforts to improve physical aspects of HQoL and education may facilitate post-transplant employment in targeted RTR populations. Interventions targeted to improve HQoL in conjunction with vocational support, particularly efforts to foster educational achievement, should be implemented to increase employment among RTRs.

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Author contributions

Dr. Chisholm-Burns contributed to securing project funding, project concept and design, data collection, data analysis and interpretation, drafting and revising the manuscript, and approval of final version of the manuscript. Dr. Erickson contributed to project concept and design, data analysis and interpretation, drafting and revising the manuscript, and approval of final version of the manuscript. Dr. Spivey contributed to project concept and design, data collection, data analysis and interpretation, drafting and revising the manuscript, and approval of final version of the manuscript. Dr. Kaplan contributed to project concept and design, data interpretation, revising the manuscript, and approval of final version of the manuscript.

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