Depressed Mood, Usual Activity Level, and Continued Employment after Starting Dialysis

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Background and objectives: When patients start dialysis, their employment rate declines and disability benefits are an option. With patient sociodemographic and clinical characteristics including disability income status controlled, we investigated the significance of depressed mood and usual activity level as predictors of patients’ continued employment after dialysis start.

Design, setting, participants, & measurements: Incident patients from 296 randomly selected dialysis clinics were surveyed in the Comprehensive Dialysis Study (CDS). Participants provided information about employment status, disability income status, education, depressive symptoms measured by the Patient Health Questionnaire-2 (PHQ-2), and usual activity level/energy expenditure measured by the Human Activity Profile. Age, gender, race, insurance, diabetes, inability to ambulate or transfer, chronic obstructive pulmonary disease, cardiovascular conditions, and hemoglobin and serum albumin values at treatment start were obtained from US Renal Data System files. Dialysis modality was defined at time of interview.

Results: Among 585 CDS participants who worked in the previous year, 191 (32.6%) continued working after dialysis start. On the basis of the PHQ-2 cutoff score >3, 12.1% of patients who remained employed had possible or probable depression, compared with 32.8% of patients who were no longer employed. In adjusted analyses, higher Human Activity Profile scores were associated with increased likelihood of continued employment, and there was a borderline association between lower PHQ-2 scores and continued employment.

Conclusions: Screening and management of depressive symptoms and support for increased activity level may facilitate patients’ opportunity for continued employment after dialysis start, along with generally improving their overall quality of life.


Employment can foster personal self-esteem and responsibility and represents an important value in American society. Individuals’ ability to engage in productive activity provides a marker of the effectiveness of care. Many patients with ESRD leave the labor market after starting dialysis, however (1-3). Renal failure that requires dialysis conveys entitlement to disability benefits, which is a recognized disincentive to patients’ maintenance of employment (4), but symptoms of depression (5-7) and reduced capacity to engage in physical activity (8) may also be important contributors. No previous studies have investigated the associations among these variables (9).

Most employed dialysis patients are individuals who continue the jobs that they held before starting dialysis treatment (1). The Comprehensive Dialysis Study (CDS) surveyed a national cohort of patients soon after dialysis start (10). We hypothesized that, after adjusting for current disability income status, other sociodemographic characteristics, and clinical variables, CDS participants’ depressed mood and their energy expenditure reflected in usual activity level would be independently associated with employment maintenance after dialysis start.

Materials and Methods

Study Design and Participants

The CDS is a special data collection study conducted by the US Renal Data System (USRDS) of patients who have ESRD and initiate long-term dialysis. The CDS was designed as a prospective cohort study, with the aim of understanding factors that contribute to physical, functional, and nutritional health status among patients who start dialysis. Outpatient dialysis units throughout the United States were selected from a sampling frame of 4410 clinics in the April 2005 Dialysis Facility Compare database of the Centers for Medicare and Medicaid Services (CMS) after merging with information from the USRDS ESRD Facility File. Pediatric and transplant-only facilities were excluded from the sampling frame, along with facilities located outside the 50 states and the District of Columbia. The sampling frame was sorted by the ESRD Network and then by adjacent states within Network. Furthermore, the sampling frame was sorted within state in a serpentine manner by the size measure of annual incident patients per facility.
The PHQ-2 is a two-item version of the Patient Health Questionnaire (PHQ) instrument (13), which assesses activities across a broad range of sectors. Participants report their level of physical activity using the Human Activity Profile (HAP) that they had completed, to answer two depression screening questions:

- Are you receiving disability benefits (Social Security Disability Insurance [SSDI], Supplemental Security Income [SSI]) from Social Security?
- Are you now working for pay (receiving taxable wages)? If yes, what kind of work are you doing now? (Jobs were subsequently classified into occupational status categories using the Hollingshead scale [11]).
- Were you working for pay (receiving taxable wages) at any time following the time of interview.
- Were you working for pay (receiving taxable wages) at any time during the year before you started dialysis?
- Are you now working for pay (receiving taxable wages)? If yes, what kind of work are you doing now? (Jobs were subsequently classified into occupational status categories using the Hollingshead scale [11]).
- Are you receiving disability benefits (Social Security Disability Insurance [SSDI], Supplemental Security Income [SSI]) from Social Security?

Respondents were also asked to indicate the highest education level that they had completed, to answer two depression screening questions that compose the Patient Health Questionnaire 2 (PHQ-2) (12), and to report their level of physical activity using the Human Activity Profile (HAP) instrument (13), which assesses activities across a broad range of energy requirements:

- The PHQ-2 is a two-item version of the Patient Health Questionnaire (PHQ) depression module (PHQ-9) (14). The PHQ-2 inquires about the frequency of depressed mood (“feeling down, depressed, or hopeless”) and anhedonia (“little interest or pleasure in doing things”) during the past 2 weeks, scoring each as 0 (not at all) to 3 (nearly every day). PHQ-2 scores range from 0 to 6, with higher scores indicating increasing severity of depressive symptoms; a total score ≥ 3 suggests probable/possible depression. Strong evidence supports the construct and criterion validity of the PHQ-2. The intent of the PHQ-2 is to screen for depression as a first step approach; the PHQ-9 would remain the preferred instrument for definitively diagnosing depressive disorders or assessing depression outcomes in response to treatment (12). A probability systematic random sampling. Use of systematic random sampling in conjunction with the sorted facility sampling frame yielded implicit geographic stratification (Network and state within Network) for the sample facilities. The selected units matched the total population of clinics closely on number of patients and dialysis stations, facility type (free-standing, hospital based), dialysis chain/nonchain affiliation, dialysis modalities (hemodialysis [HD]/peritoneal dialysis [PD]) offered, and ESRD Network. Full details of the sampling plan are available.

Patients who had ESRD, were aged ≥18 years, and initiated long-term dialysis between June 1, 2005, and June 1, 2007, at one of the selected dialysis clinics were identified to the USRDS Coordinating Center by the CMS Standard Information Management System when they had been receiving long-term dialysis for at least 2 months but no more than 3 months. Patient lists were provided monthly to the USRDS Coordinating Center, which then contacted patients to request their participation in the study. Patients who consented were asked to participate in a structured interview administered by professional interviewers using a computer-assisted telephone interviewing system.

Patients who were interviewed (n = 1643) were affiliated with 296 different dialysis clinics. Some clinics were disrupted by Hurricane Katrina during the study period, and a small number of clinics declined to provide information about the study to their patients. The dialysis clinics with which CDS participants were affiliated were located across all 18 ESRD Networks and in all states except Alaska and Vermont. At the time of interview, patients had been on dialysis for approximately 4 months (median 122 days; mean 129 days).

Measures and Data Collection

During the telephone interview, CDS participants were asked the following questions:

- Were you working for pay (receiving taxable wages) at any time during the year before you started dialysis?
- Are you now working for pay (receiving taxable wages)? If yes, what kind of work are you doing now? (Jobs were subsequently classified into occupational status categories using the Hollingshead scale [11]).
- Are you receiving disability benefits (Social Security Disability Insurance [SSDI], Supplemental Security Income [SSI]) from Social Security?

Respondents were also asked to indicate the highest education level that they had completed, to answer two depression screening questions that compose the Patient Health Questionnaire 2 (PHQ-2) (12), and to report their level of physical activity using the Human Activity Profile (HAP) instrument (13), which assesses activities across a broad range of energy requirements:

- The HAP assesses participation in 94 common activities for which average energy expenditure requirement (i.e., the metabolic equivalent) is known. The activities are ordered from 1 (lowest) to 94 (highest) in required metabolic equivalents. The HAP adjusted activity score (AAS) is used in this study. The AAS is interpreted as providing a more stable estimate of an individual’s average level of energy expenditure. It adjusts for sudden bursts of activities that individuals might perform when absolutely necessary but that provide unrealistically high estimates of their normal energy expenditure. The possible score range for the AAS is 1 to 94, with higher scores indicating a greater range of activities and estimated average energy expenditure (13).

Updated patient characteristics for respondents were obtained from 2009 USRDS Standard Analysis Files. This information included date of birth, gender, race, employer group health (EGH) insurance at time of enrollment, diabetes, inability to ambulate or transfer, chronic obstructive pulmonary disease, number of cardiovascular conditions (congestive heart failure, atherosclerotic heart disease, other cardiac disease, cerebrovascular disease, peripheral vascular disease), and hemoglobin and serum albumin values at treatment start, as documented on the CMS Form 2728 (ESRD Medical Evidence Report) submitted to CMS for all patients who have ESRD and initiate treatment for kidney failure. Treatment modality (HD/PD) was defined as of the time of the patient interview.

Statistical Analysis

Using USRDS registry data in the 2009 Standard Analysis Files, characteristics of CDS participants and characteristics of all other incident patients who started dialysis in the United States in the same period were compared.

Among the subset of CDS participants who affirmed that they were working for pay during the year before dialysis (n = 585), patient sociodemographic and clinical characteristics, PHQ-2 score, and HAP AAS were compared between patients who remained employed and those who did not at the time of interview. Logistic regression models were used to estimate the association of these variables with the likelihood of remaining employed at the time of interview. Patient clustering within dialysis units was accounted for in the inference. Because hemoglobin data were not available for 11% of respondents and serum albumin data were not available for 25% of respondents, logistic regression models were estimated with and without these two variables. In all analyses, variance estimation accounted for patient clustering within dialysis units.

Statistical analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC). The CDS was approved by institutional review boards at the location of the USRDS Coordinating Center (University of Minnesota), the USRDS Rehabilitation/Quality of Life Special Studies Center (Emory University), and the USRDS Nutrition Special Studies Center (University of California, San Francisco; and University of California, Davis). All respondents provided informed consent. Patient anonymity was ensured at the Coordinating Center by assigning a universal USRDS identifier to all data obtained for a specific patient.

Results

CDS participants, compared with other US incident patients who began dialysis during the same period, were younger on
average and more likely to be able to ambulate and transfer independently, and they had fewer cardiovascular comorbid conditions and higher average serum albumin concentration. Study participants did not differ from the remainder of the dialysis population in gender or race composition, EGH insurance coverage, diabetes, chronic obstructive pulmonary disease, or average hemoglobin level (Table 1).

A total of 585 CDS participants reported that they had been working for pay during the previous year. When interviewed approximately 4 months after dialysis start, 191 (32.6%) of these individuals reported that they were still working for pay. Among those who were still working for pay, 60% reported holding a full-time job and 40% reported holding a part-time job. In univariable analyses, patients who remained employed had a lower score on the PHQ-2 depression measure; on the basis of the PHQ-2 cutoff score ≥3, 12.1% of the 191 patients who remained employed had possible or probable depression, compared with 32.8% of the 394 patients who were no longer employed (P < 0.0001). Patients who remained employed had a higher average AAS and were less likely to be receiving disability income compared with patients who were no longer employed (5% who were employed full time and 29% who were employed part time reported receiving disability income versus 50.9% who were not employed). In addition, patients who remained employed were less likely to be black, had a higher level of education, were more likely to have EGH insurance, were more likely to be on PD rather than HD, and had higher average hemoglobin and serum albumin concentrations (Table 2).

In a multivariable logistic regression analysis, hemoglobin (odds ratio [OR] 0.91; 95% confidence interval [CI] 0.80 to 1.04; P = 0.17) and serum albumin (OR 1.26; 95% CI 0.80 to 1.96; P = 0.32) were not statistically significant predictors of patients’ continued employment. In view of the missing data for these two variables, the logistic regression analysis was repeated without including hemoglobin and serum albumin. In this analysis, EGH insurance (OR 3.25; 95% CI 2.10 to 5.03; P < 0.0001) and higher AAS (OR 1.04; 95% CI 1.02 to 1.05; P < 0.0001) were associated with increased likelihood of continued employment, whereas receiving disability income (OR 0.26; 95% CI 0.14 to 0.47; P < 0.0001) and HD rather than PD treatment (OR 0.39; 95% CI 0.19 to 0.81; P = 0.01) were associated with decreased likelihood of continued employment after dialysis start. Higher PHQ-2 score, indicating more depressive symptoms, had borderline significance for decreased likelihood of continued employment after dialysis start (OR 0.87 95% CI 0.74 to 1.01; P = 0.06; Table 3).

**Discussion**

As hypothesized, depressed mood and usual activity level were associated with CDS participants’ maintenance of employment after dialysis start. Association of depressed mood with unemployment among dialysis patients was reported >20 years ago by Craven et al. (5), who assessed patients for major depressive episode using the Diagnostic Interview Schedule. Researchers who used the Beck Depression Inventory and the Hospital Anxiety and Depression Scale (6,7) also found an association of depressed mood with unemployment among dialysis patients, and Finkelstein et al. (15) noted that depressive affect (pessimism, anhedonia, sadness, complaints of feeling helpless and hopeless) may contribute to reduced occupational activity.

Depressed mood and capacity to engage in physical activity are likely to be related. The correlation between patients’ PHQ-2 score and AAS in this study was −0.35 (P < 0.0001). Young et al. (16) recently reported in the Pathways Epidemiology Study that among primary care patients who had diabetes and reached stage 5 chronic kidney disease (CKD), 22.1% were found to have major depression as assessed by the PHQ-9. Having a sedentary lifestyle (defined as ≤1 d/wk exercise) was the baseline characteristic that most strongly differentiated patients who had diabetes with and without major depression; patients with major depression were almost twice as likely to have a sedentary lifestyle (P = 0.01) (16). Carney et al. (8) found that depression—whether assessed by the Beck Depression Inventory, the Minnesota Depression, Usual Activity, and Employment

**Table 1. Characteristics of CDS participants compared with other US patients who initiated long-term dialysis in the same period**

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>CDS Participants (n = 1643)</th>
<th>Other Incident Dialysis Patients in the United States (n = 211,988)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at enrollment (years; mean ± SD)</td>
<td>59.6 ± 14.2</td>
<td>62.3 ± 16.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>55.0</td>
<td>55.7</td>
<td>0.55</td>
</tr>
<tr>
<td>Black (%)</td>
<td>28.4</td>
<td>28.9</td>
<td>0.65</td>
</tr>
<tr>
<td>EGH insurance coverage (%)</td>
<td>27.7</td>
<td>26.1</td>
<td>0.15</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>52.7</td>
<td>51.2</td>
<td>0.22</td>
</tr>
<tr>
<td>Not able to ambulate or transfer indi-</td>
<td>2.5</td>
<td>7.5</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>COPD (%)</td>
<td>7.9</td>
<td>9.0</td>
<td>0.12</td>
</tr>
<tr>
<td>No. of cardiovascular conditions (mean ± SD)</td>
<td>0.9 ± 1.1</td>
<td>1.0 ± 1.1</td>
<td>0.03</td>
</tr>
<tr>
<td>Hemoglobin (g/dl; mean ± SD)</td>
<td>10.1 ± 1.8</td>
<td>10.1 ± 1.7</td>
<td>0.38</td>
</tr>
<tr>
<td>Serum albumin (g/dl; mean ± SD)</td>
<td>3.2 ± 0.7</td>
<td>3.1 ± 0.7</td>
<td>0.01</td>
</tr>
</tbody>
</table>

COPD, chronic obstructive pulmonary disease.
Multiphasic Personality Inventory, or the Multiple Affect Adjective Checklist—was associated with HD patients’ capacity to engage in physical activity. Patients who were studied by Carney et al. (8) received an examination by a cardiologist, a resting electrocardiogram and symptom-limited graded exercise treadmill stress test, and measurement of VO2max according to the standard Bruce protocol. VO2max, defined as the highest VO2 reached during the test, is considered an excellent measure of physical work capacity (17).

Among the other variables included in our analysis, receipt of disability income was also associated with patients’ employment status after starting dialysis. Half of the patients who did not continue working reported receiving disability income, whereas only 14% of patients who continued working reported receiving disability income. Two government programs, SSDI and SSI, provide benefits on the basis of disability. Under SSDI, individuals are eligible to receive compensation for lost employment if they are “insured” under the Social Security Act by virtue of the Social Security tax on their earnings or if they are disabled dependents of insured individuals. Individuals are eligible for SSI payments when they are disabled and have limited income and resources; in most states, these individuals are also automatically entitled to Medicaid.

That a patient is not working may be because he or she

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**Table 2.** Employment status approximately 4 months after dialysis start of CDS participants who worked in the year before dialysis (*n* = 585)

| Parameter | Working Now Full or Part Time (*n* = 191) | Not Working Now (*n* = 394) | *P*
|-----------|-----------------------------------------|-----------------------------|------
| Age (years; mean ± SD) | 53.5 ± 13.4 | 53.0 ± 13.5 | 0.69
| Male (%) | 64.4 | 58.1 | 0.19
| Black (%) | 27.8 | 38.8 | 0.04
| Education (%) | | | 0.001
| high school or less | 35.3 | 55.6 | 0.01
| at least some college | 64.7 | 44.4 | 0.11
| EGH insurance (%) | 68.1 | 31.2 | <0.0001
| Receiving disability income (%) | 14.1 | 50.9 | <0.0001
| Diabetes (%) | 39.8 | 48.0 | 0.11
| Not able to ambulate or transfer (%) | 0.5 | 1.0 | 0.56
| COPD (%) | 3.7 | 4.1 | 0.82
| No. of cardiovascular conditions (mean ± SD) | 0.6 ± 1.0 | 0.7 ± 0.9 | 0.27
| Hemoglobin (g/dl; mean ± SD) | 10.3 ± 1.8 | 9.9 ± 1.9 | 0.03
| Serum albumin (g/dl; mean ± SD) | 3.4 ± 0.6 | 3.1 ± 0.8 | 0.0003
| HD (%) | 81.1 | 94.1 | <0.0001
| PHQ-2 score (mean ± SD) | 1.0 ± 1.5 | 1.8 ± 1.9 | <0.0001
| AAS (HAP; mean ± SD) | 60.2 ± 14.8 | 46.1 ± 18.6 | <0.0001

COPD, chronic obstructive pulmonary disease.

**Table 3.** Predictors of continued employment among ambulatory CDS participants who worked in the year before dialysis (*n* = 564)

| Parameter | OR | 95% CI | *P*
|-----------|----|--------|------
| Age | 1.01 | 0.99 to 1.03 | 0.25
| Male | 1.36 | 0.85 to 2.15 | 0.20
| Black | 0.91 | 0.54 to 1.54 | 0.72
| At least some college | 1.37 | 0.84 to 2.24 | 0.20
| EGH insurance | 3.25 | 2.10 to 5.03 | <0.0001
| Receiving disability income | 0.26 | 0.14 to 0.47 | <0.0001
| Diabetes | 0.78 | 0.48 to 1.27 | 0.32
| COPD | 2.19 | 0.83 to 5.83 | 0.12
| No. of cardiovascular conditions | 1.07 | 0.83 to 1.37 | 0.60
| HD | 0.39 | 0.19 to 0.81 | 0.01
| PHQ-2 score | 0.87 | 0.74 to 1.01 | 0.06
| AAS (HAP) | 1.04 | 1.02 to 1.05 | <0.0001

Analysis is restricted to participants who were able to ambulate/transfer. COPD, chronic obstructive pulmonary disease.
would rather receive disability than be gainfully employed (9). Most people can earn much more money by working than they would receive from disability, however. Vocational counselors can help individuals who require dialysis with decisions about balancing the financial rewards that they can expect from employment versus receipt of disability benefits (18), and dialysis facilities with the highest employment rates are more likely to have patients who receive vocational rehabilitation services (19). Under the Ticket to Work and Work Incentives Improvement Act of 1999, people may be able to retain Medicaid coverage when they become employed. There is general agreement, however, that more needs to be done to strengthen the relative gains that individuals can achieve by working versus receiving disability income (20).

Patients who remained employed after starting dialysis were twice as likely to have EGH insurance as those who did not remain employed. Maintaining EGH coverage may be a motivation to continue employment for some patients, especially as a means of maintaining health insurance benefits for family members. In addition, as in other studies (21-23), patients who were on PD were more likely than those who were on HD to remain employed after starting dialysis. As Hirth et al. (23) concluded, it is likely that patient characteristics, rather than dialysis modality, function as the main determinants of employment status, but using a therapy such as PD can make employment more feasible, and patients may select or be recommended for PD to facilitate their employment.

Although educational status, race, hemoglobin, and serum albumin did not remain significantly associated with CDS participants’ employment status in the adjusted analyses, univariable analyses showed that patients with higher educational status and with higher hemoglobin and serum albumin levels were more likely to continue working, whereas black patients were less likely to continue working. Similar associations have been reported previously (1,3,21-25).

Data from the CDS do not necessarily reflect the entire dialysis population given differences between the CDS cohort and the total US population of incident dialysis patients (Table 1), but the proportion of previously employed CDS participants who discontinued employment after starting dialysis was very similar to data observed nationally (2). The analyses that we report do not include facility-level factors that may influence patients’ employment, although the analyses do take into account the effect of patient clustering in facilities as a result of the sampling design. We previously showed that dialysis clinic–specific employment rates are positively associated with availability of a late (5 p.m. or later) HD treatment shift, availability of PD or home HD training, and provision of frequent HD and that in facilities with the highest employment rates, patients are more likely to receive vocational rehabilitation services (19).

With respect to the variables of primary interest in our study—depressed mood and usual activity level—the PHQ-2 (26,27) and the HAP (28) seem to be valid and useful measures in this population. Whether the onset of depressive symptoms for CDS participants preceded dialysis start or reflects major life changes that are involved in beginning dialysis therapy remains unknown. Hedayati et al. (29) estimated that up to 20% of patients have depressive symptoms even before beginning dialysis.

The importance of providers’ addressing mood disorders in patients with CKD as early as possible (16,30) and of dialysis facilities’ screening for depression and managing mood disorders in their patients using strategies such as counseling and cognitive-behavioral therapy (15) is increasingly acknowledged. Wells et al. (31) found in a randomized clinical trial that depressed patients who were identified in primary care practices had a higher chance of remaining employed for at least 1 year when they received treatment that addressed depression in a quality-improvement program, and these outcomes applied to patients with a 12-month or lifetime disorder as well as to patients with depressive symptoms only. It is interesting that a review of disability and employment in patients with chronic fatigue syndrome found that depression was the only measurable impairment consistently associated with disability or work outcomes in these patients and that cognitive-behavioral therapy and exercise therapy but no specific patient characteristics were associated with restoring the ability to work (32).

An assessment of activity level using a tool such as the HAP yields information that could help to target patients who are realistic candidates for supportive vocational rehabilitation services and/or for accommodations in dialysis treatment scheduling that might facilitate gainful employment. We found no correlation between employed patients’ AAS and occupational status rank (r = 0.02), which we interpret as indicating that the importance for employment of an individual’s capacity for physical activity does not depend on whether the individual holds a white-collar or blue-collar job.

Interventions that address either depressed mood or activity level may also benefit the other domain. Individual or group exercise programs and counseling can have a positive impact on patient activity levels (33), and physical activity has the potential to improve mood and relieve symptoms of depression (8,34,35). Carney et al. (8) found that HD patients who participated in a 6-month exercise training program showed an increase in aerobic capacity and in performance of pleasant activities and a significant decrease in self-reported depression. On the basis of information provided by CDS participants, we conclude that more attention to improving mood and usual activity level among patients with CKD and ESRD could help these individuals to maintain employment, along with generally improving their overall quality of life.

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Disclosures
None.
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