

# Dialysis Facility Characteristics and Variation in Employment Rates: A National Study

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**Background:** Investigation of factors associated with variation in dialysis patient employment has focused primarily on patient-level factors. Little is known about facility-level factors that may be associated with patient employment.

**Design, setting, participants, and measurements:** The ESRD Facility Survey (CMS-2744A) began in 2004 to collect counts of employed patients aged 18 to 54, in addition to dialysis unit census, types and timing of treatments offered, and staffing. Using the 2004 ESRD Facility Survey File, we investigated dialysis unit characteristics and facility employment rate of patients aged 18 to 54 in a logistic regression analysis that included hospital-based chronic renal care facilities, nonhospital renal disease treatment centers, independent special purpose renal dialysis facilities, and renal disease treatment centers.

**Results:** Across all facilities, 18.9% of prevalent patients aged 18 to 54 were employed, but facility employment rates ranged from 0 to 100%. Facility employment rate was positively associated independently with availability of a 5 p.m. or later dialysis shift (odds ratio (OR) 1.54, 95% confidence interval (CI) 1.42 to 1.68), availability of peritoneal dialysis or home hemodialysis (HD) training (OR 1.19, 95% CI 1.11 to 1.28), and provision of frequent HD (OR 1.26, 95% CI 1.07 to 1.49), after adjusting for patient/social worker ratio, rurality of unit location, and unit size. In addition, patient receipt of Vocational Rehabilitation (VR) services was more often reported in facilities with higher employment rates.

**Conclusions:** Promoting gainful employment among ESRD patients continues to be a quality improvement need. A dataset that allows adjustment for patient-level variables would facilitate increased understanding of the contribution of dialysis facility variables to patient employment.

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Gainful employment among “the maximum practical number of patients” was specified as a goal in 1986 Congressional legislation governing responsibilities of End-Stage Renal Disease (ESRD) Networks (1). ESRD Network Organizations, which function as liaisons between the federal government and providers of ESRD services (2), subsequently began to collect annual counts of employed patients in each dialysis facility within their respective Network geographic areas. Variation in facility employment rates and the association of these rates with facility characteristics has not been investigated, however.

Studies of factors associated with variation in dialysis patient employment have focused primarily on patient-level factors, especially individuals’ educational background, occupational status before dialysis, treatment modality, and health status/comorbidity. Higher educational level and prior occupational status are the patient-level factors that have been most consistently

identified as predictors of patient employment (3–8). A study by Rasgon *et al.* (9) showed, however, that facility-level variables may also influence patient employment status. The researchers found that blue-collar workers receiving dialysis in a facility that provided a multidisciplinary predialysis program designed to assist patients in maintaining employment were significantly more likely to continue employment than blue-collar workers who were treated at facilities that did not provide such a program.

We undertook this study to examine the potential association of facility characteristics with variation in patient employment rates across dialysis facilities, using a national database. We investigated dialysis facility characteristics and aggregate employment within facilities of prevalent patients aged 18 to 54, as reported on the 2004 ESRD Facility Survey. The ESRD Facility Survey is completed annually for the Centers for Medicare and Medicaid Services (CMS) by all Medicare-approved facilities providing outpatient services to ESRD patients. In 2004, the survey began to collect aggregate information on the number of patients aged 18 to 54 in the facility and the number of patients aged 18 to 54 who were employed at the end of the calendar year, in addition to counts of patients entering and leaving the facility and counts of patients in specific treatment modality categories at the end of the survey period. The survey also annually captures several facility characteristics that are recognized as potentially relevant for patient employment, *i.e.*, availability of a late dialysis shift (10), availability of home dialysis

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treatment options (11), provision of frequent hemodialysis (HD) treatment (12), and level of social worker staffing (13).

## Concise Methods

### *Data Source and Study Population*

The 2004 ESRD Facility Survey File, which was released by CMS in January 2006, was the source of data for this study. The ESRD Facility Survey (CMS-2744A) "is designed to capture only a limited amount of information concerning each federally approved renal facility's operation." (14) As noted, data elements requesting information about aggregate patient employment were added to the survey form in 2004.

Facilities approved by Medicare to provide services to ESRD patients, except facilities certified as only providing inpatient services, are required to complete the ESRD Facility Survey (42 U.S.C.426; 20 CFR 405, section 2133). The 2004 ESRD Facility Survey File contains information reported by facilities for the period January 1 to December 31, 2004. After excluding short-stay hospitals, long-term hospitals, children's hospitals, and hospital-based special purpose dialysis facilities, which are unlikely to have the goal of promoting employment among working-age adults, there were 4177 hospital-based chronic renal care facilities, nonhospital renal disease treatment centers, independent special purpose renal dialysis facilities, and renal disease treatment centers (hospital satellites).

### *Measures*

Facility employment is defined as the number of patients aged 18 to 54 dialyzing at a facility as of December 31 "who are employed full-time or part-time," *i.e.*, "received taxable wages from an employer or were self-employed and paid taxes on earnings." The ESRD Facility Survey adopted this definition of employment from the definition used by facilities to report employed patient counts to ESRD Networks. The United States Renal Data System (USRDS) Rehabilitation/Quality of Life Special Studies Center collaborated in 2002 with several ESRD Network representatives and with ESRD Network administrators at CMS to increase the specificity and standardization of the definition, (1) by defining the "working-age" population as patients aged 18 to 54 inclusive rather than patients aged 18 to 55 as had been done previously, because individuals may take early retirement at age 55, and (2) by reporting as "employed" only patients with gainful employment, defined as receiving taxable wages from an employer or being self-employed and paying taxes on earnings. Predialysis employment of patients who started dialysis during the year but are not employed as of December 31 should not be counted as employment by persons who complete the survey information, according to the survey definition of employment.

The following facility characteristics were investigated as potential predictors of facility employment rates:

Late dialysis shift offered: Dialysis shift starting at 5:00 p.m. or later offered by facility.

Home dialysis services offered: Peritoneal dialysis (PD) and/or home HD training offered by the facility.

Frequent HD provided: One or more HD patient(s) dialyzed 5 or more times per week (daily or nocturnal, in-center or home).

Patient-to-social worker staff ratio: Total number of patients receiving care at end of survey period divided by total number of social workers on staff full-time and part-time (full-time is defined as 32+ hours employment/wk).

Because a facility's geographic location may influence patient outcomes (10,15), a measure of rural/urban location based on facility zip code was included as a covariate in the analysis. Following the methodology used by O'Hare *et al.* (15), "rurality" was defined using a zip

code approximation of Rural-Urban Commuting Area (RUCA) codes assigned to census tracts. RUCA codes range from 1.0 to 10.6, with 1.0 = least rural and 10.6 = most rural. A National File is available from the University of Washington and can be downloaded from [http://www.fammed.washington.edu/wwamirhrc/rucas/RUCA\\_description.htm](http://www.fammed.washington.edu/wwamirhrc/rucas/RUCA_description.htm). A measure of facility size (number of patients aged 18 to 54 receiving dialysis at the end of the calendar year, which ranged from 1 to 177 in the 2004 data) was also included as a covariate in the analysis.

### *Statistical Analyses*

Facility employment rates were determined by dividing the number of patients aged 18 to 54 employed full-time or part-time by the number of all patients aged 18 to 54. Facilities were then grouped by employment rate quartiles, and the percentage of facilities that reported availability of a late shift, home dialysis services, and frequent HD was presented for each group. The mean patient/social worker ratio of facilities across quartiles was also presented by group. The association between employment and each of these facility characteristics was tested using univariable logistic regression models with employment status as the outcome.

The association of facility characteristics with patient employment was also investigated in a multivariable logistic regression model, controlling for the effect of facility geographic location and size. All patients aged 18 to 54 in a given facility were considered to share all of the characteristics associated with that facility. Odds ratios (OR) were obtained from the logistic regression model, showing the association between employment and each facility predictor after adjusting for all other variables. In all of the logistic regression analyses, the Williams procedure (16) was used to accommodate overdispersion caused by patient clustering in facilities.

## Results

There were 105,636 dialysis patients aged 18 to 54 reported in the survey data, which represented 33% of all point prevalent dialysis patients reported by the facilities included in our analysis. Among the selected facilities, 19.0% reported availability of a dialysis shift starting at 5:00 p.m. or later, 45.2% reported offering PD and/or home HD training, and 3.5% reported that one or more HD patient(s) in the facility dialyzed 5 or more times/wk. The mean patient/social worker ratio was 62 (SD 35); the median ratio was 57.

The employment rate across all facilities was 18.9%; within individual dialysis facilities the rate of patient employment ranged from 0 to 100%. When facilities were grouped by quartile on the basis of lowest to highest employment percentage (Table 1), significant differences across quartiles were evident in the percentage of facilities reporting availability of a late shift, availability of PD and/or home HD training, and patient treatment by frequent HD. Availability of a late shift ( $P < 0.0001$ ), availability of PD and/or home HD training ( $P < 0.0001$ ), and treatment of one or more patients by frequent HD ( $P = 0.0008$ ) were more often reported as facility employment percentage increased. The patient/social worker ratio was lower for facilities in the lowest employment percentage quartile ( $P < 0.0001$ ).

In a multiple logistic regression analysis adjusted for facility location and size, availability of a late dialysis shift, availability of PD and/or home HD training, and receipt of frequent HD by one or more patients were independently associated with facil-

Table 1. Facility characteristics according to quartiles of employment rate<sup>a</sup>

Facility Characteristics	Employment Rate				P <sup>b</sup>
	0 (n = 1116)	0 to 15.12 (n = 945)	15.12 to 28.572 (n = 1026)	28.572 to 100 (n = 993)	
Late shift available (%)	10.4	13.5	24.3	29.1	<0.0001
PD and/or home HD training available (%)	38.5	41.2	52.2	50.2	<0.0001
One or more patient(s) received frequent HD (%)	2.1	3.0	4.2	5.1	<0.0001
Patient/social worker ratio					<0.0001
Mean (SD)	47 (32)	69 (32)	71 (35)	64 (34)	
Median	39	65	68	61	

<sup>a</sup>PD, peritoneal dialysis; HD, hemodialysis.

<sup>b</sup>P values were obtained from univariable logistic regression model with employment status as the outcome.

ity-specific employment. The analysis, reported in Table 2, indicated that employment of patients aged 18 to 54 was greater in facilities offering a 5 p.m. or later HD shift (OR 1.54, 95% CI 1.42 to 1.68). Availability of PD or home HD training (OR 1.19, 95% CI 1.11 to 1.28) and treatment in a facility that provided frequent HD to one or more patient(s) (OR 1.26, 95% CI 1.07 to 1.49) were also associated with higher facility employment rates. When the other facility variables were controlled in the regression analysis, patient/social worker ratio was no longer significantly associated with facility employment rates.

## Discussion

Low rates of employment among dialysis patients have been a long-standing concern in the ESRD Program (17–19). While patient characteristics such as level of education and occupational status before dialysis remain fixed, it is possible that facility-level characteristics could be modified in efforts to encourage patients' opportunity to be employed. As one ESRD Network's annual report noted, the observation of "considerable variability in rates among facilities [suggests] some potential for change" (20).

A late dialysis shift may be instituted to expand the capacity of a facility or to accommodate patients who work (10). The 1994 National Workshop on Barriers to Rehabilitation of Persons with End-Stage Renal Disease and Chronic Urinary Incontinence identified inflexible dialysis schedules as a barrier to rehabilitation (21). Similarly, Hirth *et al.* (11) observed that a key

barrier to labor force participation among dialysis patients is the convenience of scheduling treatment. The strongest predictor of facility employment rate in our analysis was the presence of a late dialysis shift. Facilities with the highest employment rates were about three times more likely to have a late shift than facilities with the lowest employment rates.

As a patient-specific variable, use of home dialysis has been found to be associated with increased likelihood of employment in some studies (5,11,22,23), but not in other studies (4,6,7). As Table 1 indicates, home dialysis was available in approximately 40% of facilities with the lowest employment rates and in approximately 50% of facilities with the highest employment rates. Hirth *et al.* (11) concluded that a relatively flexible, and hence "work-friendly," modality such as PD does facilitate employment, but primarily because of the selection of PD by patients who wish to maintain employment rather than because of the ability of PD to ease work scheduling.

An association between individual patients' use of more frequent HD and increased likelihood of employment has been suggested in reports of data from several small patient cohorts (12). Based on a multicenter study of 72 patients who used frequent HD from 1972 to 1996, Woods *et al.* reported that the most common reason given for patients starting frequent HD was lifestyle or employment (24). In the 2004 ESRD Facility Survey, 122 units reported that patients received frequent in-center HD during the day, 19 reported that patients received frequent home HD during the day, 2 reported that patients received in-center nocturnal HD, and 8 reported that patients received home nocturnal HD. The overall number of patients reported to have used one of these types of treatment was 408. Facilities with the highest employment rates were about three times more likely to report having patients on frequent HD than facilities with the lowest employment rates. Because only aggregate data were available, it remains unknown whether individual patients who received frequent HD were more likely to be employed.

The multivariable logistic regression analysis did not show an association between patient/social worker ratio and facility employment rate. It is likely that patient case-mix in a facility, as well as social workers' familiarity with patient employment issues, are important variables that influence

Table 2. Multivariable logistic regression analysis showing association of facility characteristics with facility employment rate<sup>a</sup>

Facility Characteristic	Odds Ratio (95% CI)
5:00 p.m. or later dialysis shift	1.54 (1.42 to 1.68)
PD and/or home HD training	1.19 (1.11 to 1.28)
One or more patient(s) frequent HD	1.26 (1.07 to 1.49)
Patient/social worker ratio	1.00 (0.999 to 1.002)

<sup>a</sup>A total of 3,842 facilities had information for all variables. Analysis is adjusted for facility location (rurality) and size (number of patients aged 18 to 54).

this association. The 1994 national workshop that addressed rehabilitation issues for adult ESRD patients recommended “a case-mix–adjusted ratio of renal social workers to patients that is adequate for social workers to effectively promote case-mix appropriate rehabilitation objectives” and recommended that “ESRD consumers have access to social workers. . . who are knowledgeable and experienced in dealing with SSA regulations, career exploration, *etc.*, that are relevant for renal clients’ needs (21).”

The results of our analysis were not altered when we adjusted for measures of facility geographic location and size. Size may be associated with clinical performance differences; larger facilities have been found to have higher average urea reduction ratios and lower hospitalization (Wolfe, *Kidney Epidemiology and Cost Center*, Ann Arbor, MI, personal communication, April 30, 2003). Facility-level clinical performance measures were not available in the dataset, however. We did not attempt to consider chain affiliation in the analysis, given the frequent changes that occur in facility ownership. Profit status was a data element on the survey form but was not included in the 2004 ESRD Facility Survey File (Grier, CMS, personal communication, May 3, 2006).

An additional data element reported in the ESRD Facility Survey that may be relevant for the goal of gainful employment is the number of patients aged 18 to 54 who received services from Vocational Rehabilitation (VR) during the calendar year. Receiving VR services may assist a patient to maintain, resume, or begin a job. As Hirth *et al.* (11) noted, “programs such as employment counseling or vocational rehabilitation. . . may lower some of the barriers to employment and can help target programs to individuals with the greatest potential for workforce participation.” An ESRD Network may try to promote facility knowledge of VR resources, *e.g.*, by sending each facility a list of VR counselors that includes the counselor’s contact information and the geographic regions they cover (25). The potential utility of vocational counseling for dialysis patients was addressed extensively in the 2002 report, “Effective Strategies for Improving Employment Outcomes for People with Chronic Kidney Disease,” developed by the Twenty-Seventh Institute on Rehabilitation Issues (26). Following recommendations of Institute participants, the ESRD Facility Survey specifies that patients aged 18 to 54 should be counted as receiving VR services during the calendar year if they talked with VR personnel and agreed to be evaluated for services by completing an application, having medical records requested, or being assigned a counselor; and/or received evaluation services by participating in testing or by attending an evaluation/testing center; and/or received vocational counseling, training at a community facility or private/public educational/training center or school; and/or received assistance with job seeking skills, with job placement, or with retaining or modifying a job through a VR counselor, job placement specialist, private or public agencies.

Overall, receipt of VR services by one or more patients was reported by 24.9% of facilities. The percentage of facilities in which one or more patients had received VR services differed

significantly when facilities were grouped by quartile from lowest to highest employment rate (0.6% in the first quartile, 2.3% in the second quartile, 3.7% in the third quartile, 3.8% in the fourth quartile;  $P < 0.0001$ ). Thus, employment rate and patient receipt of VR services demonstrated a linear association at the facility level. Because the ESRD Facility Survey only collects aggregate counts, it is not possible to know whether receipt of VR services promotes the likelihood of employment for individual patients.

Several limitations of this study must be noted. Our analysis focuses on an age-defined subset of patients, *i.e.*, patients aged 18 to 54. Other patient case-mix variables (gender, race, primary diagnosis, comorbidities), which may or may not be associated with employment status based on previous studies (4–8), were not available in the dataset. It was also not possible to know how long patients had been on dialysis or what percentage were covered by Medicare or by an Employer Group Health Plan.

Although we actively collaborated with CMS in efforts to improve the precision of the employment counts as well as the VR service receipt counts that are now reported on the ESRD Facility Survey (27), we are not able to assess the quality of data that were available from the 2004 survey. Data elements on the survey may not be interpreted or completed in a uniform way, especially if staff members do not carefully follow the instructions that are supplied with the survey. We acknowledge that overall employment information for a facility is incomplete if there are patients aged 55 and older in the facility who are employed, and patients who may work “off the books” are not included. In addition, the number of facility patients who were attending school during the calendar year, reported on the survey, indicates activity that may be relevant for achieving employment. An individual patient may be counted on the survey form as both employed and attending school, however, which precludes combining these two counts for a given facility.

At the same time, the ESRD Facility Survey provides a unique source of information about the gainful employment of prevalent working-age dialysis patients in the United States. Patient employment status is captured on the Medical Evidence Report when individuals start regular dialysis. There is little information about dialysis patients’ maintenance of employment over time (28), however, especially facility level factors that may influence this outcome.

The facility characteristics we analyzed are potentially modifiable. The associations we observed between facility characteristics and patient employment cannot be interpreted as indicating cause-and-effect relationships, however. Hirth *et al.* (11) showed that the association they observed between patients’ treatment modality selection and employment status substantially overstated the causal effect. Future research might consider implications of how dialysis facilities characterized by “work-friendly” characteristics are geographically distributed and whether there is an association between presence of “work-friendly” characteristics and income level of the zip code area in which a facility is located. The role of economic incentives for

facilities to accommodate employment among patients insured by Employer Group Health Plans should also be considered.

### Conclusion

We found that offering a late dialysis shift, as well as PD or home HD training and more frequent HD, was associated with higher facility employment rates. We also observed that those facilities in which at least one patient received VR services had higher employment rates. In their study of 169 dialysis facilities in Texas, Curtin *et al.* (29) showed that the number of rehabilitation activities reported by facilities was significantly associated with the mean Mental Component Summary scores of patients in those facilities. Identifying facility-level factors that may influence patient outcomes provides information that may be relevant for implementing facility-based interventions. A dataset that includes patient-level as well as facility-level variables would provide increased understanding of the role of dialysis facility characteristics in promoting dialysis patients' gainful employment, an objective that continues to be an important quality improvement needed in the ESRD Program.

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### Disclosures.

None.

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