

Dialysis Facility-Level Analysis of the Economic Impact of Pruritus Among End-Stage Renal Disease Patients Receiving Hemodialysis Therapy

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Introduction

- Pruritus, a medical condition characterized by moderate to severe itchy and dry skin, affects a large proportion (50%-90%) of end-stage renal disease (ESRD) patients who undergo hemodialysis (HD).^{1,2}
- There is an unmet need in treating pruritus; the condition is often under diagnosed, resulting in inadequate management of pruritus symptoms in ESRD patients. These patients are likely to report poor quality of life and experience poor health outcomes.^{3,4}
- The impact of pruritus on resource utilization and costs from a dialysis facility perspective is not well understood. In previous analyses, the authors of this study showed that ESRD patients with mild to severe itchiness/dryness symptoms (ie, markers of pruritus severity) were more likely to use erythropoietin-stimulating agents (ESA) and IV antibiotics, and to miss dialysis sessions.⁵⁻⁷ An increasing trend was noted from mild to severe form of itchiness and dryness symptom severity.
- The current study adds to the above analysis by measuring the cost impact to dialysis facilities resulting from increased resource use.

Objective

To assess health care costs to dialysis facilities treating ESRD patients with self-reported mild to severe itchiness and dryness symptom severity.

Methods

- **Data Source:** Data from a large dialysis provider contain information on a nationally representative sample of about 160,000 dialysis patients receiving treatment in more than 1,700 facilities across the United States. The data (DaVita Clinical Data Warehouse) contain information on patient demographics, comorbidities, medications, treatments, clinical laboratory results, hospitalizations, and quality of life.
- Patient-reported Kidney Disease Quality of Life 36 (KDQOL) survey assesses
 dialysis-specific, health-related quality of life for ESRD patients undergoing HD. It
 includes subscales for disease burden, symptoms and problems, and effects on daily
 life. This survey is administered yearly to dialysis patients treated by DaVita.
- **Study Design:** This was a retrospective database study on ESRD patients who responded to the KDQOL survey (Jan 2009 Sep 2011). Demographic variables, comorbidities, and clinical laboratory tests were assessed during the baseline month prior to KDQOL administration.
- Study Cohort: Self-reported KDQOL results for itchiness/dryness were rated on a scale of 1 to 5 for increasing symptom severity.
- Inclusion criteria: Adults (≥ 18 years), received in-center HD thrice weekly, completed the KDQOL after 3 months of HD initiation, and Medicare was the primary payer.
- Exclusion criteria: Patients receiving peritoneal dialysis, home HD, and nocturnal HD.
- Study Period: Baseline was 1 month prior to KDQOL assessment and follow-up was 3 to 6 months post KDQOL assessment.
- Study Outputs:
- Statistical differences for baseline characteristics across patient cohorts were determined through chi square tests of trend for proportions and Generalized Linear Model tests for mean differences.
- Dialysis-related costs:
- Medication costs: Multiplied total dose of each medication by unit price published in Red Book.
- Clinical lab costs: Multiplied total number of each lab test by the standard Medicare allowable amount in the physician fee and coding guide.
- Missed session costs: Multiplied total number of sessions missed by the 2012
 Medicare composite reimbursement rate (ie, \$234.81).
- Used a generalized linear mixed model with log link and gamma distribution to estimate total dialysis-related costs as a result of non-normal costs distribution.
- Determined statistical differences between cohorts using an unadjusted model. Models were adjusted for gender, race, insurance type, BMI, primary cause of ESRD, vintage, baseline comorbidities, vascular access, and length of follow up.

Results

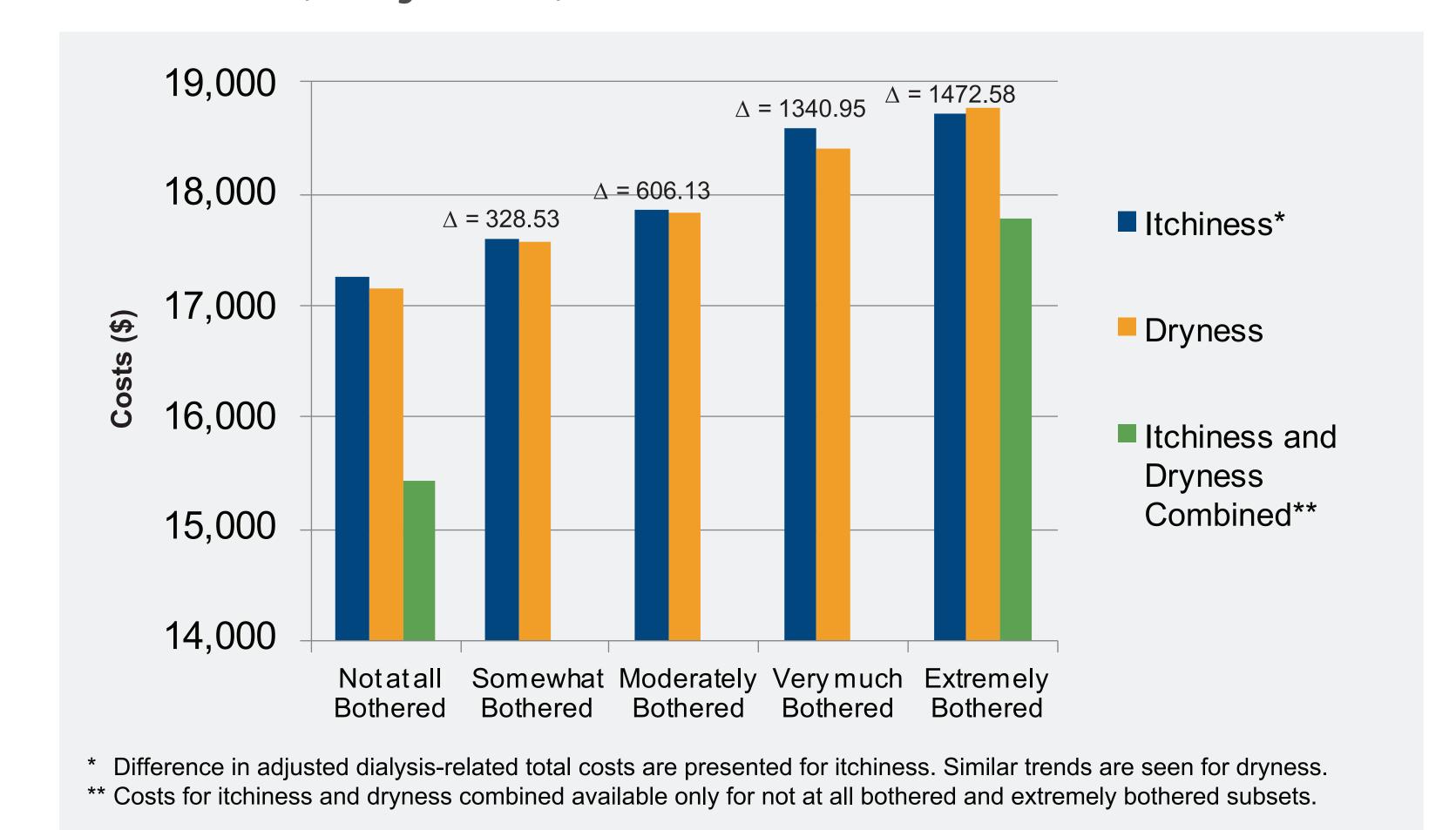
Table 1. Baseline Patient Characteristics and Clinical Measures by Patient-Reported Itchiness

N = 38,315	Not at all Bothered n = 15,319	Somewhat Bothered n = 11,567	Moderately Bothered n = 5,867	Very Much Bothered n = 3,571	Extremely Bothered n = 1,991	P-value
Age (years; mean ± SD)	62.32 ± 14.44	61.96 ± 14.25	61.55 ± 14.3	61.32 ± 14.61	59.37 ± 14.25	< 0.0001
Gender (% female)	46.3	45.47	45.36	48.19	50.88	0.0022
Race/Ethnicity (%)						< 0.0001
African American	41.94	41.71	39.34	41.89	45.61	
Asian	1.88	2.12	2.44	2.63	1.46	
Caucasian	37.57	37.82	39.82	36.26	34.2	
Hispanic	14.28	13.74	13.87	15.23	14.97	
Other	4.33	4.61	4.53	3.98	3.77	
Cause of end-stage renal disease (%)						0.0339
Diabetes	44.1	43.43	43.43	45.53	43.95	
Hypertension	32.3	32.84	31.63	30.52	30.29	
Other	23.6	23.73	24.94	23.94	25.77	
Vintage (years; mean ± SD)	3.83 ± 3.85	4.01 ± 3.89	3.98 ± 3.89	3.9 ± 3.56	4.07 ± 3.88	0.004
DaVita Vintage (years; mean ± SD)	3.08 ± 3.06	3.2 ± 3.03	3.19 ± 3.05	3.17 ± 2.94	3.19 ± 3.03	0.0155
Comorbidities (%)						
Cardiovascular	28.53	29.45	31.36	31.5	32.7	< 0.0001
Cancer	2.21	2.43	2.49	2.8	2.71	0.0215
Chronic obstructive pulmonary disease	3.39	4.05	4.57	5.26	6.48	< 0.0001
Liver disease	1.81	2.03	2.03	2.38	2.66	0.0029
Pruritus	3.46	4.88	5.37	7.17	10.1	< 0.0001
Bacteremia	27.39	29.2	31.57	32.68	33.85	< 0.0001
Septicemia	5.88	6.57	7.12	7.2	7.89	< 0.0001
Transplant History (%)	5.46	5.58	5.69	5.04	5.07	0.4387
Vascular Access (%)		16.25				0.005
Catheter	17.56	60.74	17.33	17.36	17.43	
Fistula	60.95	23.01	61.72	61.72	58.92	
Graft	21.49		20.95	20.95	23.66	
BMI (kg/m²; mean ± SD)	28.76 ± 7.10	28.9 ± 7.16	29.06 ± 7.46	28.85 ± 7.33	28.93 ± 7.62	0.0978
Hemoglobin (g/dL; mean ± SD)	11.3 ± 1.21	11.34 ± 1.21	11.33 ± 1.23	11.29 ± 1.28	11.28 ± 1.29	0.8122
Kt/V (mean ± SD)	1.56 ± 0.52	1.56 ± 0.5	1.57 ± 0.49	1.55 ± 0.51	1.56 ± 0.49	0.7504

Abbreviations: BMI, body mass index; SD, standard deviation. Similar findings were observed across patient cohorts by dryness severity.

- In the final sample (N = 38,315), differences were observed across cohorts for age, gender, race and ethnicity, cause of ESRD, and dialysis vintage (P < 0.05).
- Statistically significant differences were seen for comorbidity. With increasing itchiness/dryness, a larger proportion of patients had cardiovascular disease, chronic obstructive pulmonary disease, liver disease, pruritus, and histories of bacteremia and septicemia.
- Statistically significant differences were also observed in clinical measures (BMI, Kt/V) at baseline, but these differences were small in magnitude.
- Similar patient characteristic findings were observed by dryness severity.
- The total unadjusted costs during the 6-month follow-up period, compared to patients reporting "not at all bothered" by itchiness, were higher by \$507 (somewhat bothered), \$803 (moderately bothered), \$1,520 (very much bothered), and \$2,238 (extremely bothered). Compared to patients reporting "not at all bothered" by dryness, the total costs were higher by \$542 (somewhat bothered), \$840 (moderately bothered), \$1,610 (very much bothered), and \$2,729 (extremely bothered).
- Average total dialysis-related costs associated for patients reporting they were "very much or extremely bothered" by itchy and dry skin severity was \$2,348 higher than patients with no itchy or dry skin. All results were statistically significant (p < 0.0001).
- The adjusted model results, though similar to the unadjusted results, showed modest attenuation after inclusion of covariates (Figure 1). Differences were statistically significant (P < 0.0001).

Figure 1. Adjusted Dialysis-Related Total Costs by Itchiness, Dryness, and Combined



Discussion

- Increased use of ESAs, IV antibiotics, and missed sessions were major drivers of overall costs across all itchiness/dryness subgroups. A previous analysis using the same patient cohort showed statistically significant increases in ESA and IV antibiotic utilization⁶ and number of missed sessions⁷ with increasing severity of itchiness and dryness. Patients who reported extremely bothersome itchiness/dryness had approximately 5000 units higher monthly ESA dose, were 35% more likely to miss dialysis sessions, and were 54% more likely to use IV antibiotics, compared to patients who did not report itchiness/dryness severity.
- Study limitations:
- Costs outside the scope of dialysis facilities have not been assessed in a large sample.
- Costs were indirectly estimated based on utilization.
- Cause of skin itchiness/dryness has not been determined.

Conclusions

ESRD patients with pruritus symptoms impose higher costs to dialysis facilities. Pruritus symptom relief in ESRD patients may be an important target for therapeutic intervention.

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Acknowledgments

We extend our sincere appreciation to the teammates in more than 1,800 DaVita clinics who work every day to take care of patients and also to ensure the extensive data collection on which our work is based. We thank DaVita Clinical Research® (DCR®), and specifically acknowledge Michele G. Scheid of DCR for editorial contributions in preparing this poster. DCR is committed to advancing the knowledge and practice of kidney care.

This study was funded by Mitsubishi Tanabe Pharma Corporation.

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Poster available at www.davitaclinicalresearch.com/directory.asp

International Society for Pharmacoeconomics and Outcomes Research 18th Annual International Meeting, 18-22 May 2013, New Orleans, LA.

