

Patient-Reported Pruritus Rates and Indicators of Infection Co-vary Directly Among Patients Receiving Dialysis

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Introduction

- Data by Nunley et al. show that > 90% of dialysis patients report itch, ranging from mild to severe in intensity.¹
- The Dialysis Outcomes and Practice Patterns Study (DOPPS) reported that 70% of hemodialysis (HD) subjects with end-stage renal disease (ESRD) suffer from pruritus; 42%-45% have moderate-to-extreme itch.²
- The scratching that results may represent a source of infection, as scratching can disrupt skin integrity.³
- The Kidney Disease Quality of Life-36 (KDQOL) survey assesses dialysis-specific, patient-reported, health-related QOL for individuals with ESRD who are undergoing dialysis.⁴
- This survey includes the short form (SF-12) physical and mental component scores (PCS and MCS, respectively), subscales for burden of disease, symptoms and problems (including skin itch), and effects on daily life.
- This survey is administered annually to all dialysis patients treated by a large dialysis organization.

Objective

Increased patient-reported itching was hypothesized to be associated with intravenous (IV) antibiotic use, and infection-related inflammation was hypothesized to be associated with increased epoetin alfa (EPO) use.⁵

Methods

- We examined health records for patients (N = 70,500) undergoing dialysis (January 2009 – May 2012) for various characteristics, including IV antibiotic use and mean monthly EPO dose.
- IV antibiotic use was tracked within a 2-month window of KDQOL administration.
- Other measures were obtained during the month that the questionnaire was administered.
- Tests for trend in antibiotic use (yes/no) were performed via the Cochran-Armitage test.
- ANOVA analysis was performed on EPO utilization across categories.
- *P* values for differences among groups were based on linear regression (for continuous variables), Cochran-Armitage trend test (for dichotomous variables), or chi-square tests (for categorical variables).

Results

Table 1. Patient Characteristics by Itchiness Score

	P-value				
1	2	3	4	5	for Trend
28,073	21,320	10,869	6,521	3,717	
60.34 (14.83)	60.11 (14.55)	60.02 (14.62)	59.58 (14.57)	58.51 (14.38)	< 0.0001
3.55 (3.79)	3.65 (3.78)	3.57 (3.66)	3.61 (3.51)	3.72 (3.78)	0.0201
2.91 (2.99)	2.98 (2.97)	2.96 (2.95)	2.97 (2.86)	2.98 (2.95)	0.0568
28.98 (7.60)	29.09 (7.67)	29.19 (7.72)	29.03 (7.88)	29.20 (8.12)	0.0443
44.82	44.07	43.44	47.22	49.96	< 0.0001
53.30	53.27	54.89	56.83	56.36	< 0.0001
39.27 (10.67)	36.96 (10.15)	34.89 (9.66)	33.14 (9.30)	32.12 (9.47)	< 0.0001
52.07 (10.00)	49.74 (10.41)	47.65 (10.78)	44.81 (11.06)	43.46 (11.88)	< 0.0001
24.95	25.40	27.31	28.05	28.11	< 0.0001
2.09	2.04	2.28	2.33	2.02	0.3692
3.01	3.46	4.05	4.68	5.43	< 0.0001
1.38	1.72	1.68	1.75	1.99	0.0007
	Total				
1	2	3	4	5	Percent
39.58	38.43	36.09	38.81	42.35	38.77
15.09	15.44	15.08	16.09	15.79	15.32
2.16	2.72	3.18	3.36	2.50	2.62
1.46	1.36	1.37	1.21	0.81	1.36
1.82	1.90	2.22	1.86	1.56	1.90
0.05	0.09	0.03	0.03	0.00	0.05
42.69	42.17	42.92	43.93	42.37	42.67
31.16	31.60	30.49	29.84	30.91	31.06
5.72	5.95	5.65	6.39	5.78	5.84
2.86	2.72	2.82	2.22	2.29	2.72
12.78	12.84	13.11	12.99	13.83	12.93
	60.34 (14.83) 3.55 (3.79) 2.91 (2.99) 28.98 (7.60) 44.82 53.30 39.27 (10.67) 52.07 (10.00) 24.95 2.09 3.01 1.38 15.09 2.16 1.46 1.82 0.05	1 2 28,073 21,320 60.34 60.11 (14.83) (14.55) 3.55 3.65 (3.79) (3.78) 2.91 2.98 (2.99) (2.97) 28.98 29.09 (7.60) (7.67) 44.82 44.07 53.30 53.27 39.27 36.96 (10.67) (10.15) 52.07 49.74 (10.00) (10.41) 24.95 25.40 2.09 2.04 3.01 3.46 1.38 1.72 Itcl 1 2 39.58 38.43 15.09 15.44 2.16 2.72 1.46 1.36 1.82 1.90 0.05 0.09 42.69 42.17 31.16 31.60 5.72 5.95 2.86 2.72	1 2 3 28,073 21,320 10,869 60.34 60.11 60.02 (14.83) (14.55) (14.62) 3.55 3.65 3.57 (3.79) (3.78) (3.66) 2.91 2.98 2.96 (2.99) (2.97) (2.95) 28.98 29.09 29.19 (7.60) (7.67) (7.72) 44.82 44.07 43.44 53.30 53.27 54.89 39.27 36.96 34.89 (10.67) (10.15) (9.66) 52.07 49.74 47.65 (10.00) (10.41) (10.78) 24.95 25.40 27.31 2.09 2.04 2.28 3.01 3.46 4.05 1.38 1.72 1.68 Itchiness Scot 1 2 3 39.58 38.43 36.09 15.09 15.44	28,073 21,320 10,869 6,521 60.34 60.11 60.02 59.58 (14.83) (14.55) (14.62) (14.57) 3.55 3.65 3.57 3.61 (3.79) (3.78) (3.66) (3.51) 2.91 2.98 2.96 2.97 (2.99) (2.97) (2.95) (2.86) 28.98 29.09 29.19 29.03 (7.60) (7.67) (7.72) (7.88) 44.82 44.07 43.44 47.22 53.30 53.27 54.89 56.83 39.27 36.96 34.89 33.14 (10.67) (10.15) (9.66) (9.30) 52.07 49.74 47.65 44.81 (10.00) (10.41) (10.78) (11.06) 24.95 25.40 27.31 28.05 2.09 2.04 2.28 2.33 3.01 3.46 4.05 4.68 1.38 1.72 1.68 1.75 Itchiness Scove <td>1 2 3 4 5 28,073 21,320 10,869 6,521 3,717 60.34 60.11 60.02 59.58 58.51 (14.83) (14.55) (14.62) (14.57) (14.38) 3.55 3.65 3.57 3.61 3.72 (3.79) (3.78) (3.66) (3.51) (3.78) 2.91 2.98 2.96 2.97 2.98 (2.99) (2.97) (2.95) (2.86) (2.95) 28.98 29.09 29.19 29.03 29.20 (7.60) (7.67) (7.72) (7.88) (8.12) 44.82 44.07 43.44 47.22 49.96 53.30 53.27 54.89 56.83 56.36 39.27 36.96 34.89 33.14 32.12 (10.67) (10.15) (9.66) (9.30) (9.47) 52.07 49.74 47.65 44.81 43.46 (10.00)<</td>	1 2 3 4 5 28,073 21,320 10,869 6,521 3,717 60.34 60.11 60.02 59.58 58.51 (14.83) (14.55) (14.62) (14.57) (14.38) 3.55 3.65 3.57 3.61 3.72 (3.79) (3.78) (3.66) (3.51) (3.78) 2.91 2.98 2.96 2.97 2.98 (2.99) (2.97) (2.95) (2.86) (2.95) 28.98 29.09 29.19 29.03 29.20 (7.60) (7.67) (7.72) (7.88) (8.12) 44.82 44.07 43.44 47.22 49.96 53.30 53.27 54.89 56.83 56.36 39.27 36.96 34.89 33.14 32.12 (10.67) (10.15) (9.66) (9.30) (9.47) 52.07 49.74 47.65 44.81 43.46 (10.00)<

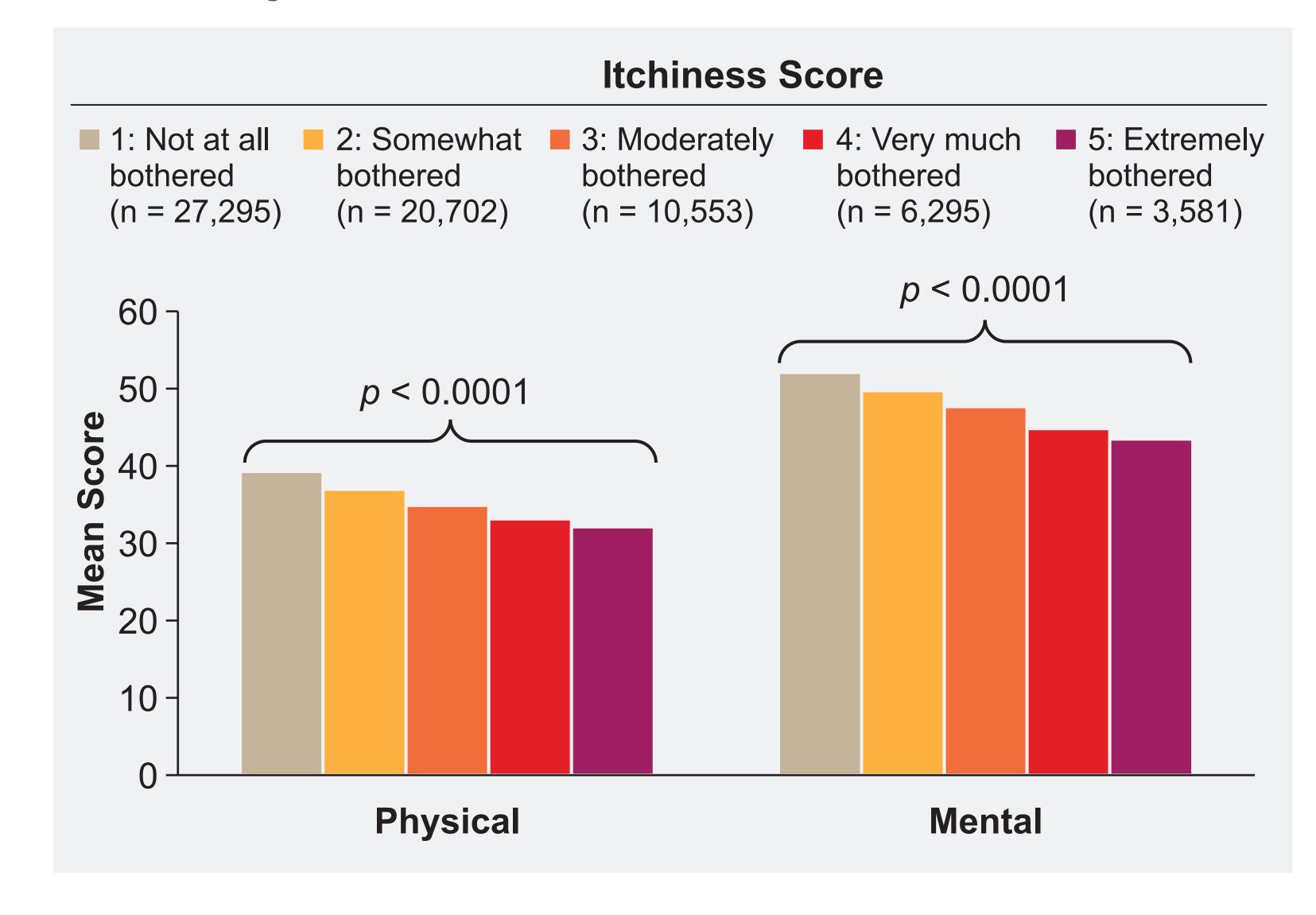
Abbreviations: BMI, body mass index; ESRD, end-stage renal disease; KD, kidney disease; KDQOL, Kidney Disease Quality of Life-36 survey; SD, standard deviation.

*Includes only patients with complete SF-12 (all 12 questions—non 0 score); n = 68,426.

†Chi-square p < 0.0001

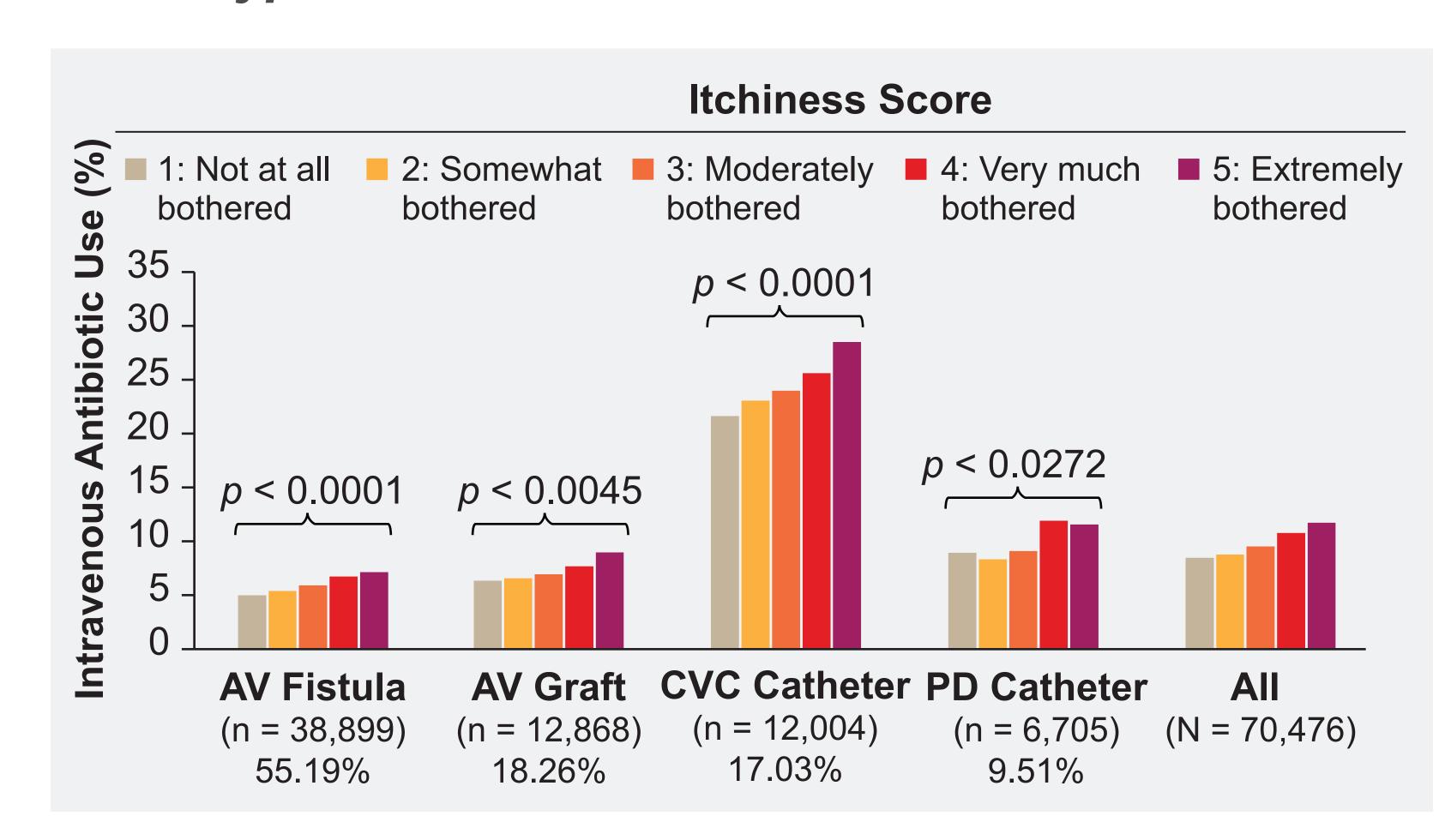
- Meaningfulness of differences were not always tied to statistical significance due to sample size.
- Patients who self-reported higher degrees of itch
- Were slightly younger
- Were more likely to be female
- Were more likely to have diabetes
- Had lower overall physical and mental component
- Were more likely to have cardiovascular disease (CVD), chronic obstructive pulmondary disease (COPD), or liver disease
- Race and cause of ESRD were different among groups but showed no meaningful pattern.

Figure 1. Kidney Disease Quality of Life Assessment Physical and Mental Component Scores by Itchiness



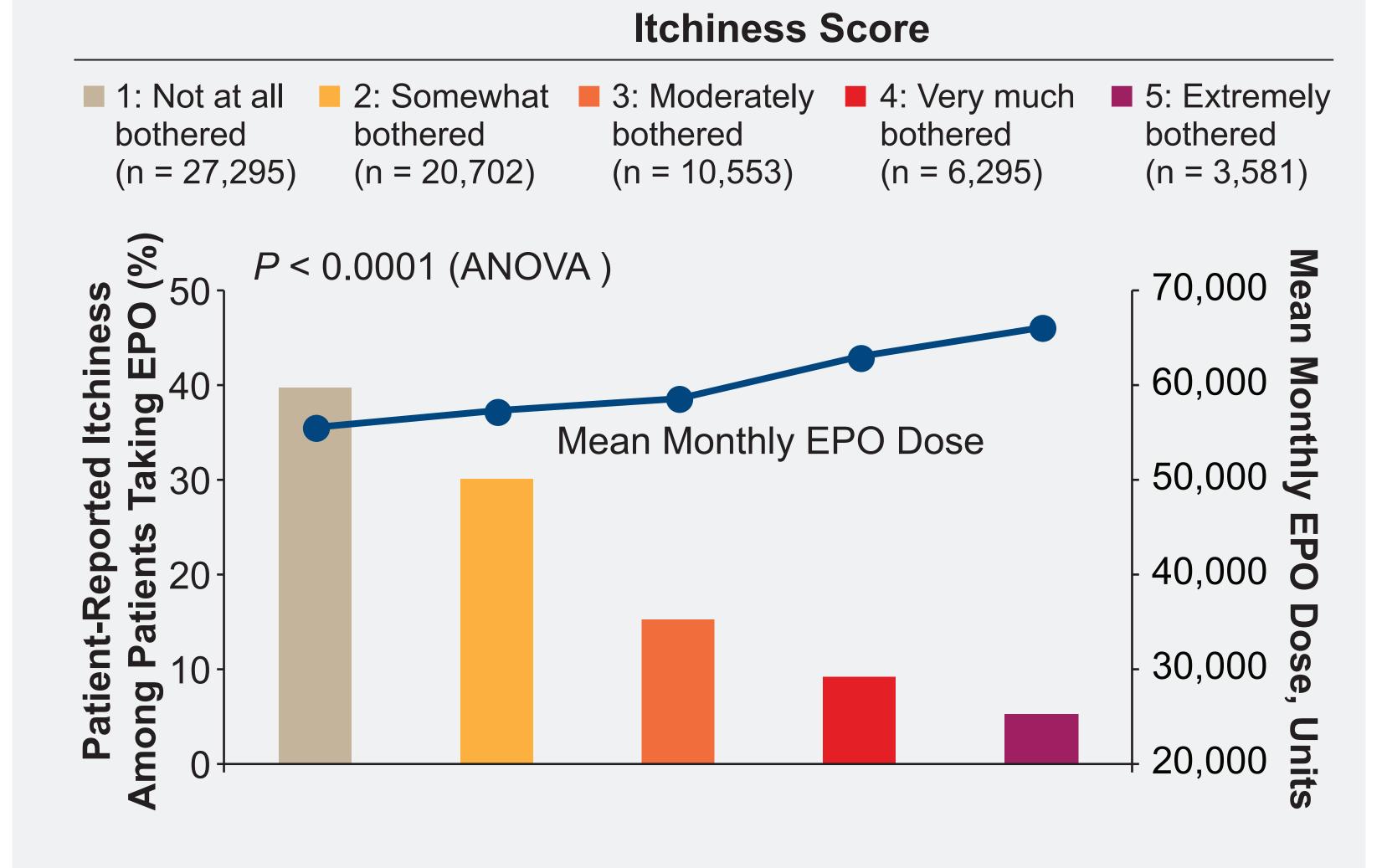
 An association was observed between itchiness and both physical and mental component scores on the KDQOL (Figure 1).

Figure 2. Intravenous Antibiotic Use by Itchiness and Type of Access



• IV antibiotics use typically varied directly with increased itch across access types (Figure 2).

Figure 3. EPO Administration in Dialysis Patients



- Among patients receiving EPO, the mean monthly dose rose with increased itchiness (Figure 3).
- Approximately 75% of the study population received IV iron sucrose (Venofer®), and the mean (SD) monthly dose rose slightly with increased itchiness.
- Not bothered at all: 257.84 (191.68) units of EPO
- Extremely bothered: 262.55 (195.19) units of EPO
- The proportion of patients who received dual phosphate binder therapy increased with increasing itchiness.
- Laboratory values varied with degree of itch, but the clinical meaningfulness is open to interpretation (Table 2).

Table 2. Laboratory Values by Itchiness Score

		P-value				
	1	2	3	4	5	for Trend
Phosphorus (mg/dL)	4.99 (1.33)	5.14 (1.40)	5.17 (1.44)	5.24 (1.53)	5.29 (1.54)	< 0.0001
Calcium (mg/dL)	9.07 (0.64)	9.10 (0.64)	9.10 (0.66)	9.09 (0.68)	9.15 (0.68)	< 0.0001
PTH (pg/mL)	414.77 (318.54)	426.51 (336.51)	423.78 (330.50)	441.25 (346.56)	439.61 (348.30)	< 0.0001
TSAT (%)	31.42 (13.84)	31.61 (14.05)	31.42 (13.95)	31.42 (14.44)	30.76 (13.87)	0.1394
Serum ferritin (ng/mL)	677.03 (381.92)	673.37 (379.11)	667.69 (377.23)	663.05 (398.65)	644.69 (388.00)	< 0.0001
Hemoglobin (g/dL)	11.15 (1.14)	11.17 (1.14)	11.15 (1.14)	11.12 (1.20)	11.11 (1.18)	0.0361
Albumin (g/dL)	3.94 (0.40)	3.93 (0.40)	3.92 (0.40)	3.89 (0.42)	3.85 (0.44)	< 0.0001

Increasing score means increased itchiness (1 = Not bothered at all; 5 = Extremely bothered).

Abbreviations: PTH, parathyroid hormone; TSAT, transferrin saturation.

Conclusions

- Patient-reported skin itchiness was highly correlated with the validated physical component and mental component scores on the Kidney Disease Quality of Life-36 survey.
- Increased itchiness varied directly with IV antibiotic usage and EPO dose.
- These results suggested that increasing pruritus may be directly correlated with increased rates of infection and healthcare resource utilization.

References

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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 Christopher A. Graybill, PhD, of DCR for editorial contributions in preparing this poster. DCR is committed to advancing the knowledge and practice of kidney care.

American Society of Nephrology Kidney Week, October 30 - November 4, 2012; San Diego, CA

This research was funded by Mitsubishi Tanabe Pharma America (MTPA), Inc.

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Six out of every 10 patients (60%) reported some level of itching (Table 1).