

suppurativa: a case report and review of the literature. *Int Wound J*. 2017;4(2):435-438.

5. Rekawek P, Mehta S, Andikyan V, et al. Squamous cell carcinoma of the vulva arising in the setting of chronic hidradenitis suppurativa: a case report. *Gynecol Oncol Rep*. 2016;16:28-30.

<https://doi.org/10.1016/j.jaad.2018.10.008>

The cost of an itch: A nationally representative retrospective cohort study of pruritus-associated health care expenditure in the United States



To the Editor: Pruritus arises from many common diseases and is reported as a symptom in >7 million outpatient visits annually in the United States.¹ The impact of pruritus on quality of life is substantial and comparable with that of chronic pain.² Although there are limited studies regarding its epidemiology, pruritus has an estimated lifetime prevalence of 25.5% and most commonly affects patients who are female, elderly, and of lower socioeconomic status.¹⁻³ Despite the significant health and biopsychosocial burden posed by pruritus, limited information exists regarding its economic burden. As such, the goal of this study was to provide nationally representative estimates of the incremental health care burden of pruritus controlling for sociodemographic characteristics and comorbidities.

In this study, we used 9 years of data from the Medical Expenditure Panel Survey (MEPS; 2007-2015), a nationally representative survey assessing patterns of utilization of outpatient care in the United States. The methods of administration for MEPS are detailed elsewhere.⁴ All analyses were done in *R* accounting for the complex survey design of MEPS to provide nationally representative samples.

We compared sociodemographic characteristics of patients with pruritus (International Classification of Disease Ninth Revision, Clinical Modification code 698) to those without pruritus using Rao-Scott chi-squared tests. To determine the adjusted incremental inflation-adjusted expenditure (in USD) of pruritus controlling for all other factors, we constructed a 2-part linear regression model to account for the high concentration of zero expenditures in the data. Our 2-part model consists of logistic regression to predict the likelihood of nonzero expenditures and a generalized linear model to predict conditional nonzero expenditures. A generalized linear model with a gamma distribution and log-link function was used to address the positive skewness of the

expenditure data. Our model was used to estimate expenditure ratios, which represented the adjusted multiplicative effect of a variable compared with the reference class. For example, an expenditure ratio of 2 would indicate that patients with pruritus had twice the health care expenditure of patients without pruritus, controlling for other factors. The advantages of this validated 2-part model have been previously described.⁵

In total, our sample included 637 patients with pruritus and 288,061 patients without pruritus. Women, older adults, nonwhite patients, Medicaid and Medicare patients, patients with less education, and patients with more comorbidities were all more likely to have pruritus ($P < .001$ for all, [Table I](#)). Controlling for Charlson Comorbidity Index and all sociodemographic factors, the cost of care for patients with pruritus is 1.64 times as high as patients without pruritus ($P < .001$, [Table II](#)). Although emergency room and home health service expenditures due to pruritus have increased over time, expenditures due to pruritus in both the outpatient and inpatient setting have decreased.

Pruritus is a significant burden to both medical and financial health. Patients with pruritus are estimated to face \$4,843.68 (adjusted for inflation) more in annual health care expenditures than patients without pruritus, even after controlling for comorbidities and sociodemographic factors. When accounting for even the most conservative national estimates of chronic pruritus (6.1%), our data suggests that pruritus is associated with >\$90 billion per year in population-level expenditures in the United States.^{3,6}

Strengths of this study include analysis of a large, nationally representative data set to provide cost estimates.⁴ A limitation is that unmeasured confounders might have overestimated the incremental cost, given the demographic differences between the pruritus and nonpruritus patient population found in this study.

Elucidating the health care costs due to pruritus is vital, considering its association with numerous chronic diseases. Although the incremental cost associated with pruritus has remained steady, expenditures due to pruritus seem to be shifting from outpatient and inpatient settings to the emergency room and home health services. As overall health care costs continue to rise, it is critical to identify effective strategies to improve the control and management of pruritus.

Raghav Tripathi, MPH, Konrad D. Knusel, MS, Harib H. Ezaldein, MD, Jeremy S. Bordeaux, MD, MPH, and Jeffrey F. Scott, MD

Table I. Weighted population characteristics of US adults by presence of pruritus, Medical Expenditure Panel Survey, 2007-2015

Patient demographics	Patients with pruritus, n = 637		Patients without pruritus, n = 288,061		P value
	n	%	n	%	
Sex					<.001
Female	400	62.8	151,036	52.4	
Male	237	37.2	137,025	47.6	
Age, y					<.001
≤18	54	8.5	73,001	25.3	
18-34	52	8.2	68,359	23.7	
35-64	268	42.1	110,598	38.4	
≥65	263	41.3	36,103	12.5	
Race					<.001
White	340	53.4	198,938	69.1	
Black	141	22.1	58,478	20.3	
Asian/Pacific Islander	131	20.6	19,619	6.8	
Other	25	3.9	11,126	3.9	
Ethnicity					<.001
Non-Hispanic	535	84	202,274	70.2	
Hispanic	102	16	85,787	29.8	
Marriage status					<.001
Married	257	40.3	105,259	36.5	
Divorced/separated/widowed	222	34.9	42,237	14.7	
Never married	158	24.8	140,565	48.8	
Region					.372
Northeast	99	15.5	44,771	15.5	
South	247	38.8	108,709	37.7	
Midwest	105	16.5	55,135	19.1	
West	186	29.2	79,446	27.6	
Insurance					<.001
Private	319	50.1	155,975	54.1	
Medicaid/Medicare	282	44.3	86,624	30.1	
Uninsured	36	5.7	45,462	15.8	
Income (% of 2015 poverty line)					.787
Poor (<100%)	136	21.4	63,369	22	
Near poor (100%-124.9%)	48	7.5	18,548	6.4	
Low income (125%-199.9%)	103	16.2	48,885	17	
Middle income (200%-399.9%)	180	28.3	82,534	28.7	
High income (≥400%)	170	26.7	74,725	25.9	
Education					<.001
No degree	138	21.7	46,514	16.1	
High school degree	188	29.5	124,341	43.2	
Some college	171	26.8	64,512	22.4	
College degree	140	22	52,694	18.3	
Charlson Comorbidity Index					<.001
0	305	47.9	222,029	77.1	
1	94	14.8	29,789	10.3	
2	88	13.8	21,441	7.4	
≥3	150	23.5	14,802	5.1	
Year					<.001
2007-2009	183	28.7	93,080	32.3	
2010-2012	185	29	97,673	33.9	
2013-2015	269	42.2	97,308	33.8	

Table II. Two-part regression model for incremental effects of health care expenditures (in 2015 USD)* among adults with pruritus, adjusted for Charlson Comorbidity Index

Category	Expenditure ratio	95% Confidence interval	P value
Pruritus			
No	Reference	---	---
Yes	1.64	1.39-1.94	<.001
Charlson Comorbidity Index			
0	Reference	---	---
1	2.37	2.24-2.50	<.001
2	2.99	2.84-3.14	<.001
≥3	5.44	5.16-5.74	<.001
Sex			
Female	Reference	---	---
Male	0.84	0.81-0.87	<.001
Age, y			
≤18	Reference	---	---
18-34	1.25	1.18-1.33	<.001
35-64	1.72	1.60-1.85	<.001
≥65	2.12	1.96-2.29	<.001
Race			
White	Reference	---	---
Black	0.81	0.77-0.85	<.001
Asian	0.70	0.62-0.79	<.001
Other	0.94	0.88-1.00	.061
Ethnicity			
Non-Hispanic	Reference	---	---
Hispanic	0.71	0.67-0.74	<.001
Marriage status			
Married	Reference	---	---
Divorced/separated/widowed	1.09	1.05-1.13	<.001
Never married	0.92	0.87-0.97	.002
Region			
Northeast	Reference	---	---
South	0.89	0.84-0.93	<.001
Midwest	1.00	0.95-1.06	.923
West	0.95	0.89-1.00	.067
Insurance			
Private	Reference	---	---
Medicaid/Medicare	1.07	1.01-1.13	.028
Uninsured	0.39	0.37-0.42	<.001
Income (% of 2015 poverty line)			
Poor (<100%)	Reference	---	---
Near poor (100-124.9%)	0.98	0.91-1.05	.525
Low income (125-199.9%)	0.95	0.89-1.02	.164
Middle income (200-399.9%)	0.95	0.90-1.01	.129
High income (≥400%)	1.03	0.97-1.09	.370
Education			
No degree	Reference	---	---
High school degree	1.05	0.99-1.10	.112
Some college	1.12	1.06-1.18	<.001
College degree	1.16	1.1-1.123	<.001
Year			
2007-2009	Reference	---	---
2010-2012	1.02	0.98-1.07	.240
2013-2015	1.05	1.00-1.10	.035

*Adjusted for inflation.

From the Department of Dermatology, Case Western Reserve University School of Medicine, and Department of Dermatology, University Hospitals Cleveland Medical Center, Cleveland, Ohio

Funding sources: Supported by the Brian Werbel Memorial Fund through the Case Comprehensive Cancer Center (to Mr Tripathi).

Conflicts of interest: None disclosed.

Reprints not available from the authors.

Correspondence to: Raghav Tripathi, MPH, Department of Dermatology, University Hospitals Cleveland Medical Center, Lakeside 3500, 11100 Euclid Ave, Cleveland, OH 44106

E-mail: Raghav.Tripathi@case.edu

REFERENCES

1. Shive M, Linos E, Berger T, Wehner M, Chren M-M. Itch as a patient-reported symptom in ambulatory care visits in the United States. *J Am Acad Dermatol*. 2013;69(4):550-556.
2. Leader B, Carr CW, Chen SC. Pruritus epidemiology and quality of life. *Handb Exp Pharmacol*. 2015;226:15-38.
3. Mattered U, Apfelbacher C, Vogelgsang L, Loerbroks A, Weisshaar E. Incidence and determinants of chronic pruritus: a population-based cohort study. *Acta Derm Venereol*. 2013; 93(5):532-537.
4. Agency for Healthcare Research and Quality. *Medical expenditure panel survey: survey background*; 2015. https://meps.ahrq.gov/mepsweb/about_meps/survey_back.jsp#household. Accessed January 1, 2018.
5. Kirkland EB, Heincelman M, Bishu KG, et al. Trends in healthcare expenditures among US adults with hypertension: national estimates, 2003–2014. *J Am Heart Assoc*. 2018;7(11):e008731.
6. Weisshaar E, Mattered U. Epidemiology of Itch. In: Carstens E, Akiyama T, eds. *Itch: Mechanisms and Treatment*. Boca Raton (FL): CRC Press/Taylor & Francis; 2014. Chapter 2. <http://www.ncbi.nlm.nih.gov/pubmed/24830008>. Accessed July 25, 2018.

<https://doi.org/10.1016/j.jaad.2018.10.025>

Conflict of interest and citation impact among dermatology guideline authors



To the Editor: Clinical practice guidelines (CPGs) apply structured review of evidence as well as expert evaluation to help characterize optimal patient care. Most CPGs include authors with financial conflicts of interest (COI), such as consultancy payments, research support, equity or stock ownership, or other relationships,¹ although the Institute of Medicine and Council of Medical Specialty Societies advise limiting the percentage of CPG authors with financial COI so that they make up only a minority (<50%) of panel members.

Table I. Articles of example author

Article	Article position (h-position)	No. citations per article
A	1 (most citations)	25
B	2	12
C	3	7
D	4	6
E	5 (fewest citations)	2

Persistent inclusion of physicians with COI is often justified by the argument that they possess expertise crucial to CPG development. As recognized experts, they might be sought after by industry as well as by specialty organizations for their knowledge.² By extension, excluding such authors completely would deprive CPGs of valuable expertise.

We sought to evaluate this claim by analyzing the relationship between recognized expertise and financial COI among dermatology CPG authors. All active dermatology CPGs (n = 16) listed on the American Academy of Dermatology (ADD) website as of March 12, 2018, were downloaded and authors were identified and grouped by presence or absence of reported COI. For each guideline, we used the RISmed package in R (version 1.1.423) to search PubMed for each author and determine the number of articles they had published before the year of guideline publication, as well as the number of citations for each article. We then ranked an author's publications by number of citations from largest to smallest and calculated the h-index by determining the hth publication that had been cited at least h times. Consider a researcher with 5 publications A, B, C, D, and E with 25, 12, 7, 6, and 2 citations, respectively. The researcher would have an h-index of 4 because this is the last position in which the number of citations (6) equals or exceeds the position (4) (rank order of the publications, or h value) (Table I). Similar to the h-index, the g-index quantifies productivity by considering the number of papers and the number of citations per paper. We calculated the g-index by identifying the largest rank (g) at which the top ranked articles including g received together at least g² citations. The g-index averages the number of citations, allowing more highly cited papers to bolster lower cited papers.

We compared h-index, a measure of citation impact, between authors who reported a COI and those who did not. The h-index is a measure of influence and productivity on the basis of a researcher's publications. The h-index is the number of papers (h) that have been cited at least h times. Researchers with a greater number of publications as well as publications that are more widely cited will have a higher h-index. Although it is difficult to