Characterization of ACD Population by Demographics, Healthcare Access, and Expenditure (2018-2023)

Rishi M. Ray, BS[1], JiaDe Yu, MD, MS[2]

[1]School of Medicine, Virginia Commonwealth University, Richmond, VA; [2]Department of Dermatology, Virginia Commonwealth University, Richmond, VA

Background and Objectives

Most studies examining disparities in healthcare access and expenditures among U.S. patients with allergic contact dermatitis (ACD) are more than a decade old. In 2015, the United States adopted ICD-10-CM, introducing the first ACD-specific diagnostic codes and enabling ACD to be distinguished from other forms of dermatitis. We used Medical Expenditure Panel Survey (MEPS) data from 2018–2023 to characterize contemporary healthcare utilization, expenditures, and disparities among U.S. patients with ACD.

Keywords: allergic contact dermatitis, healthcare disparity, healthcare expenditure, healthcare utilization, public health

Disclosures: None.

Methodology

We analyzed cross-sectional data from the 2018–2023 Medical Expenditure Panel Survey (MEPS), accessed through the Integrated Public Use Microdata Series (IPUMS).

Respondents with ≥1 condition coded as ICD-10-CM L23 were identified as having ACD and linked to patient-level sociodemographic characteristics, prescription medications, healthcare utilization and expenditures, and self-reported barriers to healthcare access. Expenditures were inflation-adjusted using the 2024 Consumer Price Index.

We reported unweighted sample characteristics and survey-weighted national estimates for respondents with and without ACD. Survey-weighted linear regression and Rao-Scott chi-square tests were used to compare continuous and categorical variables, respectively. Analyses were performed in R 4.6.0.

Table 1. Sociodemographic and Healthcare Access Characteristics of Patients with Allergic Contact Dermatitis

Characteristic	Unweighted ACD Patients (n=668)	Weighted ACD Patients (n=1,444,388)	Weighted Non-ACD Patients (n=328,739,409)	P value
Mean age (SD)	46.4 (23.2)	44.8 (22.4)	39.3 (23.2)	<0.001
Female Sex	390 (58.4%)	816057 (56.5%)	167122876 (50.8%)	0.02
Male Sex	278 (41.6%)	628331 (43.5%)	161616533 (49.2%)	
White	545 (81.6%)	1215396 (84.1%)	249263875 (75.8%)	0.046
Asian	43 (6.4%)	102123 (7.1%)	20398947 (6.2%)	
Black/African American	48 (7.2%)	75540 (5.2%)	42767102 (13.0%)	
Not Hispanic origin	563 (84.3%)	1263424 (87.5%)	266419999 (81.0%)	0.051
12th grade, no diploma	3 (0.4%)	3969 (0.3%)	3245183 (1.0%)	0.011
Bachelor's degree (BA,AB,BS,BBA)	110 (16.5%)	250242 (17.3%)	53998911 (16.4%)	
GED or equivalent	20 (3.0%)	46052 (3.2%)	9092572 (2.8%)	
High school graduate	130 (19.5%)	278708 (19.3%)	65082273 (19.8%)	
Master's degree (MA,MS,Med,MBA)	85 (12.7%)	178921 (12.4%)	26171324 (8.0%)	
Other degree	71 (10.6%)	159762 (11.1%)	26590551 (8.1%)	
Professional School or Doctoral degree (MD, DDS, DVM, JD, PhD, EdD)	21 (3.1%)	65936 (4.6%)	7156879 (2.2%)	
Some college, no degree	65 (9.7%)	150866 (10.4%)	37310053 (11.3%)	
MEPS family income <100% of the poverty line	108 (16.2%)	156,709 (10.8%)	35,407,024 (10.8%)	0.434
100-199% of poverty line	117 (17.5%)	217,101 (15.0%)	53,859,598 (16.4%)	
200–299% of poverty line	91 (13.6%)	198,698 (13.8%)	51,510,642 (15.7%)	
300–399% of poverty line	65 (9.7%)	164,918 (11.4%)	43,251,594 (13.2%)	
400–499% of poverty line	64 (9.6%)	149,869 (10.4%)	36,021,388 (11.0%)	
≥500% of poverty line	223 (33.4%)	557,096 (38.6%)	108,689,164 (33.1%)	
Excellent overall health status	62 (9.3%)	151673 (10.5%)	33640526 (10.2%)	0.001
Very good overall health status	179 (26.8%)	396623 (27.5%)	67704669 (20.6%)	
Good overall health status	120 (18.0%)	255808 (17.7%)	53316429 (16.2%)	
Fair overall health status	55 (8.2%)	102636 (7.1%)	18288257 (5.6%)	
Poor overall health status	11 (1.6%)	20651 (1.4%)	3565129 (1.1%)	
Not reported overall health status	230 (34.4%)	499811 (34.6%)	146754753 (44.6%)	
Does not have usual place for medical care	80 (12.0%)	182588 (12.6%)	78004285 (23.7%)	<0.001
Has usual place for medical care	582 (87.1%)	1249467 (86.5%)	236542656 (72.0%)	
Admits medical care delayed due to cost, past 12 months	53 (7.9%)	123416 (8.5%)	20701512 (6.3%)	0.182
Admits having needed but couldn't afford medical care, past 12 months	26 (3.9%)	51083 (3.5%)	11657334 (3.5%)	0.403
Admits having needed but couldn't afford prescription medicines, past 12 months	25 (3.7%)	54258 (3.8%)	7812671 (2.4%)	0.474
Admits being Delayed getting prescription medicine due to cost, past 12 months	34 (5.1%)	70789 (4.9%)	9144359 (2.8%)	0.116
Medicaid or other public health insurance	250 (37.4%)	439164 (30.4%)	90645496 (27.6%)	0.033
Private health insurance	403 (60.3%)	961079 (66.5%)	217122033 (66.0%)	
Uninsured	15 (2.2%)	44146 (3.1%)	20971879 (6.4%)	

Note: Values are presented as unweighted sample counts with unweighted percentages, survey-weighted average annual national estimates with weighted percentages, or mean (SD), unless otherwise indicated. Weighted estimates used MEPS person-level survey weights divided by six for pooled 2018-2023 analyses and incorporated survey strata and primary sampling units. P values compare weighted ACD and non-ACD groups using survey-weighted linear regression for continuous variables and Rao-Scott chi-square tests for categorical variables.

Table 2. Healthcare Utilization and Expenditure of Patients with Allergic Contact Dermatitis

Characteristic	Unweighted ACD Patients (n=668)	Weighted ACD Patients (n=1,444,388)	Weighted Non-ACD Patients (n=328,739,409)	P value
Annual total direct health care payments, mean (SD); median [IQR]	9090.7 (16442.4) 3302.9 [1149.0-9300.9]	8893.5 (16955.7) 3127.4 [1105.3-8983.4]	7168.3 (22320.6) 1449.6 [268.7-5596.5]	0.038
Annual total out-of-pocket payments for health care, mean (SD); median [IQR]	1281.9 (2551.0) 411.2 [67.2-1314.5]	1353.2 (2744.2) 463.8 [108.3-1374.0]	952.3 (3841.1) 162.1 [0.0-796.5]	0.003
Annual total of charges for health care, mean (SD); median [IQR]	18444.7 (49450.6) 4632.6 [1582.2-15217.6]	15638.7 (38147.3) 4398.9 [1527-13825.6]	14857.4 (65020.4) 1950.4 [344.5-8194.2]	0.636
Annual total of direct health care payments for outpatient visits, mean (SD); median [IQR]	1221.8 (4206.0) 0.0 [0.0-346.9]	1104.7 (4050.7) 0.0 [0.0-293.4]	817.5 (6328.7) 0.0 [0.0-0.0]	0.087
Count of all prescribed medications purchased during the year, mean (SD); median [IQR]	16.4 (24.8) 7.0 [3.0-19.0]	15.6 (26.3) 6.0 [3.0-18.0]	9.1 (18.1) 1.0 [0.0-11.0]	<0.001
Count of dermatology events, mean (SD)*	0.4 (1.0)	0.4 (0.9)	0.1 (0.6)	<0.001
Total expenditure for dermatology events, mean (SD)*	92.3 (316.9)	89.5 (318.9)	41.2 (468.1)	0.002
Total charges for dermatology events, mean (SD)*	254.6 (1316.8)	294.7 (1774.7)	100.3 (1304.4)	0.066
Total events linked to ACD, mean (SD); median [IQR]	1.1 (1.9) 1.0 [0.0-1.0]	1.1 (1.7) 1.0 [0.0-1.0]		
Total expenditure for events linked to ACD, mean (SD); median [IQR]	293.6 (855.4) 109.3 [0.0-245.1]	313.4 (942.4) 108.0 [0.0-231.4]		
Total charges for events linked to ACD, mean (SD); median [IQR]	850.1 (3184.0) 188.3 [0.0-459.4]	889.7 (3285.6) 188.5 [0.0-444.5]		
Count of dermatology events linked to ACD, mean (SD)*	0.1 (0.6)	0.1 (0.5)		
Total expenditure for dermatology events linked to ACD, mean (SD)*	34.0 (203.6)	29.8 (193.3)		

Note: All expenditure and charge values are reported in 2024 U.S. dollars after CPI adjustment. Values are presented as mean (SD) and median (IQR), where applicable. Expenditure and utilization measures are right-skewed and zero-inflated; therefore, SDs may exceed means. P values correspond to weighted mean comparisons, not median comparisons.

*Median and interquartile ranges for these variables across all three groups represented was 0.0 and [0.0-0.0], respectively.

Results

Among 156,464 MEPS person-year observations from 2018–2023, 668 had ≥1 ACD code, corresponding to weighted estimates of 1.44 million respondents with ACD and 328.74 million without ACD. **Respondents with ACD were older** (mean age, 44.8 vs. 39.3 years; p<0.001) and **more likely to be female, have higher educational attainment, report excellent/very good health, have a usual source of healthcare, and have health insurance** (p<0.05 for all).

Compared with respondents without ACD, those with ACD had **greater mean annual healthcare expenditures** ($8,893.50 vs. $7,168.30; p=0.038**), out-of-pocket payments** ($1,353.20 vs. $952.30; p=0.003), **outpatient visits** (1.3 vs. 0.8; p<0.001), and **prescribed medications** (15.6 vs. 9.1; p<0.001).

ACD was also associated with more annual dermatology encounters (0.4 vs. 0.1; p<0.001) and greater dermatology-related expenditures ($89.50 vs. $41.20; p=0.002). **ACD-coded encounters accounted for a mean of $313.40 annually.**

Notably, 77 unweighted ACD person-year observations, representing **11.6% of the weighted ACD population** (n=167,552), exceeded the IQR upper fence of $21,511.85 and **accounted for 58.2% of weighted total healthcare expenditures.**

Conclusion & Discussion

Patients with ACD reported better overall health and were more likely to have health insurance than those without ACD, consistent with prior studies. These findings may reflect differential access to dermatologic evaluation and diagnosis rather than a lower ACD burden among disadvantaged populations.

Despite higher overall healthcare expenditures, ACD-coded encounters accounted for only $313.40 annually, suggesting that much of the excess spending occurred outside of ACD-directed care. ACD was also associated with greater prescription medication use and out-of-pocket costs, patterns similar to those reported in atopic dermatitis.[5] A small subset of high-expenditure patients accounted for a disproportionate share of total spending, highlighting the need to better characterize drivers of healthcare costs among patients with ACD.

Limitations include reliance on self-reported MEPS survey data and ICD-10-CM coding, the descriptive cross-sectional design, and potential changes in healthcare utilization during the COVID-19 pandemic. Future studies should investigate cost drivers, potential detection biases, and strategies to improve equitable ACD diagnosis and management.