

# Identifying Predictors of High-Cost Care in Generalized Pustular Psoriasis: Insights from U.S. Real-World Data

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## Conclusions

- Patients with GPP face a substantial economic burden, with charges heavily concentrated among a subset of high utilizers
- Broad comorbidity-related drivers, GPP severity, and risk factors emerging at the high-charge end of the spectrum, were all associated with increased economic burden, underscoring the heterogeneity of cost determinants in GPP
- This study highlights the need for improved adoption of GPP-specific treatment to improve clinical outcomes and address economic burden of GPP

## Objective

To characterize HCRU and associated charges among patients with GPP across total charge deciles, and to identify key factors associated with catastrophic charges

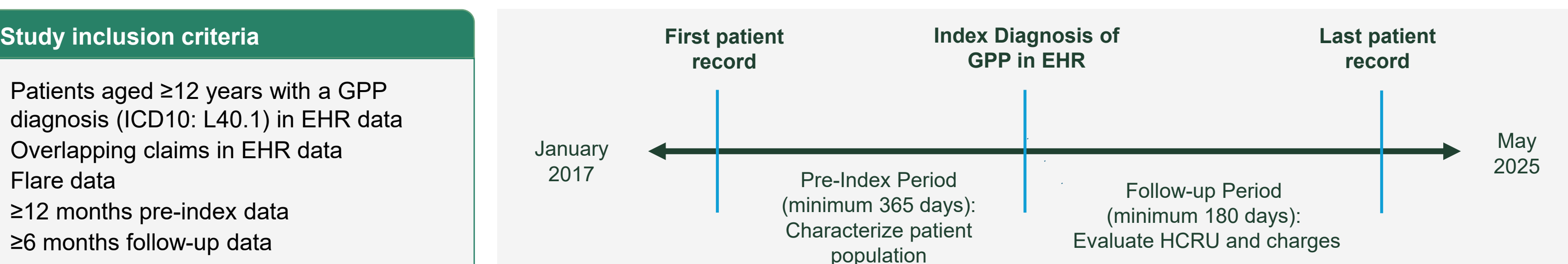
## Background

- GPP is a chronic autoinflammatory skin disease characterized by potentially life-threatening flares of sterile pustules and widespread erythema, often with systemic symptoms<sup>1,2</sup>
- As of 2025, there is one FDA-approved treatment specifically for GPP: spesolimab, a monoclonal antibody targeting the IL-36 receptor<sup>2</sup>
- Patients with GPP experience substantial economic burden and higher HCRU compared to patients with plaque psoriasis, including increased emergency visits, hospitalizations, and medication costs<sup>3-5</sup>
- The estimated direct all-cause per patient per month (PPPM) cost of GPP in the United States was found to be \$3,175 (2019 USD), more than 5 times the cost for a matched general population cohort<sup>3</sup>
- However, little is known about the predictors of catastrophic healthcare costs in GPP

## Methods

- This **retrospective cohort study** used de-identified EHR from the OMNY Health Dermatology Platform linked with open claims (January 2017 to June 2025)
- Annualized all-cause charges were calculated on a PPPY basis and stratified into deciles; **catastrophic costs were defined as charges in the highest decile**
- Descriptive analyses summarized demographics, treatments, and HCRU
- Quantile regression examined predictors across charge distribution, and logistic regression identified factors associated with catastrophic costs
- LASSO approach was used for variable selection in regression models

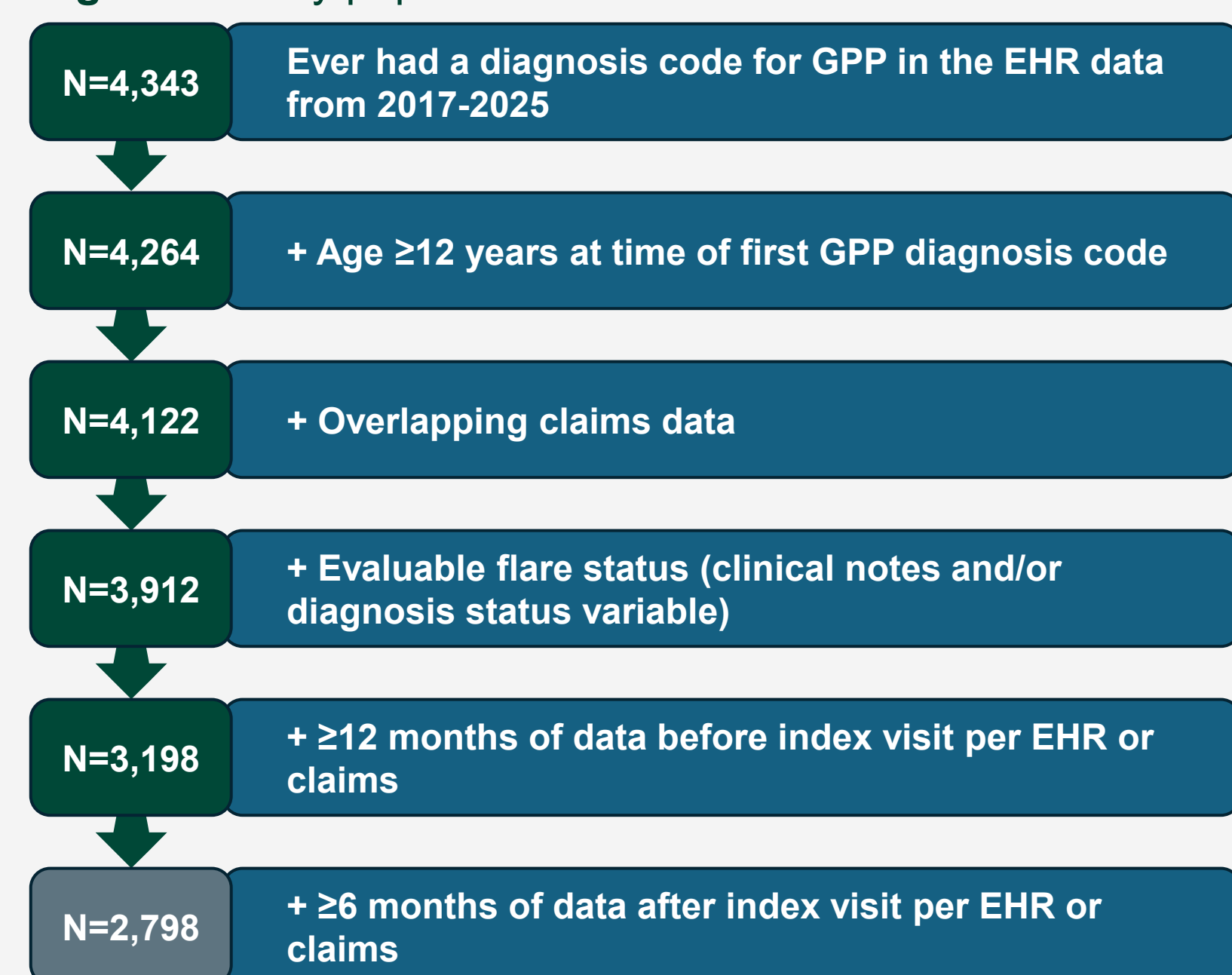
Figure 1 Study design



## Results

- 2,798 GPP patients (mean age 56.7; 74.8% female; 84.5% White) were included in this study (Figure 2); patient demographics are shown in Table 1
- Common comorbidities included cardiovascular disease (60.8%), systemic infection (53.3%), plaque psoriasis (45.9%), and anxiety (31.8%; Table 2)
- At or before index, 69.2% of patients used TCS, 13.4% used biologics, and 16.6% used opioids (Table 2)
- Emergency room visits averaged (± SD) 0.5 ± 1.2 PPPY, hospitalizations 0.2 ± 0.9 PPPY, and hospital stay length among hospitalized patients 2.4 ± 2.8 days PPPY (Figure 3)
- **Average total all-cause charges were USD \$37,778 PPPY**, with the top decile (catastrophic cost group) exceeding USD 94,792 PPPY

Figure 2 Study population



## Results (cont.)

### Annualized healthcare resource utilization and charges

Table 1 Patient demographics by cost group

	Total Study Population (N = 2798)	Non-catastrophic cost group (N = 2519)	Catastrophic cost group (N = 279)
Female, n (%)	2091 (74.8%)	1881 (74.7%)	210 (75.3%)
Age years mean (SD)	56.7 (15.3)	56.6 (15.4)	57.0 (14.3)
<b>Race, n (%)</b>			
White	1438 (84.5%)	1283 (85.0%)	155 (80.7%)
Black or African American	162 (9.5%)	136 (9.0%)	26 (13.5%)
Asian/Pacific Islander	42 (2.5%)	37 (2.5%)	5 (2.6%)
Other	60 (3.5%)	54 (3.6%)	6 (3.1%)
Hispanic or Latino, n (%)	101 (7.7%)	92 (8.0%)	9 (5.7%)
<b>Region, n (%)</b>			
Northeast	165 (6.0%)	144 (5.8%)	21 (7.7%)
South	1629 (59.4%)	1457 (59.0%)	172 (63.2%)
Midwest	625 (22.8%)	567 (23.0%)	58 (21.3%)
West	323 (11.8%)	302 (12.2%)	21 (7.7%)
<b>Payer type, n (%)</b>			
Medicare	1178 (42.1%)	1037 (41.2%)	141 (50.5%)
Medicaid	522 (18.7%)	423 (16.8%)	99 (35.5%)

Percentages based on non-missing data. Payer type categories are not mutually exclusive and may not sum to 100%.

Table 2 Comorbidities, treatment history, and disease activity in the pre-index period and at index visit by cost group

	Total Study Population (N = 2798)	Non-catastrophic cost group (N = 2519)	Catastrophic cost group (N = 279)
<b>Comorbidities, n (%)</b>			
<b>Autoimmune conditions</b>			
Plaque psoriasis	1285 (45.9%)	1117 (44.3%)	168 (60.2%)
Psoriatic arthritis	505 (18.0%)	430 (17.1%)	75 (26.9%)
IBD	113 (4.0%)	86 (3.4%)	27 (9.7%)
Depression	752 (26.9%)	628 (24.9%)	124 (44.4%)
Anxiety	889 (31.8%)	750 (29.8%)	139 (49.8%)
Any cardiovascular disease	1702 (60.8%)	1488 (59.1%)	214 (76.7%)
Any systemic infection	1492 (53.3%)	1317 (52.3%)	175 (62.7%)
Charlson comorbidity index Mean (SD)	3.2 (3.0)	3.0 (2.9)	4.7 (3.7)
<b>Treatment History, n (%)</b>			
Phototherapy	71 (2.5%)	66 (2.6%)	5 (1.8%)
TCS	1937 (69.2%)	1758 (69.8%)	179 (64.2%)
Other topical agents (non-steroids)	678 (24.2%)	620 (24.6%)	58 (20.8%)
Oral systemic corticosteroids	540 (19.3%)	468 (18.6%)	72 (25.8%)
Corticosteroid injection	311 (11.1%)	263 (10.4%)	48 (17.2%)
Other systemic agents/DMARDs	493 (17.6%)	419 (16.6%)	74 (26.5%)
<b>Biologics</b>	374 (13.4%)	303 (12.0%)	71 (25.4%)
Tumor necrosis factor inhibitors	176 (6.3%)	143 (5.7%)	33 (11.8%)
Interleukin inhibitors	246 (8.8%)	204 (8.1%)	42 (15.1%)
T-cell inhibitors	12 (0.4%)	8 (0.3%)	4 (1.4%)
Spesolimab	11 (0.4%)	4 (0.2%)	7 (2.5%)
Opioids	464 (16.6%)	390 (15.5%)	74 (26.5%)
<b>Disease Activity</b>			
GPP BSA, mean (SD)	12.7 (18.6)	12.1 (17.9)	19.0 (23.6)
<b>GPP PGA, n (%)</b>			
Clear	9 (2.1%)	9 (2.4%)	0 (0.0%)
Almost clear	21 (5.0%)	20 (5.2%)	1 (2.6%)
Mild	92 (21.9%)	87 (22.8%)	5 (13.2%)
Moderate	199 (47.4%)	184 (48.2%)	15 (39.5%)
Severe	99 (23.6%)	82 (21.5%)	17 (44.7%)
GPP pain VAS, mean (SD)	2.6 (2.9)	2.5 (2.8)	3.6 (3.6)

Percentages based on non-missing data. Note that therapies are not mutually exclusive.

Abbreviations: BSA, body surface area; CI, confidence interval; DMARDs, disease-modifying antirheumatic drugs; EHR, electronic health records; GPP, generalized pustular psoriasis; HCRU, healthcare resource utilization; IBD, inflammatory bowel disease (Crohn's disease or ulcerative colitis); ICD, international classification of diseases; LASSO, least absolute shrinkage and selection operator; n, number of patients with recorded observation; N, number of patients in indicated set; NI, not included in model based on variable selection process; OR, odds ratio; PGA, physician global assessment; PPPM, per patient per month; PPPY, per patient per year; SD, standard deviation; TCS, topical corticosteroids; USD, US dollar; VAS, visual analogue scale.

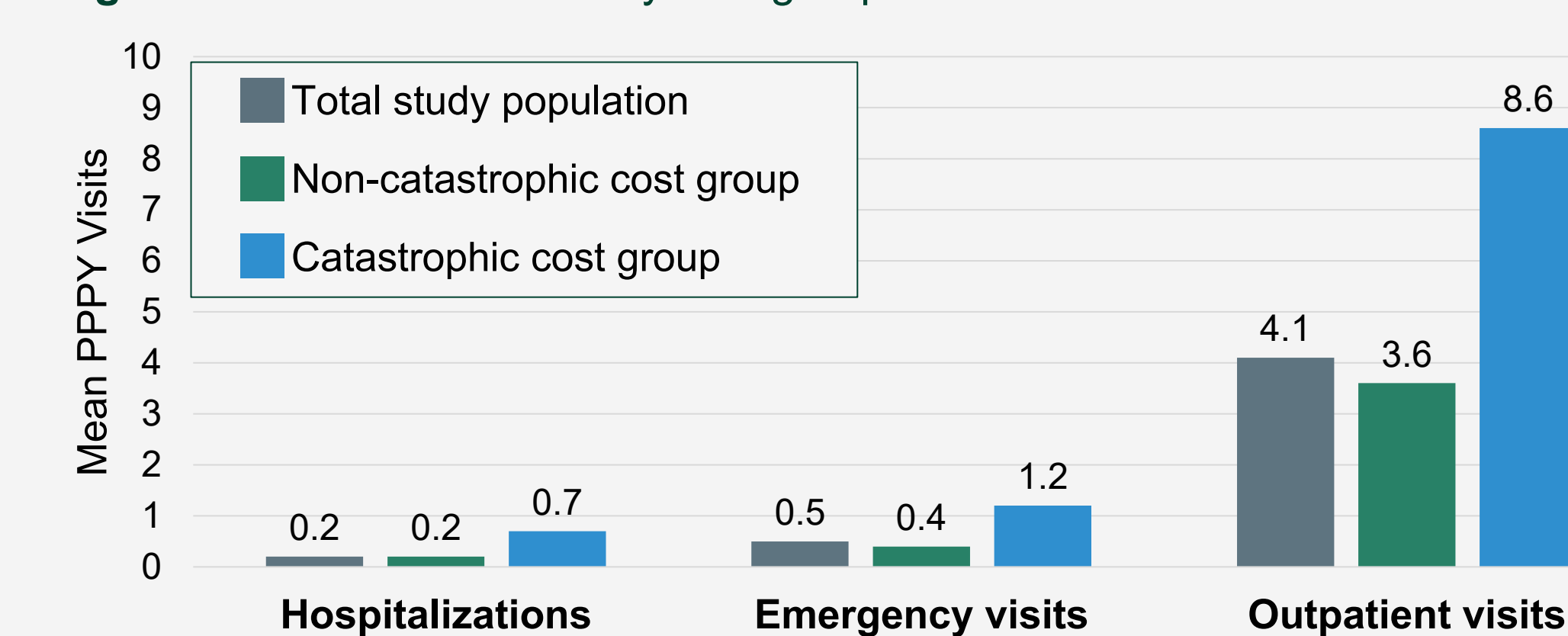
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**References:** 1. Armstrong AW, et al. *J Am Acad Dermatol*. 2024;90(4):727-30. 2. Eweksi B, Lebwohl MG. *J Psoriasis Psoriatic Arthritis*. 2025;10(2):58-66. 3. Hanna ML, et al. *Curr Med Res Opin*. 2021;37(5):735-42. 4. Ghahani T, Farberg AS. *Dermatol Ther (Heidelb)*. 2024;14(2):341-360. 5. Lebwohl M, et al. *J Am Acad Dermatol*. 2025;93(5):1341-1343.

### Comparison of higher charges

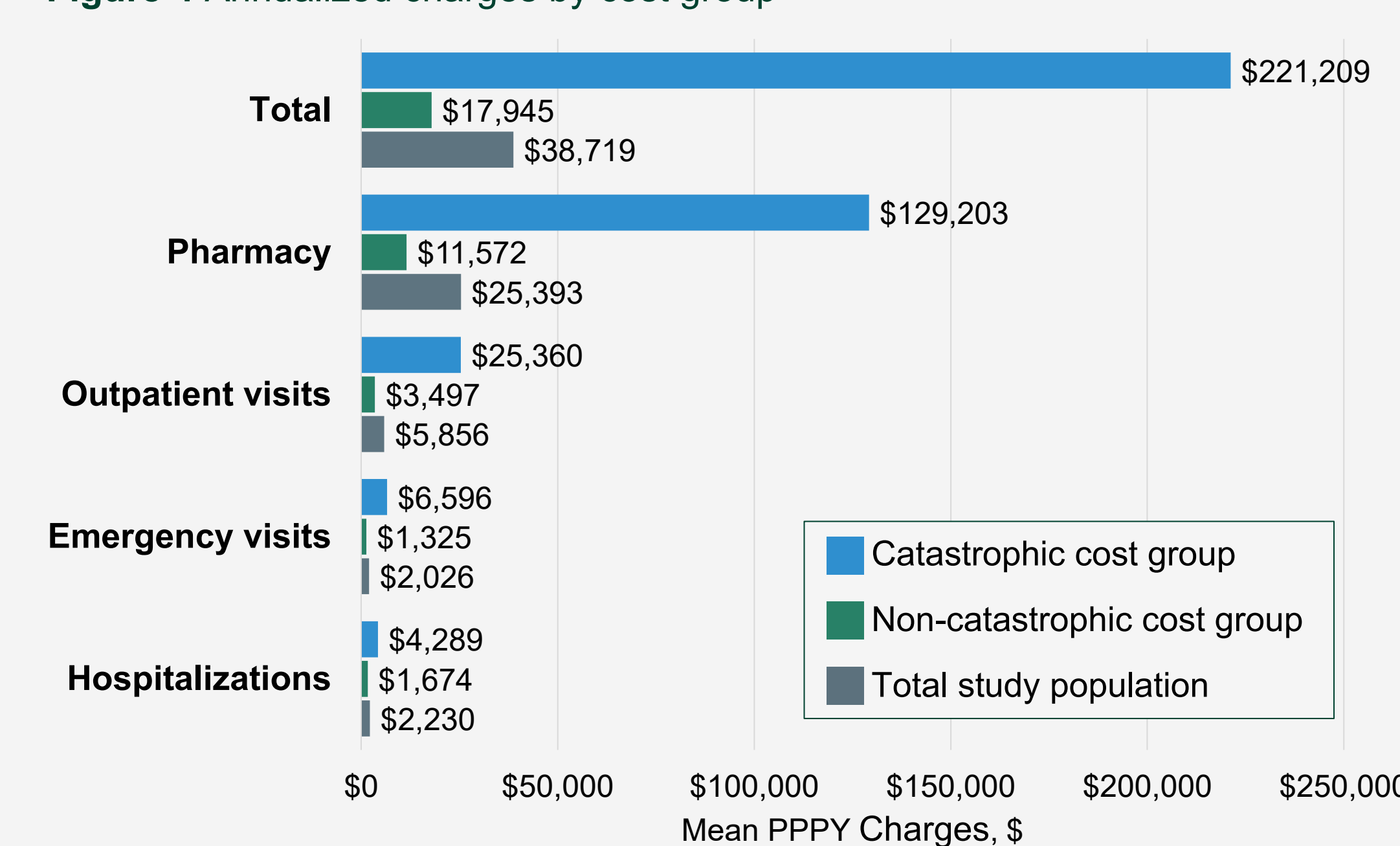
- The catastrophic cost group had a higher percentage of Black patients and Medicare/Medicaid payer type compared to the non-catastrophic cost group (Table 1)
- The proportions of patients with comorbidities and history of treatment with biologics or opioids were higher among the catastrophic cost group (Table 2)
- In the pre-index period or at index visit, GPP severity was higher in the catastrophic versus non-catastrophic cost group (Table 2)
- The mean PPPY number of hospitalizations, emergency visits, and outpatient visits was approximately 2-3 times higher in the catastrophic versus non-catastrophic cost group (Figure 3)
- Total PPPY charges were more than 10 times higher in the catastrophic cost group compared to the non-catastrophic cost group (mean ± SD: USD 221,209.4 ± 178,130.3 vs 17,945.4 ± 21,330.2; Figure 4)

Figure 3 Annualized HCRU by cost group<sup>a</sup>



<sup>a</sup>Visits shown include all observations, which represents HCRU across all eligible patients.

Figure 4 Annualized charges by cost group<sup>b</sup>



<sup>b</sup>Charges are shown "not counting zeros", which represents HCRU only among patients who utilized this resource.

### Predictors of higher charges

- A quantile regression model showed higher total charges were associated with Medicare/Medicaid insurances, plaque psoriasis, psoriatic arthritis, depression, anxiety, cardiovascular disease, oncologic disease, and skin infection (Table 3)
  - Oral corticosteroids exposure and non-White race were notably associated with higher total charges only in the upper quantiles
- Logistic regression analysis confirmed **higher odds (OR > 1) of catastrophic costs with non-White race, Medicare/Medicaid insurances, plaque psoriasis, depression, anxiety, cardiovascular disease, and skin infection (Figure 5)**
  - TCS use was associated with lowered odds of catastrophic costs

### Study limitations

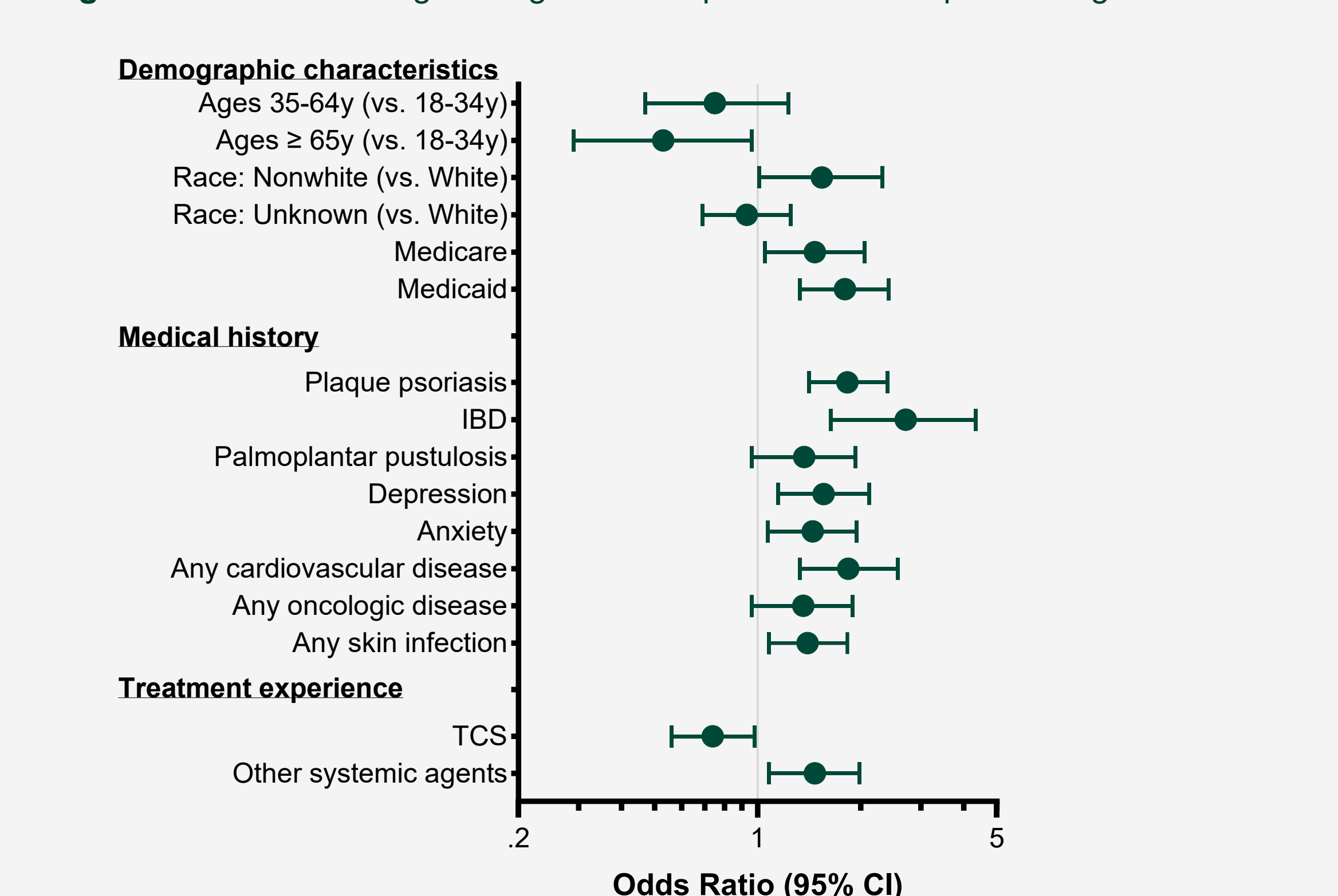
- Findings may be limited by potential underdiagnosis and inconsistent coding of GPP and incomplete capture of care

Table 3 Multivariable quantile regression to predict annualized total gross charges

Variable, Coefficient (95% CI)	Quantile 10	Quantile 25	Quantile 50	Quantile 75	Quantile 90 (Catastrophic cost group)
(Intercept)	-608 (-881, -335)	-1754 (-2768, -739)	-1083 (-4632, 2466)	1900 (-4224, 8024)	12796 (2792, 22800)
<b>Demographic Characteristics</b>					
Ages 35-64y (vs. 18-34y)	23 (-111, 158)	1016 (226, 1807)	NI	NI	NI
Ages ≥ 65y (vs. 18-34y)	-265 (-437, -93)	-78 (-957, 800)	NI	NI	NI
Region: South (vs. Northeast)	608 (341, 875)	1728 (956, 2500)	3439 (-224, 7103)	5666 (-626, 11958)	NI
Region: Midwest (vs. Northeast)	129 (-106, 364)	550 (-170, 1271)	1223 (-2382, 4828)	217 (-6573, 7008)	NI
Region: West (vs. Northeast)	391 (155, 627)	671 (-198, 1539)	443 (-3213, 4098)	-3232 (-9891, 3427)	NI
Region: Unknown (vs. Northeast)	-116 (-758, 525)	88 (-1479, 1655)	1665 (-1920, 5249)	20443 (39283)	NI
Race: Nonwhite (vs. White)	NI	NI	NI	NI	20667 (9688, 31646)
Race: Unknown (vs. White)	NI	NI	NI	NI	1392 (-8930, 11713)
Medicare	969 (702, 1237)	2502 (1808, 3196)	4170 (2577, 5762)	6248 (2922, 9574)	8132 (-4529, 16793)
Medicaid	1008 (526, 1489)	2929 (1828, 4030)	6539 (2792, 10286)	24789 (16918, 32660)	44596 (31960, 57232)
<b>Medical History</b>					
Plaque psoriasis	472 (223, 721)	1531 (945, 2118)	4258 (2735, 5780)	7655 (4211, 11099)	26342 (15282, 37402)
Psoriatic arthritis	758 (217, 1299)	3115 (1419, 4810)	5343 (2240, 8446)	10316 (3954, 16678)	NI
IBD	NI	3521 (-978, 8019)	14822 (1829, 27815)	55443 (19959, 90886)	NI
Rheumatoid arthritis	NI	2269 (-296, 4834)	6867 (832, 12902)	11262 (4198, 18327)	NI
Ankylosing spondylitis	NI	NI	10677 (1144, 20210)	NI	NI
Uveitis	1369 (45, 2693)	4258 (59, 8457)	NI	10787 (-)	NI
Hidradenitis suppurativa	NI	NI	6726 (1473, 11979)	NI	NI
Scleroderma	NI	6251 (2460, 10041)	NI	NI	NI
Allergic rhinitis	NI	NI	NI	NI	21869 (5107, 38631)
Conjunctivitis	NI	NI	NI	6873 (2723, 11024)	NI
Chronic sinusitis	578 (-174, 1329)	NI	NI	9969 (2873, 17066)	NI
Urticaria	NI	NI	NI	NI	36037 (22351, 49723)
Depression	435 (159, 712)	NI	4823 (1845, 7801)	10537 (4315, 16759)	NI
Anxiety	730 (466, 995)	2223 (1382, 3065)	6047 (3303, 8792)	13874 (8072, 19676)	16690 (5746, 27635)
Any cardiovascular disease	353 (198, 508)	1079 (603, 1556)	3660 (2266, 5054)	7959 (4375, 11543)	22773 (13749, 31798)
Any oncologic disease	300 (168, 433)	NI	NI	NI	21788 (3306, 40270)
Any skin infection	285 (65, 504)	668 (119, 1217)	NI	5433 (1244, 9623)	21363 (9792, 32935)
<b>Treatment Experience</b>					
Oral corticosteroids	NI	-928 (-1488, -368)	NI	NI	26004 (7804, 44205)
Injected steroids	-756 (-1001, -512)	NI	NI	NI	22773 (13749, 31798)
Other systemic agents	NI	NI	NI	10700 (4943, 16456)	NI
Tumor necrosis factor inhibitors	NI	NI	NI	6179 (-514, 12827)	NI
Interleukin inhibitors	NI	NI	NI	7976 (-3469, 19421)	21575 (-7857, 51006)
Opioids	NI	NI	NI	NI	15756 (-2933, 34444)

NI, Not included in model based on variable selection process. The following variables were tested but NI for all quantiles: sex, ethnicity, medical conditions (i.e. psoriatic arthritis, rheumatoid arthritis, ankylosing spondylitis, uveitis, hidradenitis suppurativa, scleroderma, acute generalized exanthematous pustulosis, allergic rhinitis, conjunctivitis, keratitis, chronic sinusitis, urticaria, upper respiratory tract infection, any systemic infection), pre-index medications (i.e. non-corticosteroid topical agents, oral corticosteroids, injected steroids, tumor necrosis factor inhibitors, interleukin inhibitors, opioids).

Figure 5 Multivariable logistic regression to predict "catastrophic" charges



The following variables were tested but not included in the model based on variable selection process: sex, region, ethnicity, medical conditions (i.e. psoriatic arthritis, rheumatoid arthritis, ankylosing spondylitis, uveitis, hidradenitis suppurativa, scleroderma, acute generalized exanthematous pustulosis, allergic rhinitis, conjunctivitis, keratitis, chronic sinusitis, urticaria, upper respiratory tract infection, any systemic infection), pre-index medications (i.e. non-corticosteroid topical agents, oral corticosteroids, injected steroids, tumor necrosis factor inhibitors, interleukin inhibitors, opioids).

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