

Healthcare Burden of Patients Newly Diagnosed with Moderate to Severe Non-Advanced Systemic Mastocytosis Using a Real-world Database of US Health Plan Members



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Background

- Systemic mastocytosis (SM) is a rare mast cell neoplasm primarily driven by KIT D816V mutation.^{1,2} Uncontrolled mast cell proliferation can cause debilitating symptoms including skin lesions, anaphylaxis, organ damage, and diarrhea.³
- As per the updated World Health Organization (WHO) classification in 2016, SM is divided into advanced SM (aggressive SM [ASM]), SM with associated hematological neoplasm [SM-AHN], and mast cell leukemia [MCL] and non-advanced SM (non-AdvSM, including indolent SM [ISM] and smoldering SM [SSM]).^{1,4}
- There are currently no therapies available that are specifically designed to target D816V mutation, the underlying driver of SM.
- The management of patients with moderate to severe non-AdvSM is typically based on symptom control. Treatment is generally limited to anaphylaxis prevention/symptom control/osteoporosis management.¹ Data on burden of non-AdvSM is limited. As non-AdvSM is marked by long-term morbidity and reduced quality of life,^{5,6} assessment of disease burden can help in understanding the unmet need among these patients.

OBJECTIVE: To estimate and compare healthcare resource utilization (HCRU) and medical costs between patients with moderate/severe non-AdvSM and a matched cohort of patients without SM using a large United States (US) claims database.

Methods

STUDY DESIGN AND DATA SOURCE

- A retrospective cohort study with 12-month pre-and post-index periods was conducted using the PharMetrics® Plus database from Oct 1, 2015 to Sept 30, 2019 (study period).
- Newly diagnosed patients with SM were identified from Oct 1, 2016 to Sep 30, 2018 (selection window); index date was the date of the first observed SM diagnosis code.
- To derive a non-SM comparison cohort, a 1% random sample of health plan claimants was extracted from the source dataset; a randomly selected pharmacy or medical claim was defined as the index date for these patients.

SAMPLE SELECTION

- An algorithm based on concomitant conditions, procedures, and medications was used to identify non-AdvSM patients using the following steps:

Step 1: Identification of overall SM sample

- Patients with ≥1 ICD-10-CM code for SM in any position (D47.02 OR C94.30 OR C94.31 OR C94.32 OR C96.21) during the selection window.

Step 2: Of step 1, exclude adv-SM patients

- Patients who met eligibility criteria for AdvSM (MCL OR SM-AHN OR ASM) any time during the 24-month study period (details described in Poster D3, "Economic Burden of Advanced Systemic Mastocytosis: A Real-World Evaluation of Direct Healthcare Resource Utilization and Costs from a United States Payer Perspective") were excluded.

Step 3: Of step 2, non-advSM patients were identified

- Upon excluding patients from step 2, this cohort comprised patients who met eligibility criteria for moderate to severe ISM any time during the 24-month study period.
- Patients were required to meet one of the following criteria:
 - ≥1 claim of tyrosine kinase inhibitor (TKI) OR ≥1 claim of specific treatment used for severe ISM OR
 - ≥2 medical claims of diagnosis codes used to define symptoms of severe ISM OR
 - ≥1 claim from a list of pharmacy or procedure codes indicating 'moderate antihistamines' OR 'other moderate qualifiers'

Conclusions

- Patients with moderate/severe non-AdvSM had significantly higher HCRU and associated medical costs in the year before and after diagnosis compared to matched cohort of patients without SM.
- Total medical costs in non-AdvSM patients were driven primarily by higher pharmacy and medical outpatient costs.
- Further research is needed to understand key drivers of medical costs and identify opportunities to decrease the economic burden of disease.

LIMITATIONS

- No causal relationships can be derived from the findings of this retrospective observational study.
- Categorization of non-AdvSM relied strictly on a claims-based algorithm; while rigorous in its concept and application, the algorithm is subject to the assumptions of objective and consistent coding practices.
- Implications from the results are limited to the current patient population and may not be generalizable to other commercially or non-commercially insured populations.

Results

STUDY SAMPLE

- A total of 170 patients with non-AdvSM met the inclusion criteria, with 61% female, mean (±SD) age 46±11, 64/35% commercial insurance/self-insured (Table 1).
- Prevalent baseline comorbidities included cancer (28%), anxiety (26%), asthma (16%), and depression (15%) (Table 1). Anaphylaxis was observed in 9% non-AdvSM patients.
- After direct matching, patients in the two cohorts were well-balanced on age, gender, index year, payer type, and CCI.

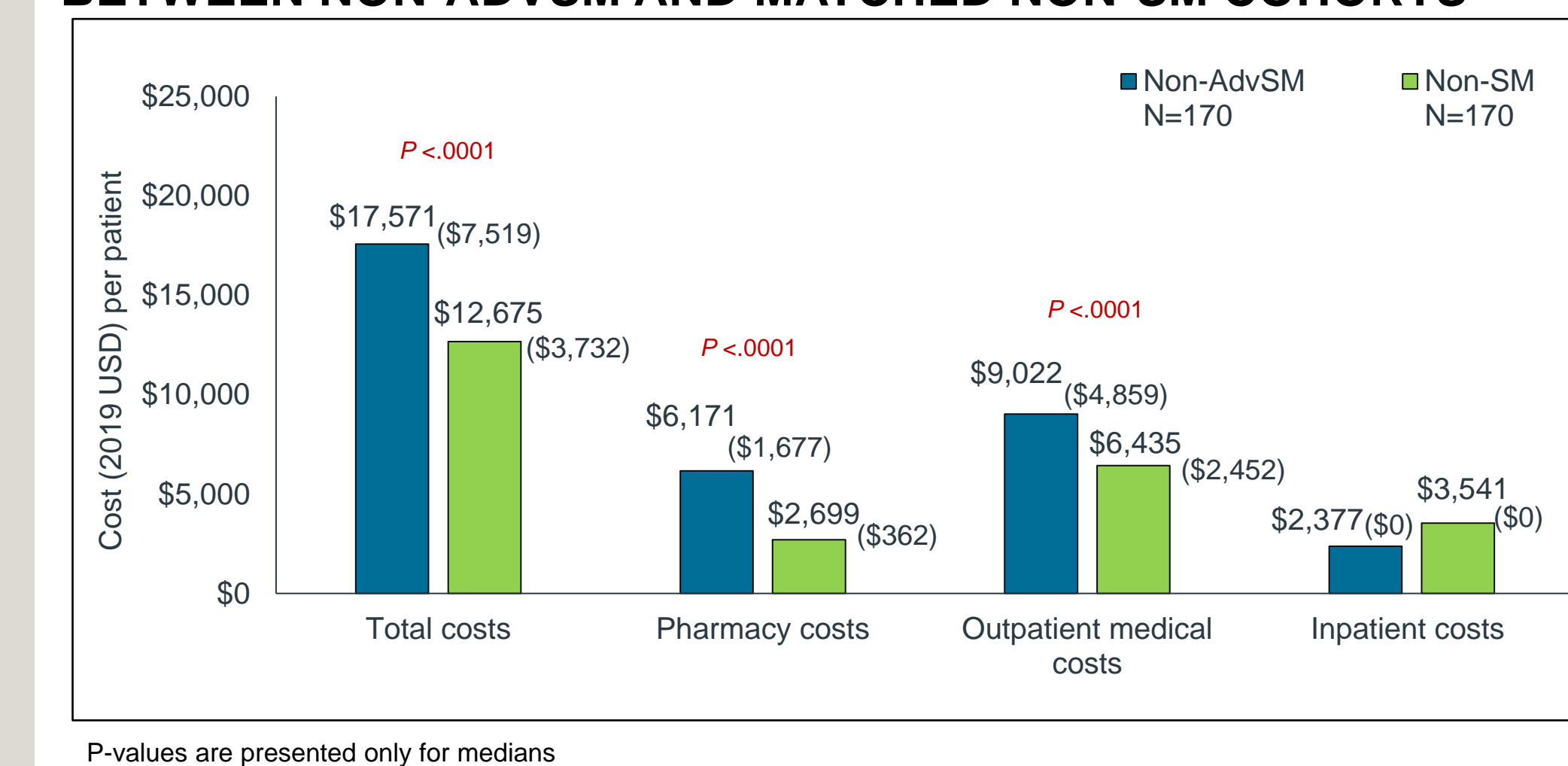
TABLE 1. BASELINE CHARACTERISTICS

Characteristics	Pre-Match			Post-Match		
	Non-AdvSM (N=170)	Non-SM (N=110,362)	P-value	Non-AdvSM (N=170)	Non-SM (N=170)	P-value
Age, Mean (SD)	46.2 (11.5)	43.4 (13.6)	0.0094	46.2 (11.5)	46.4 (11.5)	0.4831
Female (%)	61.2%	52.2%	0.0196	61.2%	61.2%	NA
Region (%)			0.0038			0.0128
Northeast	24.7%	18.4%		24.7%	19.4%	
Midwest	28.8%	27.8%		28.8%	24.7%	
South	29.4%	41.8%		29.4%	48.8%	
West	17.1%	12.1%		17.1%	7.1%	
Payer Type (%)			0.3180			0.0991
Commercial	64.2%	57.7%		64.2%	54.7%	
Self-insured	34.7%	40.3%		34.7%	42.9%	
Others	1.2%	2.1%		1.2%	2.4%	
Index Year (%)			<.0001			NA
2016	0.0%	13.9%		0.0%	0.0%	
2017	32.9%	48.3%		32.9%	39.2%	
2018	67.1%	37.8%		67.1%	67.1%	
CCI, Mean (SD)	1.2 (1.4)	0.4 (1.0)	<.0001	1.2 (1.4)	1.2 (1.5)	0.7542
Physician specialty (%) ^a			<.0001			<.0001
Primary care physician	29.4%	16.9%		29.4%	15.3%	
Oncologist/Hematologist	8.2%	0.8%		8.2%	1.2%	
Allergist/Immunologist	10.6%	0.3%		10.6%	0.0%	
Other	51.8%	82.0%		51.8%	83.5%	
Comorbidities (%) [*]						
Cancer	28.2%	3.8%	<.0001	28.2%	15.9%	0.0004
Anxiety	25.9%	11.1%	<.0001	25.9%	16.5%	0.0325
Hypertension	21.8%	20.9%	0.7909	21.8%	32.4%	0.0244
Asthma	16.5%	4.7%	<.0001	16.5%	14.1%	0.4927
Depression	14.7%	8.0%	0.0013	14.7%	9.4%	0.1282
Tests of interest (%)						
Bone marrow biopsy	6.5%	0.1%	<.0001	6.5%	0.6%	0.0039
Serum Trypsin	44.7%	0.7%	<.0001	44.7%	1.2%	<.0001
Medications (%) [*]						
Corticosteroids	50.6%	29.9%	<.0001	50.6%	38.2%	0.0167
Antihistamines	27.6%	7.0%	<.0001	27.6%	10.6%	<.0001
Epinephrine injectors	27.1%	0.8%	<.0001	27.1%	0.6%	<.0001
Antileukotrienes	25.3%	3.1%	<.0001	25.3%	4.7%	<.0001
Montelukast	23.5%	3.1%	<.0001	23.5%	4.7%	<.0001

^{*}Top 5 prevalent comorbidities and medications of interest have been presented; ^aPhysician specialty is measured at index; NA: P-values are not applicable because patients were direct matched on age group, gender, year of index, and CCI (categorical)

- Median pre-index medical costs were significantly higher for non-AdvSM patients compared to matched non-SM comparator cohort (Figure 1).
- Total pre-index medical costs were driven by outpatient and pharmacy costs.

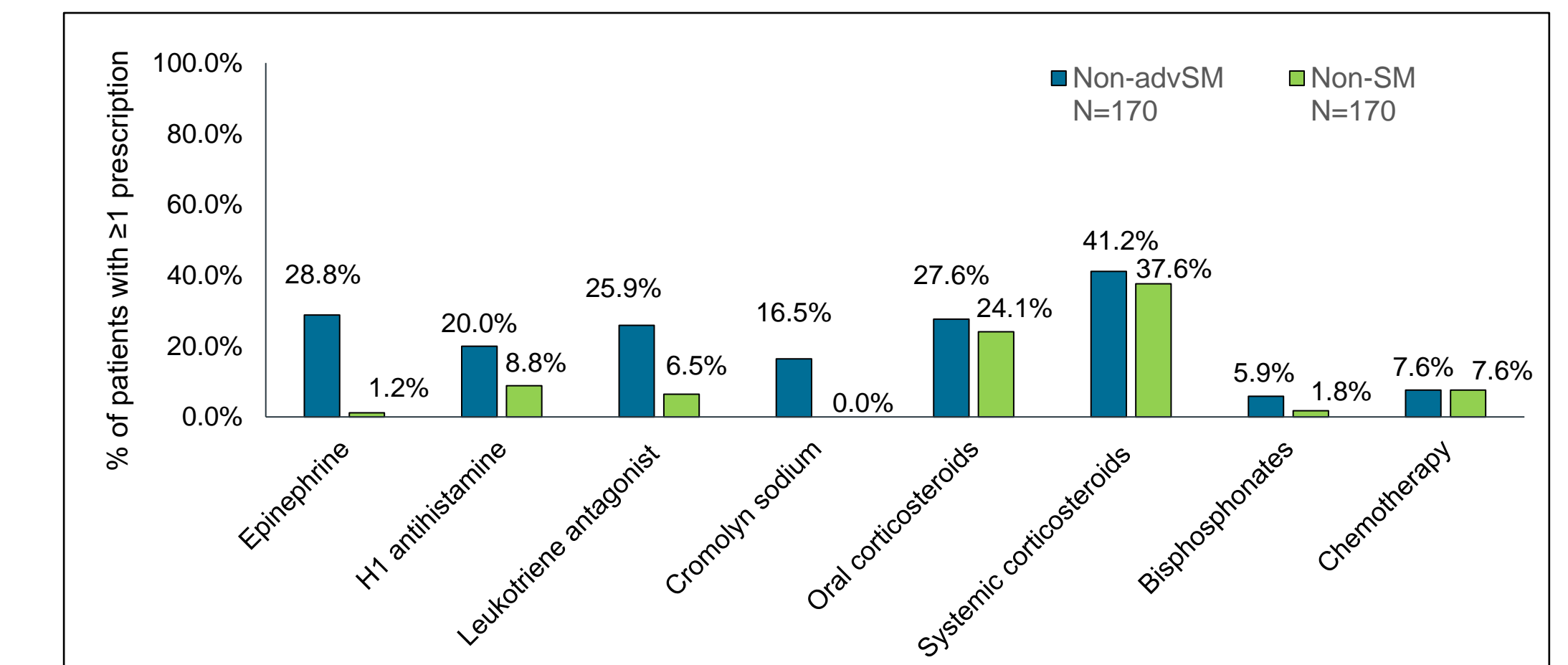
FIGURE 1. MEAN (MEDIAN) PRE-INDEX MEDICAL COSTS BETWEEN NON-ADVSM AND MATCHED NON-SM COHORTS



OUTCOMES: POST-INDEX HCRU AND COSTS

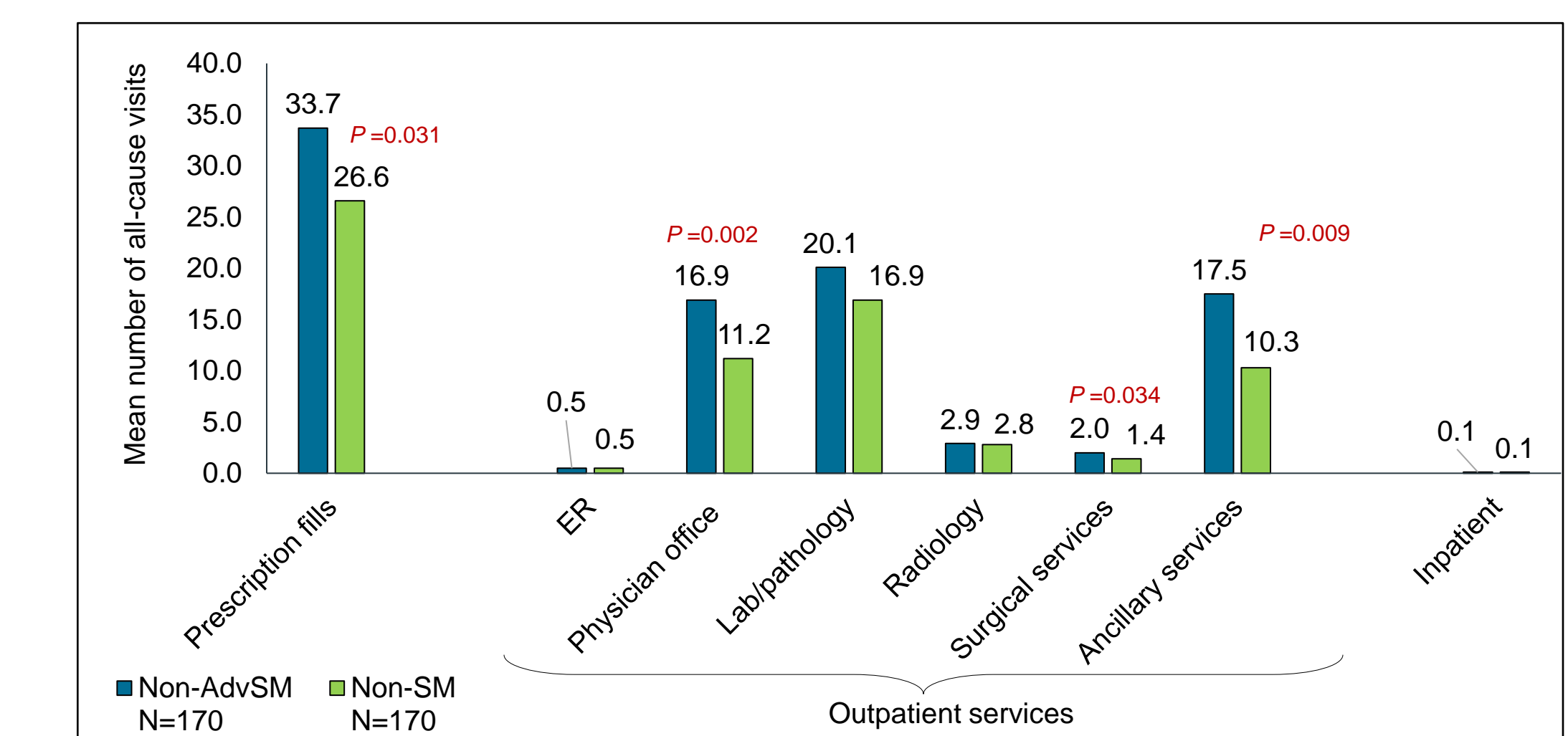
- Proportion of patients with utilization of select medications of interest were significantly higher in the non-AdvSM cohort compared to non-SM controls during 1-year follow-up (Figure 2).
- Common medications among non-AdvSM vs. controls included H1 antihistamines (20% vs. 9%) and leukotriene antagonists (26% vs. 6%) (both $P<0.01$); 29% (vs. 1%) filled a prescription for epinephrine ($P<0.001$).

FIGURE 2. PROPORTION OF PATIENTS WITH ≥1 PRESCRIPTION OF MEDICATIONS OF INTEREST BETWEEN NON-ADVSM AND MATCHED NON-SM COHORTS



- Mean number of prescription fills and outpatient service utilization higher among non-AdvSM vs. non-SM patients (Figure 3).

FIGURE 3. MEAN POST-INDEX ALL-CAUSE HCRU BETWEEN ADVSM AND MATCHED NON-SM COHORTS



- Median medical costs during the 1-year post-index period were higher for non-AdvSM vs. non-SM patients (Table 2).
- Mean±SD (median) post-index total medical costs were \$24,588±\$1,385 (\$9,019) vs. \$14,419±\$3,449 (\$4,035) ($P<0.001$).
- Pharmacy (45.9%) and outpatient medical costs (43.8%) accounted for a majority of follow-up costs among non-AdvSM patients.

TABLE 2. MEAN +/- SD AND MEDIAN ALL-CAUSE MEDICAL COSTS BETWEEN NON-ADVSM AND MATCHED NON-SM COHORTS

Medical costs	Non-AdvSM (N=170)		Non-SM (N=170)		P-value (mean)	P-value (median)
	Mean	Median	Mean	Median		
Total	\$24,588	\$9,019	\$14,419	\$4,035	0.0254	<.0001
Pharmacy	\$11,288	\$1,301	\$4,742	\$423	0.0377	0.0006
ER	\$637	\$0	\$725	\$0	0.7696	0.0281
Physician office	\$2,229	\$1,663	\$1,267	\$672	<.0001	<.0001
Lab/Pathology	\$1,266	\$491	\$532	\$182	0.0003	<.0001
Radiology	\$1,055	\$358	\$1,157	\$113	0.8003	0.0427
Surgical	\$2,433	\$143	\$1,168	\$0	0.0613	0.0801
Ancillary services	\$3,143	\$823	\$3,099	\$89	0.9733	0.0001
Inpatient	\$2,536	\$0	\$1,729	\$0	0.5614	0.6742