Research Article

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Healthcare utilization and costs among patients with acromegaly in the United States

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Aim: Recent evidence regarding the healthcare resource utilization (HCRU) and associated costs of acromegaly is limited. **Materials & methods:** This retrospective, cross-sectional administrative claims analysis (IQVIA Pharmetrics Plus®) identified patients (≥18 years) with acromegaly between 1 January 2017 and 30 June 2022. HCRU and costs over 1 year were compared in patients with acromegaly and matched patients without acromegaly (age, sex, insurance type, year). Among patients with acromegaly, annual total healthcare costs of comorbidities and procedures consistent with high-risk comorbidities were reported. Costs were adjusted to 2023 USD. **Results:** Among 2289 patients with acromegaly and 2289 matched patients without acromegaly, mean age was 49.8 years and 51.6% were female. Patients with acromegaly had a significantly ($p < 0.001$) higher comorbidity burden than patients without acromegaly. A significantly ($p < 0.001$) greater proportion of patients with acromegaly versus patients without acromegaly had inpatient hospitalizations (20.1 vs 4.9%) and emergency department visits (23.9 vs 15.7%). Total mean healthcare costs were also significantly higher for patients with acromegaly than patients without acromegaly ($51,888 vs $10,601). The majority of acromegaly-related healthcare costs ($30,985) were attributable to acromegaly therapy ($25,895). Hypertension (42.8%) was the most common high-risk comorbidity associated with acromegaly. The costliest high-risk comorbidity was congestive heart failure, with a mean cost difference of $38,123 ($p < 0.05$) between patients with acromegaly with and without hypertension. **Conclusion:** Patients with acromegaly had higher HCRU and costs than matched patients without acromegaly, and the presence of acromegaly with high-risk comorbidities was associated with a substantial HCRU and cost burden. This high burden of illness may be alleviated with better disease control.

Plain language summary: Healthcare burden & costs in acromegaly

What is this article about? Acromegaly is a rare hormonal disease that leads to poor health outcomes without effective treatment. This study examined healthcare use and cost among patients with and without acromegaly, along with acromegaly-specific services and costs.

What were the results? In this retrospective cohort study, patients with acromegaly used more healthcare services than those without acromegaly. Twenty percent of patients with acromegaly were hospitalized during the 1-year study period compared with 5% of patients without acromegaly. Average total healthcare costs were almost fivefold higher for patients with acromegaly compared with those without acromegaly ($51,888 vs $10,601). Among patients with acromegaly, those with associated medical conditions and surgeries had the highest healthcare costs.

What do the results mean? Acromegaly – and acromegaly with high-risk comorbidities – was associated with a substantial healthcare burden, indicating that an unmet need remains for affected patients.

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Keywords: acromegaly • administrative claims analysis • comorbidities • costs • healthcare utilization

Acromegaly is a rare disease that results from excessive growth hormone (GH) production, typically from a pituitary adenoma. Excess GH stimulates hepatic secretion of insulin-like growth factor-1 (IGF-1), leading to excessive acral and soft tissue growth [1]. Patients with acromegaly often experience abnormal growth of hands and feet, alteration of facial features and thickening of tissue leading to uncontrolled disease. Patients with uncontrolled acromegaly are at risk of developing multiple comorbidities, including diabetes mellitus, hypertension, cardiomyopathy, sleep apnea and colon polyps, at rates much higher than the nonacromegaly population [2,3]. The risk of development and progression of these conditions generally increases with prolonged exposure to elevated GH levels [2,3]. If left untreated, patients with acromegaly have a twofold higher mortality rate than the general population [4,5]. Clinical diagnosis is often delayed because the signs of acromegaly progress slowly over a period of many years [6–8]. The goal of acromegaly management is to reduce GH and/or IGF-1 levels to normal or near normal levels [9]. Initial treatment usually consists of surgery to remove the tumor, but about half of patients require additional treatment [10]. First-line pharmacologic treatment for patients with persistent, significant disease often consists of a somatostatin receptor ligand (SRL) (i.e., octreotide or lanreotide), which inhibits GH secretion, or a GH receptor antagonist (i.e., pegvisomant). The efficacy of SRL therapy varies greatly, with an average biochemical response rate of approximately 55% across most large studies. Among drug-naive patients, an even larger proportion (46–83%) may fail to have their disease controlled by their initial treatment [11,12]. These patients may require further treatment including adding dopamine agonists or pegvisomant, additional surgery or radiotherapy [13].

There is limited recent real-world data on the overall disease burden of acromegaly, particularly on the group of patients with evidence of poor disease control. In a study assessing claims data, commercially covered patients with acromegaly had increased healthcare utilization associated with comorbidities; however, healthcare costs were not reported [14]. Two prior studies that utilized administrative claims data to examine healthcare costs among patients with acromegaly predate the US FDA approval of oral octreotide in 2020 [15–17]. One reported higher healthcare utilization and costs in patients with acromegaly compared with matched controls [17]. The second found that hospitalizations and pharmacotherapy were the largest drivers of acromegaly-related costs, possibly because of severe comorbidities [18]. Given the changing treatment landscape of acromegaly, and the dearth of evidence on the impact of high-risk comorbidities associated with uncontrolled disease, we aimed to provide estimates for healthcare utilization and costs for acromegaly in a commercially insured population.

Materials & methods

Study design & data source

This retrospective cross-sectional cohort analyzed adults in the US with acromegaly from the IQVIA Pharmetrics Plus® Database of adjudicated medical and pharmacy claims, including patient enrollment and benefit data. This database includes a nationally representative sample of more than 210 million enrollees since 2006 and contains demographic and enrollment characteristics, diagnoses and procedures, inpatient hospitalizations, outpatient primary and specialty visits, outpatient prescriptions and costs. The database is a Health Insurance Portability and Accountability Act compliant administrative claims database.

These claims data provide an opportunity to examine acromegaly, a rare disease, because they provide a sufficiently large patient population. This study uses the most recent 5 years of available data, from 1 January 2017 to 30 June 2023, to investigate healthcare resource utilization (HCRU) and costs among adult patients with acromegaly compared with patients without acromegaly, and, in a secondary analysis, to analyze patients with acromegaly and high-risk comorbidities.

Claims data are well-suited for measuring burden of illness, HCRU and costs in patients with rare diseases; their large sample size, relatively long follow-up period, and detailed capture of healthcare encounters, diagnoses and billing allow researchers to evaluate real-world health outcomes and economic impact of acromegaly [19]. However, claims data are administrative data for which the primary purpose is to facilitate reimbursement and all results should be interpreted with this in mind [20]. Other limitations of claims data have been explored and include missing data, duplicate records, upcoding, high rates of disenrollment and general lack laboratory test results [20,21].

Patient identification

This study included adults (aged $\geq$ 18 years) with acromegaly during the identification (ID) period (1 January 2017 to 30 June 2022), identified by at least two medical claims with acromegaly (International Classification of Diseases, 10th Revision, Clinical Modification [ICD-10-CM] diagnosis code: E22.0) in any diagnosis field or at

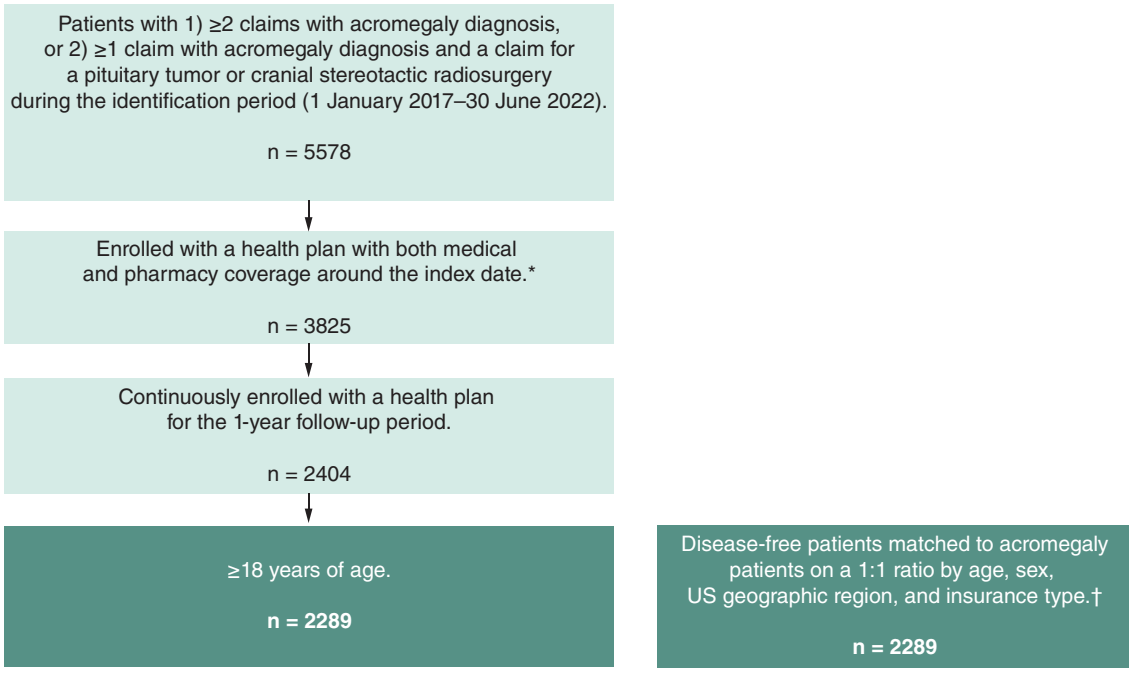

Figure 1. Patient attrition.
*A randomly selected claim with acromegaly diagnosis was the index date.
†Drawn from a 5% sample of the IQVIA Pharmetrics Plus® database. Assigned the same index date as the matched acromegaly cases and met the same enrollment criteria.

least one medical claim with an acromegaly diagnosis code in combination with one other claim for a pituitary tumor (ICD-10-CM: D35.2, D44.3), pituitary surgery (hypophysectomy), or cranial stereotactic radiosurgery (a full list of diagnosis and procedure codes is provided in Supplementary Table 1). A randomly selected claim with an acromegaly diagnosis was the index date. A random claim, rather than the first claim, was selected to include both individuals with existing and newly diagnosed acromegaly. All patients were followed for 1 year from the index date (observation period). Patients were excluded if they were not continuously enrolled in the database for the 1-year observation period. From a 5% random sample of enrollees in the database, a reference group of patients without acromegaly was selected by matching them with patients with acromegaly on a 1:1 ratio by age, sex, US geographic region and insurance type. The patients in this reference group were assigned the same index date as the matched acromegaly cases and met the same enrollment criteria.

In a secondary analysis, acromegaly with high-risk comorbidities was defined by the presence of one or more comorbidities of interest (i.e., osteoarthritis, hypertension, cardiomyopathy, congestive heart failure, valvular heart disease, sleep apnea, psychosis and depression) and procedures that are known to be associated with inadequately controlled disease.

Study measures

We reported baseline age, gender, insurance type and US geographic region at index date. During the observation period, we measured and compared disease burden between patients with and without acromegaly by analyzing comorbidities (a full list of diagnosis and procedure codes is provided in Supplementary Table 2), all-cause HCRU and costs. Comorbidity burden was measured by the Charlson Comorbidity Index (CCI) and specific comorbidities of interest. All-cause healthcare utilization included inpatient admissions, emergency department (ED) visits and outpatient visits. Costs included total healthcare costs and medical costs for inpatient hospitalizations, ED services and non-ED outpatient service costs.

For patients with acromegaly, we reported use of laboratory and imaging tests (i.e., IGF-1, glucose tolerance, GH, pituitary MRI), use of therapies (i.e., somatostatin analogs, dopamine receptor agonists, GH receptor antagonists, pituitary surgery, radiation therapy [a full list of diagnosis and procedure codes is provided in Supplementary Table 3]) and treatment costs. Acromegaly-related medical healthcare use and costs were estimated based on

Table 1. Matched cohort patient characteristics at baseline.

	Acromegaly patients (n = 2289)	Matched patients without acromegaly† (n = 2289)	All (n = 4578)	p-value
Age, mean (SD)	49.8 (14.0)	49.8 (14.0)	49.8 (14.0)	
Female, n (%)	1180 (51.6)	1180 (51.6)	2360 (51.6)	
Geographic region, n (%)				
Midwest	603 (26.3)	603 (26.3)	1206 (26.3)	
Northeast	406 (17.7)	406 (17.7)	812 (17.7)	
South	884 (38.6)	884 (38.6)	1768 (38.6)	
West	396 (17.3)	396 (17.3)	792 (17.3)	
Insurance type, n (%)				
Commercial	1469 (64.2)	1469 (64.2)	2938 (64.2)	
Medicare	188 (8.2)	188 (8.2)	376 (8.2)	
Other	632 (27.6)	632 (27.6)	1264 (27.6)	
Charlson Comorbidity Index (CCI), mean (SD)	1.3 (2.0)	0.6 (1.5)	0.9 (1.8)	<0.001
Comorbidities, n (%)				
Musculoskeletal	573 (25.0)	278 (12.1)	851 (18.6)	<0.001
Osteoarthritis	350 (15.3)	157 (6.9)	507 (11.1)	<0.001
Arthropathy/arthralgia/synovitis	107 (4.7)	43 (1.9)	150 (3.3)	<0.001
Kryphosis and scoliosis	15 (0.7)	7 (0.3)	22 (0.5)	0.087
Vertebral fracture	10 (0.4)	5 (0.2)	15 (0.3)	0.196
Carpal tunnel syndrome	48 (2.1)	32 (1.4)	80 (1.7)	0.017
Myopathy/myalgia	176 (7.7)	86 (3.8)	262 (5.7)	<0.001
Cardiovascular	1127 (49.2)	702 (30.7)	1829 (40.0)	<0.001
Hypertension	980 (42.8)	662 (28.9)	1642 (35.9)	<0.001
Cardiomyopathy	66 (2.9)	21 (0.9)	87 (1.9)	<0.001
Cardiac hypertrophy	83 (3.6)	30 (1.3)	113 (2.5)	<0.001
Congestive heart failure	81 (3.5)	48 (2.1)	129 (2.8)	0.003
Valvular heart disease	171 (7.5)	74 (3.2)	245 (5.4)	<0.001
Cardiac dysrhythmia/arrhythmia	269 (11.8)	108 (4.7)	377 (8.2)	<0.001
Endocrine/metabolic	1557 (68.0)	789 (34.5)	2346 (51.2)	<0.001
Diabetes (including impaired glucose tolerance)	640 (28.0)	278 (12.1)	918 (20.1)	<0.001
Obesity	661 (28.9)	371 (16.2)	1032 (22.5)	<0.001
Galactorrhea	17 (0.7)	0 (0.0)	17 (0.4)	<0.001
Menstrual abnormalities	189 (8.3)	85 (3.7)	274 (6.0)	<0.001
Impaired libido/impotence	200 (8.7)	106 (4.6)	306 (6.7)	<0.001
Hypothyroidism	693 (30.3)	200 (8.7)	893 (19.5)	<0.001
Chronic obstructive pulmonary disease	86 (3.8)	64 (2.8)	150 (3.3)	0.068
Sleep apnea (obstructive and central)	557 (24.3)	175 (7.6)	732 (16.0)	<0.001
Solid tumor without metastasis	1557 (68.0)	340 (14.9)	1897 (41.4)	<0.001
Deficiency anemias	189 (8.3)	77 (3.4)	266 (5.8)	<0.001
Psychoses	5 (0.2)	3 (0.1)	8 (0.2)	0.726
Depression	388 (17.0)	227 (9.9)	615 (13.4)	<0.001

†Disease-free beneficiaries were drawn from a 5% random sample of enrollees in the IQVIA Pharmetrics Plus® Database and matched to acromegaly beneficiaries on a 1:1 ratio by age, gender, insurance type and US geographic region. The disease-free controls were assigned with the same index date as the matched acromegaly cases and met the same enrollment criteria.

medical claims with acromegaly as any diagnosis. Costs were adjusted to 2023 US dollars using the medical component of the Consumer Price Index [22].

Statistical analysis

Descriptive statistics including mean, standard deviation (SD), and relative frequencies and percentages for continuous and categorical data, respectively, were reported. We used *t*-tests for continuous variables and Chi-squared

Table 2. Matched cohort all-cause healthcare utilization.

	Acromegaly patients (n = 2289)	Matched patients without acromegaly† (n = 2289)	All (n = 4578)	p-value
Had an inpatient hospitalization, n (%)	460 (20.1)	113 (4.9)	573 (12.5)	<0.001
Length of stay (days) among utilizers, mean (SD)	6.0 (9.9)	8.2 (17.0)	6.4 (11.7)	0.176
Inpatient hospitalizations, n (%)				<0.001
0	1829 (79.9)	2176 (95.1)	4005 (87.5)	
1	353 (15.4)	90 (3.9)	443 (9.7)	
2+	107 (4.7)	23 (1.0)	130 (2.8)	
Had an ED service, n (%)	546 (23.9)	360 (15.7)	906 (19.8)	<0.001
ED services, n (%)				<0.001
0	1743 (76.1)	1929 (84.3)	3672 (80.2)	
1	338 (14.8)	233 (10.2)	571 (12.5)	
2	113 (4.9)	61 (2.7)	174 (3.8)	
3+	95 (4.2)	66 (2.9)	161 (3.5)	
Office visits, mean (SD)	15.7 (15.5)	7.5 (10.9)	11.6 (14.0)	<0.001
Other outpatient services (non-ED/non-office), mean (SD)	11.5 (15.9)	4.4 (11.5)	8.0 (4.3)	<0.001

†Disease-free beneficiaries were drawn from a 5% random sample of enrollees in the IQVIA Pharmetrics Plus® Database and matched to acromegaly beneficiaries on a 1:1 ratio by age, gender, insurance type and US geographic region. The disease-free controls were assigned with the same index date as the matched acromegaly cases and met the same enrollment criteria.

tests for binary or categorical variables. All tests were two-sided. All data transformations and statistical analyses were performed using SAS© version 9.4.

Results

Patient identification & demographics

We identified 5578 patients with existing or newly diagnosed acromegaly during the ID period (1 January 2017 to 30 June 2022). After excluding patients without medical and pharmacy coverage around the index date (a randomly selected claim with an acromegaly diagnosis) or without continuous enrollment in a health plan during the 1-year observation period, 2404 patients remained. Among these patients, 2289 were at least 18 years old (Figure 1). The final sample consisted of 2289 patients with acromegaly and 2289 patients without acromegaly.

Across patients with and without acromegaly, the mean (SD) age was 49.8 (14.0) years. More patients were female (51.6%), from the South (38.6%), and had commercial insurance (64.2%). Patients with acromegaly had a higher comorbidity burden compared with patients without acromegaly (mean CCI score: 1.3 vs 0.6, $p < 0.001$), including greater proportions of patients with musculoskeletal (25.0 vs 12.1%), cardiovascular (49.2 vs 30.7%) and endocrine/metabolic (68.0 vs 34.5%) comorbidities of interest ($p < 0.001$ for all) (Table 1).

Healthcare utilization & costs

All-cause HCRU & costs

Patients with acromegaly had higher HCRU than patients without acromegaly, including a greater proportion of patients with an inpatient hospitalization (20.1 vs 4.9%) and ED visit (23.9 vs 15.7%), and a higher number of mean office visits (15.7 vs 10.9) and non-ED/non-office visits (11.5 vs 4.4) ($p < 0.001$ for all) (Table 2). Healthcare costs were higher among patients with acromegaly than patients without acromegaly, including total costs ($51,888 vs $10,601), medical (nonoutpatient pharmacy) costs ($32,095 vs $8101) and outpatient pharmacy costs ($19,794 vs $2500) ($p < 0.001$ for all) (Figure 2A). For patients with acromegaly, inpatient hospitalization was the largest single contributor ($9400) to medical costs (Figure 2B).

Acromegaly-related HCRU & costs

The majority (59%) of patients with acromegaly did not have evidence of acromegaly therapy (medical, pituitary surgery or radiation therapy). Of the 41% of patients who received therapy, somatostatin analogs (octreotide, lanreotide and pasireotide) were the most observed therapies (48.9%), followed by dopamine receptor agonists

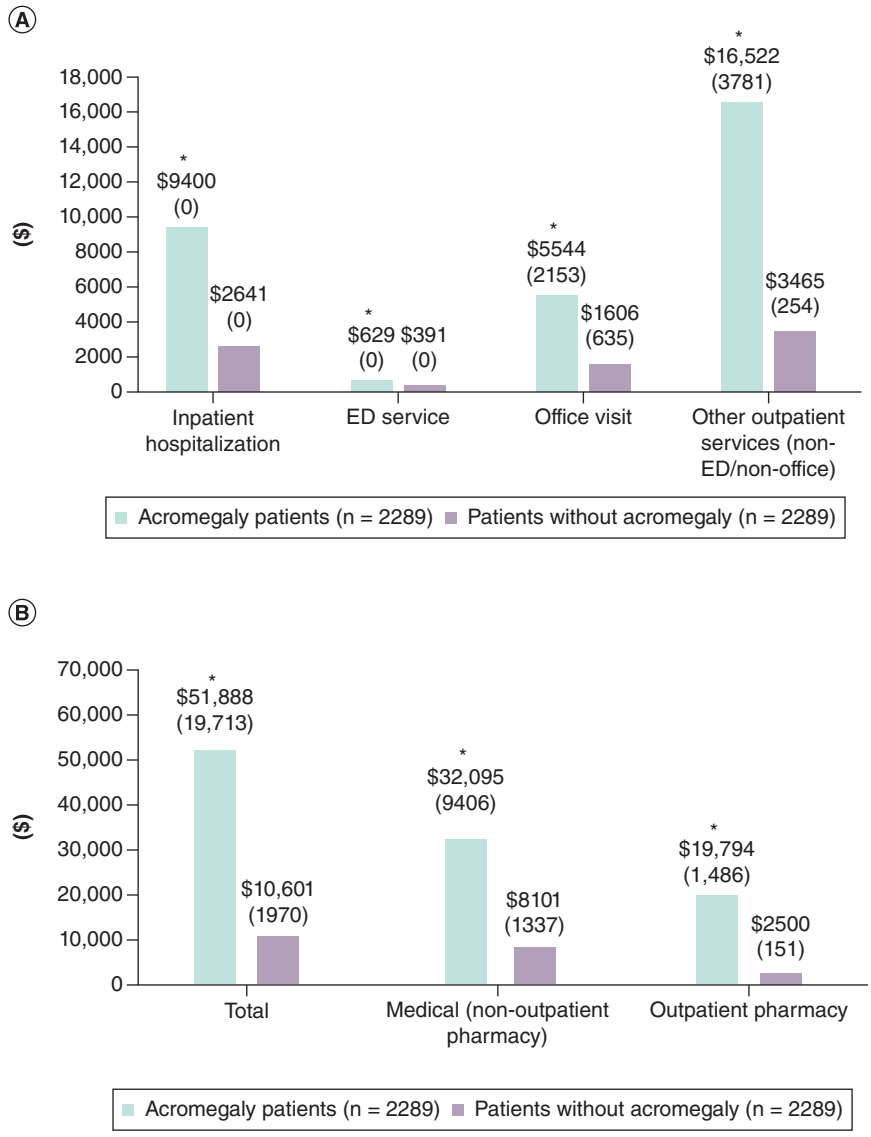

Figure 2. Matched cohort healthcare costs. (A) Mean (median) healthcare services costs and **(B)** Mean (median) total, medical, and outpatient pharmacy costs for patients with acromegaly and patients without acromegaly. Medical healthcare costs were the combined costs of inpatient hospitalization, emergency department services, office visits and non-emergency department/non-office costs other than outpatient pharmacy.
*$p < 0.001$ versus patients without acromegaly.

(35.3%). Pituitary surgery (21.9%) and radiation therapy (2.7%) were the least common therapy modalities (Table 3). Acromegaly-related inpatient hospitalization and ED visits were observed in 12.2 and 2.7% of patients, respectively. Patients had a mean (SD) of 1.7 (2.5) endocrinologist office visits (Table 3). Acromegaly therapy costs ($25,895) accounted for the majority of the mean total acromegaly-related healthcare costs ($30,985). Therapy costs ranged from $141 for dopamine receptor agonists to $13,270 for somatostatin analogs (Table 4).

High-risk comorbidity-related HCRU & costs in acromegaly

The most common high-risk comorbidities in patients with acromegaly were hypertension (42.8%), sleep apnea (24.3%), depression (17%) and osteoarthritis (15.3%). Among patients with acromegaly, the largest statistically significant mean cost difference between those with and without high-risk comorbidities was observed for congestive heart failure ($38,123), followed by osteoarthritis ($28,486), valvular heart disease ($25,543) and sleep apnea ($21,634) ($p < 0.001$ for all comparisons) (Figure 3).

Table 3. Acromegaly-related healthcare utilization.

	Acromegaly patients (n = 2289)
Laboratory or imaging test, n (%)	1924 (84.1)
IGF-1 test	1646 (71.9)
Glucose tolerance test	335 (14.6)
Growth hormone test	901 (39.4)
Pituitary MRI	1033 (45.1)
Acromegaly therapy (medical, pituitary surgery and radiation therapy, n (%)	938 (41.0)
Somatostatin analogs (octreotide, lanreotide, pasireotide)	459 (20.1)
Dopamine receptor agonists (cabergoline, bromocriptine)	331 (14.5)
GH receptor antagonist (pegvisomant)	164 (7.2)
Pituitary surgery (hypophysectomy)	205 (9.0)
Radiation therapy	25 (1.1)
Had an acromegaly-related inpatient hospitalization, n (%)	280 (12.2)
Length of stay (days) among utilizers, mean (SD)	4.1 (6.2)
Acromegaly-related† inpatient hospitalizations, n (%)	
0	2009 (87.8)
1	246 (10.7)
2+	34 (1.5)
Had an acromegaly-related † ED service, n (%)	62 (2.7)
Acromegaly-related † office visits, mean (SD)	2.4 (3.5)
Endocrinologist office visits, mean (SD)	1.7 (2.5)
Acromegaly-related † other outpatient services (non-ED/non-office), mean (SD)	2.7 (3.6)

†Medical claims with acromegaly as any diagnosis.
ED: Emergency department; GH: Growth hormone; IGF-1: Insulin-like growth factor 1.

Colonoscopies and colonic procedures for polyps/tumors were the most frequent surgery (12.6% of cases) with a mean cost per surgery of $2179. The costliest surgeries were lumbar and cervical spinal fusions and laminectomies ($60,760; 0.8% of patients) (Table 5).

Discussion

Patients with acromegaly use substantially more healthcare services and have higher costs than patients without acromegaly. Hospitalization is four-times more common among acromegaly patients than among those without acromegaly. Mean total healthcare costs are over fourfold higher for patients with acromegaly than patients without acromegaly. Mean total healthcare costs are over fourfold higher for patients with acromegaly than patients without. Among patients with acromegaly, high-risk comorbidities and procedures are associated with even higher costs.

No published studies have examined healthcare costs among patients with acromegaly in administrative claims data since the FDA approval of oral octreotide in 2020, and recent data on HCRU associated with acromegaly is limited [15]. Consistent with the current work, older studies reported a range of inpatient hospitalization rates (22–34.6%) and ED visits (20.2–28.3%) among patients with acromegaly [15–17], as well as a multifold higher hospitalization rate than matched controls [16]. The current study's total costs (all-cause and acromegaly-related) were higher than those published in previous studies using older administrative claims data (all costs adjusted to 2023 USD) [16–18,23–25]. Placzek and colleagues reported acromegaly-related costs (medical and pharmacy) of $19,324, which is lower than the $30,985 (both adjusted to 2023 USD) in our study [17]. The main driver of the difference between these acromegaly-related costs appears to be related to therapy costs. Placzek and colleagues reported prescription (pharmacy) costs of $10,895 compared with the $25,895 we found (both inflation-adjusted to 2023 USD) [17]. In our study, total healthcare costs were highest for patients with acromegaly and high-risk comorbidities or procedures. Thus, despite the introduction of a new SRL, the humanistic and HCRU burden among patients with acromegaly remains high, with 20% of patients having at least one inpatient hospitalization in a year.

We reported higher rates of patients using acromegaly medical therapy compared with an older 2015 study that also used a prevalent acromegaly cohort [25]. This is an expected result, given that the proportion of patients receiving

Table 4. Acromegaly-related healthcare costs.

		Acromegaly patients (n = 2289)
Total acromegaly-related † healthcare costs	Mean	$30,985
	SD	59,856.7
	Median	1772
Costs of acromegaly-related † nontherapy claims	Mean	$5090
	SD	16,967.4
	Median	869
Acromegaly-related † inpatient hospitalization costs	Mean	$1,896
	SD	13,099.6
	Median	0
Acromegaly-related † ED service costs	Mean	$58
	SD	545.5
	Median	0
Acromegaly-related † office visit costs	Mean	$689
	SD	3123.2
	Median	242
Acromegaly-related † other outpatient services (non-ED/non-office) costs	Mean	$2446
	SD	9076.6
	Median	284
Acromegaly therapy costs	Mean	$25,895
	SD	55,549.4
	Median	0
Somatostatin analog costs	Mean	$13,270
	SD	35,325.8
	Median	0
Dopamine receptor agonist costs	Mean	$141
	SD	614.3
	Median	0
GH receptor antagonist costs	Mean	$7886
	SD	36,069.5
	Median	0
Pituitary surgery costs	Mean	$4184
	SD	15,843.8
	Median	0
Radiation therapy costs	Mean	$413
	SD	5539.2
	Median	0

†Medical claims with acromegaly as any diagnosis.
ED: Emergency department; GH: Growth hormone; IGF-1: Insulin-like growth factor 1.

acromegaly medical therapy has increased over time [26,27]. However, the use of medical therapy in our cohort was somewhat lower than the 43–60% of patients with persistent or recurrent acromegaly [28–30]. This suggests that there is a portion of patients with persistent acromegaly who remain untreated and represents a significant unmet need in disease management for patients with high-risk comorbidities. Studies that assessed acromegaly therapy during earlier stages of the disease course found higher proportions of cabergoline and bromocriptine [18,25]. Over time, patients treated with cabergoline tend to discontinue, switch to a different therapy, or add-on an additional therapy [14]. This study was designed as a prevalent cohort to represent the full spectrum of the disease impact from initial diagnosis and treatment to the long-term impacts of well-controlled disease and acromegaly with high-risk comorbidities. The differences in the patients represented in each study explains why the current study's proportion of patients on cabergoline is relatively low. While treatment switching may signal that patients are progressing to therapies that are more effective over time, it also raises questions about whether patients have access to the newer,

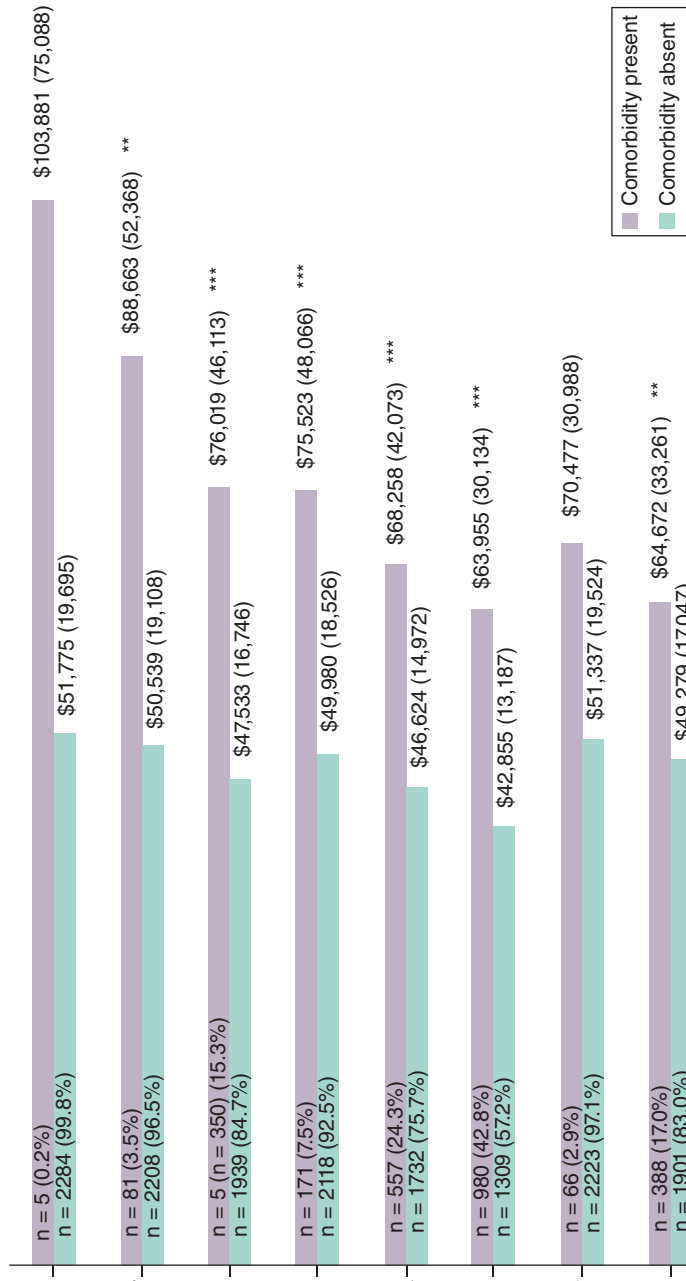

Figure 3. Total healthcare costs stratified by selected comorbidities among acromegaly patents. Mean (median) total healthcare costs stratified by selected comorbidities among patients with acromegaly. Total healthcare costs included costs of medical claims (inpatient hospitalization, emergency department services, office visits, other outpatient non-emergency department/non-office services) and outpatient pharmacy claims.
**$p < 0.01$; ***$p < 0.001$ versus patients without acromegaly without comorbidities.

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Table 5. Utilization and costs of surgeries of interest and severe headaches among acromegaly patients.

	Patients with surgery/event, n (%)[†]	Surgeries during observation period, n	Mean [median] costs per surgery[‡]
Surgery of interest			
Total or partial hip replacements	36 (1.57)	41	$23,196 [22,511]
Total or partial knee replacements	30 (1.31)	32	$16,244 [11,128]
Lumbar and cervical spinal fusions, laminectomies	18 (0.79)	19	$60,760 [43,931]
Other orthopedic surgeries for arthritis[§]	13 (0.57)	15	$21,043 [14,019]
Carpal tunnel release (bilateral)	9 (0.39)	9	$2572 [1,736]
Uvulopalatopharyngoplasty and other sleep apnea procedures	50 (2.18)	65	$31,375 [27,394]
Colonoscopies and colonic procedures for polyps/tumors	288 (12.58)	300	$2179 [1,463]
Frontal protrusion corrected by osteotomy	2 (0.09)	2	$42,864 [42,864]
Vertical and anteroposterior facial disproportion by bimaxillary procedures	2 (0.09)	2	$42,864 [42,864]
Nasal deformity by rhinoplasty or skull bone grafting	47 (2.05)	51	$34,708 [27,720]
Macroglossia by tongue resection	0 (0)	0	N/A [N/A]

[†] Among 2289 acromegaly patients.
[‡] Total admission costs of inpatient or outpatient surgeries, including costs of other surgeries or services done during the same admission.
[§] Arthroplasty (complete and partial), arthrodesis and osteotomy, focusing on specific joints – hip, knee, shoulder, hand and foot.

more effective, treatment options soon after their initial diagnoses. Addressing these gaps in treatment utilization is essential for improving patient outcomes and reducing disease burden. This study's design also explains why the current study's proportion of patients who underwent pituitary surgery is low (9.0%) compared with other studies that report whether patients with acromegaly had ever received pituitary surgery (96.3%); this analysis only captured procedures documented during the 1-year observation period [31].

This was a retrospective cross-sectional study using claims data from a large, longitudinal health plan database that was conducted over several years. The primary purpose of administrative claims data is to support reimbursement; thus, the identification of patients with acromegaly with and without high-risk comorbidities based on diagnosis and procedure codes has not been validated and may be inaccurate. The following claims-based studies use the same, or similar, definition for identifying acromegaly in claims data [14,16–18,23–25,32,33]. Undiagnosed patients or those not seeking acromegaly-related care would not have been captured in this study. Also, results may not be generalizable to patients with incident cases of acromegaly, as our study cohort included patients at varying stages of disease. We identified patients diagnosed with high-risk conditions, rather than with laboratory testing, as the claims database used for this study had no information on test results. Commercial claims databases have limited coverage of patients aged 65 years or older, so data reported here may not be generalizable to the older population or to uninsured populations.

Conclusion

Despite the introduction of new medical therapies, patients with acromegaly still have substantial HCRU and costs compared with those without acromegaly. These costs are primarily driven by inpatient hospitalizations, other outpatient services (non-ED/non-office), and outpatient pharmacy. Patients with acromegaly who have high-risk comorbidities or procedures incur the highest costs and unmet need. New treatments that can provide better disease control could lead to lower HCRU, costs and symptom burden.

Supplementary data

To view the supplementary data that accompany this paper please visit the journal website at: https://becarispublishing.com/doi/epdf/10.57264/cer-2025-0069

Author contributions

TP Quock, SK Rattana and IE Paulson: acquisition of data; design of the work; interpretation of data; revising the work for important intellectual content; final approval. E Chang, AK Das, A Speller, MH Tarbox, ML Rossi and MS Broder: design of the work; analysis of data; interpretation of data; drafting and revising the work for important intellectual content; final approval.

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Competing interests disclosure

TP Quock, SK Rattana and IE Paulson are employees of, and hold stock in Crinetics Pharmaceuticals, Inc. at the time of this study. E Chang, AK Das, MH Tarbox and MS Broder were employees of Partnership for Health Analytic Research, LLC (now ADVI Health), which received funding from Crinetics to conduct the research described in this manuscript. PHAR also discloses financial relationships with the following commercial entities outside of the submitted work: Abbvie, Akcea, Amgen, Astellas, AstraZeneca, Delfi Diagnostics, Dompe, Exact Sciences Corporation, Genentech, Gilead, GRAIL, Ionis, Janssen, Nobelpharma, Novartis, Pfizer, Recordati, Regeneron and Sanofi US Services. The authors have no other competing interests or relevant affiliations with any organization or entity with the subject matter or materials discussed in the manuscript apart from those disclosed.

Ethical conduct of research

The authors state that they have obtained appropriate institutional review board approval or have followed the principles outlined in the Declaration of Helsinki for all human or animal experimental investigations.

Summary points

- No published studies have examined healthcare costs among patients with acromegaly in administrative claims data since the US FDA approval of oral octreotide in 2020, and recent data on healthcare resource utilization (HCRU) associated with acromegaly are limited. Prolonged exposure to elevated growth hormone levels increases the risk of comorbidities and mortality for patients with acromegaly.
- This retrospective cohort study used 2017–2022 administrative claims data (IQVIA Pharmetrics Plus®) to compare HCRU and costs between patients with acromegaly and a reference group of patients without acromegaly, and, in a secondary analysis, analyzed patients with acromegaly who also have high-risk comorbidities and procedures.
- Patients with acromegaly have a higher comorbidity burden than the matched reference group without acromegaly (Charlson Comorbidity Index: 1.3 vs 0.6, $p < 0.001$).
- A fourfold greater proportion of patients with acromegaly have an inpatient hospitalization than the matched reference group without acromegaly.
- Mean total healthcare costs are higher for patients with acromegaly than for the matched reference group ($51,888 vs $10,601).
- Among patients with acromegaly, acromegaly therapy costs ($25,895) account for the majority of mean total acromegaly-related healthcare costs ($30,985); however, only 41% of patients with acromegaly have evidence of acromegaly therapy.
- Mean all-cause healthcare costs are higher for patients with each comorbidity of interest than those without, with the largest mean cost difference seen for osteoarthritis ($28,486; $p < 0.001$).
- The most frequent surgeries associated with acromegaly with high-risk comorbidities are colonoscopies and colonic procedures for polyps/tumors (12.6% of cases), and the costliest surgeries are lumbar and cervical spine fusions and laminectomies ($60,760; 0.8% of patients).
- An unmet need remains for patients with acromegaly, especially those with high-risk comorbidities. Better disease control among patients with acromegaly could lead to lower HCRU, costs and symptom burden.

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