Original Article

INCIDENCE AND PREVALENCE OF ACROMEGALY IN THE UNITED STATES: A CLAIMS-BASED ANALYSIS

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ABSTRACT

Objective: Acromegaly, a rare endocrine disorder, results from excessive growth hormone secretion, leading to multisystem-associated morbidities. Using 2 large nationwide databases, we estimated the annual incidence and prevalence of acromegaly in the U.S.

Methods: We used 2008 to 2013 data from the Truven Health MarketScan® Commercial Claims and Encounters Database and IMS Health PharMetrics healthcare insurance claims databases, with health plan enrollees <65 years of age. Study patients had ≥2 claims with acromegaly (International Classification of Diseases, 9th Revision, Clinical Modification Code [ICD-9CM] 253.0), or 1 claim with acromegaly and 1 claim for pituitary tumor, pituitary surgery, or cranial stereotactic radiosurgery. Annual incidence was calculated for each year from 2009 to 2013, and prevalence in 2013. Estimates were stratified by age and sex.

Results: Incidence was up to 11.7 cases per million person-years (PMPY) in MarketScan and 9.6 cases PMPY in PharMetrics. Rates were similar by sex but typically lowest in ≤17 year olds and higher in >24 year olds. The prevalence estimates were 87.8 and 71.0 per million per year in MarketScan and PharMetrics, respectively. Prevalence consistently increased with age but was similar by sex in each database.

Conclusion: The current U.S. incidence of acromegaly may be up to 4 times higher and prevalence may be up to 50% higher than previously reported in European studies. Our findings correspond with the estimates reported by a recent U.S. study that used a single managed care database, supporting the robustness of these estimates in this population. Our study indicates there are approximately 3,000 new cases of acromegaly per year, with a prevalence of about 25,000 acromegaly patients in the U.S. **(Endocr Pract. 2016;22:000-000)**

Abbreviations:
CT = computed tomography; **GH** = growth hormone; **IGF-1** = insulin-like growth factor 1; **ICD-9-CM Code** = International Classification of Diseases, 9th Revision, Clinical Modification Codes; **MRI** = magnetic resonance imaging; **PMPY** = per million person-years

INTRODUCTION

Acromegaly is a slowly progressive growth disorder resulting from excessive growth hormone (GH) production (1). The consequences include severe disfigurement, multiple morbidities, and premature mortality. Slow onset of the disease hampers the diagnosis of acromegaly in early stages (2). The most serious health consequences of acromegaly are type 2 diabetes, high blood pressure, increased risk of cardiovascular disease, and arthritis (3).

Literature suggests that the duration from symptom onset to diagnosis is 4 to 10 years, and it develops at an average age of approximately 40 years (4). Diagnostic tests for acromegaly include tests of serum insulin-like growth factor 1 (IGF-1) and GH, computed tomography (CT), and magnetic resonance imaging (MRI). First-line treatment is usually trans-sphenoidal surgery to remove the tumor. If surgery fails, or in cases where it cannot be performed safely, medication or radiation may be used.

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A 2016 study by Burton et al reported an overall annual incidence rate of acromegaly in the U.S. of about 11 cases per million person-years (PMPY) based on a single managed healthcare database. The authors also recently reported an overall annual prevalence of about 78 cases per million each year (5). Several prior estimates of incidence and prevalence of acromegaly were reported using older data in non-U.S. populations (6-19).

Given that only 1 U.S. study has previously reported estimates of incidence and prevalence of acromegaly based on a single major managed healthcare data source, our aim was to better understand the incidence and prevalence of this rare endocrine disorder across other nationwide data sources in the U.S. For this purpose, a study was conducted that used data from 2 major healthcare insurance claims databases that covered multiple managed care health plans across the U.S. The objective was to estimate both annual incidence and prevalence of acromegaly in the U.S.—overall and stratified by age and sex—across a 6-year period from 2008 to 2013.

METHODS

Study Design and Data Source

We conducted a retrospective cross-sectional study from January 1, 2008 to December 31, 2013 using data from 2 large, Health Insurance Portability and Accountability Act -compliant administrative commercial health insurance claims databases: Truven Health MarketScan® Commercial Claims and Encounters Database, and IMS Health PharMetrics (18,19). The MarketScan® database provides in-depth, longitudinal views of healthcare practices (18,19). It contains claims data on approximately 170 million insured lives from all regions of the U.S. since 1995. The database includes patient-level demographic information, insurance features, financial information, inpatient and outpatient medical information, and drug and enrollment information. The PharMetrics database is a nonpayer owned integrated claims database of commercial insurers that includes medical and pharmacy claims for more than 150 unique patients across the U.S. (18,19). Data are available from 2006 onward and include diverse representation of geography, employers, payers, providers, and therapeutic areas. The database includes patient-level demographics, prescription information, inpatient and outpatient medical claims, medical and pharmacy cost data, and enrollment information.

Both databases include inpatient and outpatient claims, diagnoses, and procedures, including International Classification of Diseases, 9th Revision, Clinical Modification Codes (ICD-9-CM Code) and Current Procedural Terminology codes. Medicare plans were not included in the MarketScan database, and very few Medicare patients were included in the PharMetrics database (18,19); thus, our study focused only on patients <65 years old.

Study Population

Acromegaly patients were identified for each calendar year during the study time frame (1/1/2008 to 12/31/2013). To be included, patients must have had at least 2 medical claims with acromegaly (ICD-9-CM code 253.0) (20) or 1 medical claim with acromegaly in combination with 1 other claim for a pituitary tumor (ICD-9-CM codes 237.0x) (20), pituitary surgery (hypophysectomy), or cranial stereotactic radiosurgery in any diagnosis field in the same calendar year. Patients ≥65 years old were excluded. Patients may have been identified in multiple calendar years.

Incidence Cohorts

A limitation of using claims data to estimate disease incidence is the inability to know with certainty that the first diagnosis seen in the data represents the first clinical diagnosis of the condition. To address this issue, different patient cohorts were created based on years of continuous enrollment. To be included in the main analysis, patients must have been continuously enrolled for 3 years: the specific calendar year of diagnosis and 2 years prior to that, with no evidence of disease in the prior 2 years. For example, using the 3 years' continuous enrollment requirement, a cohort of patients identified with acromegaly in 2010 must have been enrolled during the entire 2008 to 2010 period. In a sensitivity analysis, we included patients with 2 years of continuous enrollment. In this cohort, patients must have been continuously enrolled for the specific calendar year of diagnosis and the prior year, with no evidence of the disease in the prior year. Both enrollment timelines are shown in Figure 1.

For the main analysis, the incidence rate was calculated as the number of patients in a particular year divided by the number of all patients who were continuously enrolled across the three year period (year of diagnosis and 2 prior disease-free years). For sensitivity analysis, the rate was calculated as the number of patients in a particular year divided by the total number of patients who were continuously enrolled across the 2-year period (year of diagnosis and 1 prior disease-free year). These estimates were further stratified based on sex and age (≤17 years, 18-24, 25-34, 45-54, and 55-64 years).

Prevalence Cohorts

Given the complexity of the claims data analysis, we calculated prevalence in 2 ways to achieve more robust estimates. Two prevalence cohorts were identified. The first included patients who were continuously enrolled for the entire calendar year 2013 and met the inclusion criteria at any time during 2008 and 2013 (the main analysis). The second cohort had no requirement for continuous enrollment (the sensitivity analysis). Patients were stratified by age (≤17, 18-24, 25-34, 45-54, and 55-64 years) and sex.

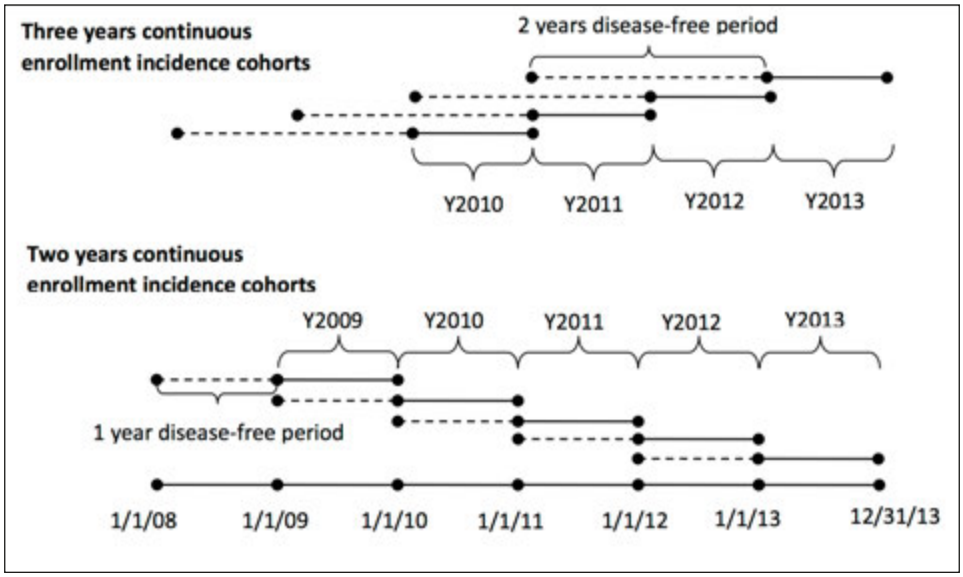

Fig. 1. Depiction of the 2- and 3-year continuous enrollment incidence cohorts.

Statistical Analysis

Yearly incidence rates were calculated for 2010 through 2013 for the 3 years' continuous enrollment cohort, and 2009 through 2013 for the 2 years' continuous enrollment cohort. Claims were reviewed during the enrollment years to determine the demographic measures. Thus, for each of the calendar years used in this analysis, we reported the distribution of patient demographics, summarizing continuous variables with means and SDs and categorical variables with patient counts and percentages.

Prevalence proportions for the various cohorts (based on enrollment criteria, age, and sex) were calculated as the number of patients in each cohort divided by the total number of health plan enrollees for the same cohort. For the main analysis, prevalence was calculated as the number of acromegaly patients in the cohort divided by the total number of patients continuously enrolled for the full calendar year 2013. For the sensitivity analysis, prevalence was calculated as the number of acromegaly patients in the cohort divided by the number of patients enrolled in June 2013.

For both incidence and prevalence analyses, all estimates were reported in overall and stratified by age and sex for adults <65 years old, and reported separately for each database.

Finally, we extrapolated the incidence rates and prevalence proportions for acromegaly to the populations of various countries in North America and Europe. These extrapolated estimates were calculated using the incidence and prevalence from our main analysis and the population estimates for these countries (14).

All data transformations and statistical analysis were performed using SAS® version 9.4 (SAS Institute, Cary, NC).

RESULTS

Incidence Results

About 1,200 patients (from 1,065 to 1,542 in MarketScan and 924 to 1,141 in PharMetrics) were identified as having acromegaly in each year from 2008 to 2013 (Table 1). Roughly half were females in both datasets (Table 1). Overall, incidence estimates were slightly higher from the MarketScan data compared to PharMetrics. In the main analysis, the incidence rates of acromegaly in individuals less than 65 years old were between 10.6 and 11.7 PMPY in MarketScan and between 8.3 and 9.6 PMPY in PharMetrics (Tables 2 and 3). Sex-specific rates were similar, ranging from 11.1 to 12.2 PMPY in females and 10.0 to 11.5 PMPY in males in MarketScan, and 8.3 to 10.5 PMPY and 7.4 to 10.3 PMPY, respectively, in PharMetrics (Tables 2 and 3). Incidence varied by age, with the highest rate in those aged between 35 and 64 years (up to 16.7 PMPY in MarketScan and up to 15.2 PMPY in PharMetrics) and lowest in those aged ≤17 years, between 4.4 and 5.8 PMPY and between 1.8 and 4.9 PMPY in MarketScan and PharMetrics, respectively (Tables 2 and 3). In the sensitivity analysis, rates were slightly higher: between 12.2 and 15.0 PMPY in MarketScan and between 9.6 and 11.9 PMPY in PharMetrics (data not shown).

Prevalence Results

In 2013, there were up to 2,581 and 2,100 prevalent acromegaly patients in MarketScan and PharMetrics, respectively. In both databases that year, the proportion of females was about 52%, and age distributions were also similar: 10.3% and 10.2% were ≤17 years old, 4.7% and 5.9% were 18 to 24 years old, 10.7% and 12.7% were 25

Table 1
Patient Demographics[a]

	2008	2009	2010	2011	2012	2013
Truven Health MarketScan® Commercial Claims and Encounters Database						
N	1,065	1,375	1,347	1,503	1,542	1,238
Age, year, %						
≤17	9.3	8.2	8.5	8.7	8.2	7.4
18-24	3.6	2.8	3.9	3.2	4.3	4.0
25-34	10.9	10.4	12.0	11.6	10.8	10.8
35-44	21.4	18.9	17.6	18.1	18.6	17.8
45-54	29.7	32.3	30.5	29.3	29.2	30.2
55-64	25.2	27.3	27.5	29.1	28.8	29.9
Female, %	48.5	51.0	49.7	50.0	48.0	51.5
IMS Health PharMetrics						
N	1,045	1,141	1,071	1,050	988	924
Age, year, %						
≤17	8.9	9.0	8.1	7.7	7.2	9.4
18-24	3.3	4.0	4.1	4.0	4.3	4.3
25-34	10.7	10.5	12.1	11.1	12.1	11.9
35-44	18.1	18.7	16.3	19.5	18.9	17.4
45-54	31.1	28.6	29.3	27.5	27.0	26.8
55-64	27.9	29.2	30.0	30.1	30.5	30.1
Female, %	49.0	50.8	49.4	49.7	46.9	50.0

[a] Patients had 2 or more medical claims with an acromegaly diagnosis codes, or 1 medical claim with an acromegaly diagnosis code in combination with 1 other claim for a pituitary tumor, pituitary surgery (hypophysectomy), or cranial stereotactic radiosurgery in any diagnosis field in the same calendar year. Patients may have been identified in multiple calendar years. No continuous enrollment was required.

Table 2
Main Analysis: Acromegaly Incidence Rate with 3 Years' Continuous Enrollment (MarketScan)

2010 N = 13,593,738		Incidence rate per 100,000 patient-years[a]			
		2011 N = 15,348,513	2012 N = 16,527,196	2013 N = 14,785,312	
Sex	**Age**				
Female	≤17	0.75	0.28	0.32	0.06
	18-24	1.46	0.16	0.79	0.99
	25-34	1.58	1.87	1.66	1.20
	35-44	0.90	1.62	2.12	1.35
	45-54	1.67	1.41	1.01	1.64
	55-64	1.22	1.42	1.54	1.50
	All females	1.22	1.14	1.20	1.11

Table 2 *Continued*					
Male	≤17	0.42	0.59	0.66	0.80
	18-24	1.05	0.47	0.91	1.09
	25-34	0.31	0.40	0.90	0.93
	35-44	1.56	1.47	1.16	0.89
	45-54	1.42	1.34	1.69	1.18
	55-64	1.79	1.61	1.44	1.13
	All males	1.12	1.05	1.15	1.00
Both sexes	≤17	0.58	0.44	0.49	0.44
	18-24	1.25	0.32	0.85	1.04
	25-34	0.99	1.19	1.31	1.07
	35-44	1.21	1.55	1.67	1.13
	45-54	1.55	1.38	1.33	1.42
	55-64	1.49	1.51	1.49	1.33
	All patients	**1.17**	**1.10**	**1.17**	**1.06**

[a] Number of members with full-year enrollment in that year and 2 years before.

Table 3 **Main Analysis: Acromegaly Incidence Rate with 3 Years' Continuous Enrollment (PharMetrics)**					
		Incidence rate per 100,000 patient-years [a]			
2010 **N = 17,364,358**		**2011** **N = 17,209,914**	**2012** **N = 15,351,185**	**2013** **N = 14,469,652**	
Sex	**Age**				
Female	≤17	0.37	0.38	0.25	0.34
	18-24	0.65	0.73	1.01	1.66
	25-34	1.29	1.39	0.97	0.89
	35-44	1.03	1.33	1.44	0.95
	45-54	1.44	0.92	0.64	1.21
	55-64	0.65	1.08	0.96	1.39
	All females	0.90	0.94	0.83	1.05
Male	≤17	0.60	0.51	0.12	0.64
	18-24	0.64	0.59	0.50	0.49
	25-34	0.95	0.82	1.03	0.79
	35-44	0.75	0.85	1.04	0.37
	45-54	1.61	0.91	0.90	1.11
	55-64	1.37	0.78	1.45	1.45
	All males	1.03	0.74	0.83	0.86
Both sexes	≤17	0.49	0.45	0.18	0.49
	18-24	0.64	0.66	0.75	1.06
	25-34	1.13	1.12	1.00	0.84
	35-44	0.90	1.10	1.25	0.67
	45-54	1.52	0.92	0.76	1.16
	55-64	0.99	0.94	1.19	1.42
	All patients	**0.96**	**0.84**	**0.83**	**0.95**

[a] Number of members with full-year enrollment in that year and 2 years before.

to 34 years old, 17.3% and 16.1% were 35 to 44 years old, 27.5% and 26.5% were 45 to 54 years old, and 29.5% and 28.6% were 55 to 64 years old in MarketScan and PharMetrics, respectively (data not shown). Generally, prevalence estimates were slightly higher in MarketScan compared to PharMetrics. The prevalence proportion of acromegaly in the main analysis was 87.8 per million per year in the MarketScan database and 71.0 per million per year in PharMetrics (Table 4). In the sensitivity analysis, proportions were slightly higher: 88.8 per million per year in MarketScan and 72.8 per million per year in PharMetrics (not shown). Sex-specific proportions differed between databases. Disease prevalence was 87.5 per million per year in females in MarketScan and slightly higher in males (88.2 per million per year), whereas in PharMetrics estimates were higher in females (74.5 per million per year) than males (67.3 per million per year). Prevalence varied by age, with the highest estimates in those aged 55 to 64 years (152 per million per year in the MarketScan database and 115 per million per year in PharMetrics) and lowest in those aged ≤17 years, at 38 per million per year and 32.9 per million per year in MarketScan and PharMetrics, respectively (Table 4).

Table 4
Acromegaly Prevalence[a] in 2013: Main Analysis and Sensitivity Analysis

		Prevalence proportion per 100,000 per year	
		MarketScan N = 24,508,019[b]	**PharMetrics N = 22,405,110[b]**
Sex	**Age**		
Female	≤17	3.52	2.92
	18-24	3.69	4.11
	25-34	8.1	7.53
	35-44	9.43	8.19
	45-54	12.5	11
	55-64	14.6	10.4
	All females	8.75	7.45
Male	≤17	4.06	3.64
	18-24	3.97	3.39
	25-34	5.7	4.58
	35-44	10.1	6
	45-54	13.6	9.14
	55-64	15.8	12.8
	All males	8.82	6.73
All	≤17	3.8	3.29
	18-24	3.83	3.74
	25-34	6.98	6.08
	35-44	9.73	7.12
	45-54	13	10.1
	55-64	15.2	11.5
	All patients	**8.78**	**7.10**

[a] Patients who ever enrolled with health plan in 2013 and had 2 or more medical claims with an acromegaly diagnosis codes, or one medical claim with an acromegaly diagnosis code in combination with one other claim for a pituitary tumor, pituitary surgery (hypophysectomy), or cranial stereotactic radiosurgery in any diagnosis field any time between 1/1/2008 and 12/31/2013.
[b] Number of members with full year enrollment in 2013.

Extrapolated Results

The incidence and prevalence observed in main analysis were extrapolated to the populations of various countries in North America and Europe (Table 5). We used 2013 midpoint estimate of 10 PMPY (10.6 PMPY in MarketScan and 9.5 PMPY) for incidence and a midpoint estimate of 80 per million per year for prevalence in the extrapolation. Our estimates indicate there are 3,165 new cases of acromegaly per year in the U.S., with a prevalence of about 25,320 acromegaly patients in the U.S.

DISCUSSION

We found that the annual incidence of acromegaly in the U.S. for individuals <65 years of age is about 10 PMPY, according to 2 databases from 2008 to 2013. The prevalence proportions of acromegaly are approximately 71.0 to 87.8 per million per year, with similar proportions in males and females, and the highest proportion among those aged 55 to 64 years. Our findings highly correspond with the 2016 estimates published by Burton et al. Both our estimates and those from the single recent U.S. study, are substantially higher than the most commonly cited estimates from a literature review from 1999 (6). Other prior estimates were derived based on data from European-based population studies, including the Newcastle Region, Sweden, Northern Ireland, Spain (6), and other parts of the world (8-12).

The 2016 study by Burton et al reported an overall annual incidence rate of acromegaly in the U.S. of about 11 cases PMPY based on nationwide database from a single managed healthcare plan. Similar to our rate of 10 PMPY, this estimate is much higher than the commonly quoted estimate of 3.3 PMPY published in 1999 on studies of non-U.S. populations dating as far back as 1926 (6). At this rate, approximately 1000 people in the U.S. would have been diagnosed with acromegaly in 2015(7). This commonly cited statistic is derived from data from outside the U.S., and from studies several decades old. In South Korea, the average annual incidence was reported as 3.9 cases PMPY during 2003 to 2007 (8). According to the Spanish national data, the estimated incidence in Spain was 2.5 cases PMPY from 1997 to 2009 (9). Slightly different results were observed for Belgium and Luxemburg with

Table 5
Extrapolated Incidence and Prevalence of Acromegaly for North America and Europe for 2013

Region/country	Extrapolated incidence[a]	Extrapolated prevalence[b]	Population (in millions)[c]
North America			
United States	3,165	25,320	316.5
Canada	351.6	2,813	35.16
Mexico	1,223	9,784	122.3
Northern Europe			
Denmark	56.14	449.1	5.614
Finland	54.39	435.1	5.439
Iceland	3.23002	25.84	0.323002
Sweden	95.93	8,077	9.593
Western Europe			
UK	641	5,128	64.1
Belgium	112	896	11.2
France	660.3	5282	66.03
Ireland	45.95	367.6	4.595
Netherlands	168	1,344	16.8
Wales	31	248	3.1
Central Europe			
Austria	84.74	677.9	8.474
Czech Republic	105.2	841.6	10.52
Germany	806.2	6,450	80.62
Hungary	98.97	791.8	9.897
Poland	385.3	3,082	38.53
Switzerland	80.81	646.5	8.081
Eastern Europe			
Russia	1435	11,480	143.5
Ukraine	454.9	3,639	45.49
Southwestern Europe			
Portugal	104.6	836.8	10.46
Spain	471.3	3,770	47.13
Southern Europe			
Greece	110.3	882.4	11.03
Italy	598.3	4,786	59.83

[a] Based on 2013 midpoint estimate of 10 per million per year for incidence.
[b] Based on midpoint estimate of 80 per million per year for prevalence.
[c] Incidence and prevalence were extrapolated based on the population of these countries (14).

average incidence of 1.9 cases PMPY for the period from June 2003 to September 2004(10). In Germany, the acromegaly incidence rate was 3 to 4 cases PMPY for the period 2003 to 2005(11). In New Zealand, an incidence of 3-4 cases PMPY was reported, whereas in Sweden, it was 3.64 cases PMPY for 1991 to 2011 (12). In Northern Ireland, the incidence was 5.5 cases PMPY over the preceding 25 years from 1984 (13).

Two major reasons may help to explain why our findings and those in the 2016 Burton et al study are much higher than the older estimates reported in non-U.S. populations. First, recent developments in biochemical testing and cranial imaging may make diagnosing acromegaly easier. Tumors below the level of CT scan resolution would have been missed in many earlier studies. Current MRI technology allows the identification of much smaller lesions. Subtle

biochemical derangements are now identifiable with a much greater sensitivity than in prior decades. Second, underlying disease rates may simply be higher in the U.S. compared to other countries. Finally, it is possible that differences in study designs and methods used to derive the estimates may have contributed to the differences. Nevertheless, study limitations are discussed in detail below.

Our results indicate that incidence varies with age, with the lowest rates of acromegaly appearing in individuals ≤17 years old. In both the MarketScan and PharMetrics databases, acromegaly had the higher incidence in individuals >34 years old: up to 16.7 in MarketScan and 15.2 in PharMetrics. Our results have a similar pattern to the studies published using the Spanish Acromegaly Registry (Registro Español de Acromegalia) (9) and the Swedish Pituitary Registry (12), which reported the mean ages of diagnosis as 45 and 51 years, respectively (9,12). This study also indicates that incidence rates are similar between males and females—a finding not mentioned in earlier reports.

Our annual prevalence estimate of about 71 to 87.8 per million per year is comparable to the recently published statistic by Burton et al. (2016) of 78 cases per million each year. Although, similar to older incidence estimates described above, the commonly quoted prevalence of 60 cases per million per year is lower than our recent finding(6). However, most recent European studies do suggest that the actual prevalence may be underestimated (15-17). A study on patients diagnosed with acromegaly in Iceland from 1955 through 2013 revealed that the prevalence of acromegaly in 2013 was 121 cases per million per year (17).

The higher prevalence proportions in our study in comparison to older investigations may be explained by several reasons. First, some portion of the difference likely results from improved access to healthcare in more recent years. For example, this comparison is consistent with the other recently published U.S. study (5). The U.S. healthcare delivery system has undergone tremendous changes over the past decade. The proportion of younger individuals who are uninsured, and therefore lack access to care for many nonemergent conditions, fell from 18% in 2009 to 11% in 2015 (21). Other potential explanations include technological advances in acromegaly diagnosis (22). For example, the development of sensitive assays for measuring GH and IGFI levels and the widespread use of MRI for detecting small pituitary tumors have likely increased the number of individuals diagnosed and managed (22). In addition, when many of the prior studies were performed, intracranial imaging technology only allowed the reliable identification of much larger tumors compared to current MRI scans (23). Increased awareness of the condition and its early manifestations may also have contributed to the apparent increase in disease prevalence. Also, the prior estimates used numbers from a variety of countries, and it is possible that the U.S. prevalence is simply higher than in those countries or that underlying disease prevalence could be increasing. Similarities in incidence and prevalence estimates reported in the current study as compared to the 2016 U.S. study by Burton et al support the robustness of these contemporary estimates for the commercially insured U.S. population.

Using our incidence rate for 2013, we estimate that there are about 3,000 new cases of acromegaly diagnosed per year in the U.S., and about 1,500 additional patients in Canada or Mexico. While our extrapolated results for prevalence suggest that there are around 25,000 acromegaly patients currently diagnosed in the U.S. and 12,500 more in the rest of North America, these extrapolations are not age adjusted and do not take into account any genetic, cultural, environmental, social, and racial or other differences across these countries. Hence, they only provide a general indication of the number of new cases of acromegaly found every year in these countries and of prevalence proportions of acromegaly worldwide.

Strengths and Limitations

The major strengths of this study included the use of 2 well-known, large, U.S. claims databases to calculate incidence and prevalence of a very rare condition. Results from this type of epidemiologic study are more generalizable than estimates derived from single-institution studies or case series. Standard ICD-9-CM 253.0 and ICD-9-CM: 237.0x diagnostic codes were used to identify acromegaly patients. We also used sensitivity analyses to understand the impact of different continuous enrollment definitions. Similar results in the 2 separate databases confirmed our findings.

The study has limitations. First, only diagnosis codes were used to identify patients with the condition of interest. Claims data do not contain the requisite pathology and laboratory data to confirm the diagnosis of acromegaly. Future studies could include chart reviews or studies of electronic health records, either to confirm our observations directly or to validate our algorithm for identifying acromegaly using clinical data. While the lack of clinical validation might tend to overestimate incidence, some factors may have led to underestimation. Specifically, many patients do not require acromegaly-related treatment following surgery. Such patients would not have been captured by our algorithms. In addition, our study could not account for patients with the condition but who are not diagnosed. Second, our study only included commercially insured patients under age 65. The results are not generalizable to the uninsured patients or patients over 65. However, a recent European registry study reported mean age of 45 with an interquartile range of 35 to 55, suggesting that a substantial majority of patients with acromegaly are <65 years old (9). Third, only patients presenting for care were included; we cannot estimate the population size of the undiagnosed patients. Furthermore, acromegaly patients who have had surgery and are cured may not return for regular care, or if they do return, may not have acromegaly

coded. As a result, adequately treated patients are likely to be underrepresented in this analysis, biasing the results toward lower prevalence. Lastly, as claims are collected for payment and not for research, any coding related problems would affect our estimates.

CONCLUSION

This study reports the annual incidence and prevalence of acromegaly in the U.S. in 2008 to 2013 based on 2 major nationwide commercial health insurance databases, which both include multiple health plans across the country. Our estimates are comparable to results in another recent U.S. study in a single managed healthcare organization, and both are higher than those reported in older studies. Acromegaly is substantially more common in individuals <65 in the U.S. than suggested by previous research, with a prevalence of about 80 per million per year corresponding to approximately 25,000 patients estimated across the country. This may reflect an actual change in prevalence or, more likely, improved diagnosis due to more sensitive laboratory and imaging tests than were available in prior decades.

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DISCLOSURE

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