Healthcare services utilization and costs associated with the management of patients living with acromegaly

MON-141

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BACKGROUND

- Acromegaly is a rare (11.7 cases per million person-years in the United States), chronic disorder of growth hormone (GH) hypersecretion that is associated with increased morbidity.[1,2]
- Little is known about the locations where these patients access care services, their patterns of care, and the number of services they receive at locations of care (LoC).

OBJECTIVE

- The aims of this research on adult patients with and without acromegaly were to:
  - Analyze the likelihood and number of healthcare services used by patients with acromegaly by LoC.
  - Assess the costs associated with each LoC.

METHODS

- This research analyzed information (recorded January 2010 to April 2019) from the Human Capital Management Services (HCMS) Research Reference database (RRDb), a proprietary database of de-identified health information on 4.6 million lives, including 2.8 million US employees.
- Employees and spouses with acromegaly were retrospectively identified based on claims with International Classification of Disease (ICD) code 253.0 (short description, acromegaly or gigantism)[3] or ICD-10 code E22.0 (short description, acromegaly or pituitary gigantism).[4]
- Patients (18–64 yr) with acromegaly who were included in the study had: ≥ 2 diagnoses of acromegaly at least 30 days apart or, 1 diagnosis of acromegaly during the study period plus either a diagnosis of pituitary adenoma or, 1 claim for pituitary surgery (hypophysectomy) or stereotactic radiosurgery.
- Patients were excluded for the following reasons:
  - Not continuously employed during the 12-month study period (workers).
  - < 12 continuous months of claims information available (spouses or workers).
- For each eligible patient with acromegaly, 20 control employees and spouses who did not have acromegaly were matched by:
  - Demographics (age, gender, employee/spouse status).
  - Job-related variables (salary, full-time or part-time status).
  - Region of the country.
  - Index date.
- Cost data were adjusted to constant dollars using components of the Consumer Price Index (CPI)[5]: medical CPI and prescription drug CPI.
- Outcomes analyzed by LoC included costs, number of services (potentially more than one chargeable activity per visit: e.g. blood work, evaluation and management, x-rays, etc.), and likelihood of use over the 12-month period.
- Outcomes were compared using separate two-part stepwise regression models (logistic followed by generalized linear) controlling for demographic and job-related variables, region, and Charlson comorbidity index (CCI) scores.
- The likelihood models only used logistic regression.

RESULTS

- A total of 60 patients with acromegaly (mean age, 47.0 years) were identified, including 47 employees from the US employee database and 13 spouses.
  - These study subjects were matched to 1200 controls (mean age, 45.4 years).

Table 1: Baseline characteristics of the study populations

Variable	Patients with acromegaly (N = 60)	Matched controls (N = 1,200)	*p* value
	Mean [Standard error]	Mean [Standard error]	
Age (yr) at index date	47.0 [1.5]	45.4 [0.3]	0.2779
Female	45.0% [6.5%]	49.5% [1.4%]	0.4963
White	23.3% [5.5%]	18.3% [1.1%]	0.3311
African American	1.7% [1.7%]	1.4% [0.3%]	0.8735
Hispanic	5.0% [2.8%]	3.8% [0.5%]	0.6216
Other Race	0.0% [0.0%]	2.8% [0.5%]	0.1862
Race Missing	70.0% [6.0%]	73.7% [1.3%]	0.5300
Exempt*	33.3% [6.1%]	33.3% [1.4%]	1.0000
Annual Salary†	$78,279 [$6,736]	$78,263 [$1,490]	0.9981
Full Time Status (of Employee)	71.7% [5.9%]	71.8% [1.3%]	0.9777

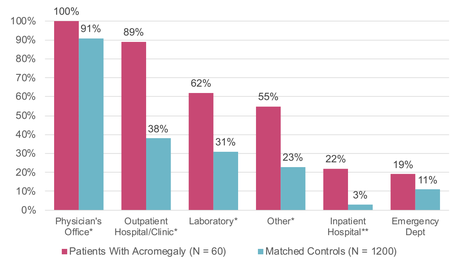
*An indicator of the percentage of the employee population who are classified as management versus other employees. †For annual salary, data were based on 44 patients and 880 matched controls.
Note: Sums may not equal 100.0% because of rounding.

Table 2: Number of chargeable services provided at place of service per 12 months

Place of service	Patients with acromegaly (N = 60)	Matched controls (N = 1,200)	*p* value
	Adjusted* mean [Standard error]	Adjusted* mean [Standard error]	
Physician's Office	31.6 [4.2]	13.6 [0.4]	<0.0001
Inpatient Hospital	4.0 [1.1]	0.6 [0.1]	0.0013
Outpatient Hospital or Clinic	20.5 [2.9]	4.0 [0.2]	<0.0001
Emergency Department	0.6 [0.2]	0.6 [0.0]	0.7067
Laboratory	9.8 [1.6]	2.3 [0.1]	<0.0001
Other	6.4 [1.1]	1.0 [0.1]	<0.0001
Total (sum of above)	**72.9**	**22.1**	

*Means adjusted by two-part regression models controlling for age, tenure, gender, marital status, race, exempt status, salary, region of the country, spouse vs. employee indicator variable, and Charlson Comorbidity Index score.

Figure 1. Likelihood of utilization by location of service



* $p<0.0001$; ** $p=0.0005$

Table 3: Costs by place of service

Place of service	Patients with acromegaly (N = 60)	Matched controls (N = 1,200)	Difference between cohorts	*p* value
	Adjusted* mean cost [Standard error]	Adjusted* mean cost [Standard error]		
Physician's Office	$4,762 [$678]	$1,301 [$43]	$3,461	<0.0001
Inpatient Hospital	$8,646 [$2,388]	$739 [$115]	$7,907	0.0009
Outpatient Hospital or Clinic	$9,611 [$1,793]	$1,355 [$74]	$8,256	<0.0001
Emergency Department	$242 [$70]	$231 [$20]	$10	0.8860
Laboratory	$508 [$93]	$66 [$4]	$442	<0.0001
Other	$2,001 [$583]	$367 [$29]	$1,634	0.0052
Total (sum of above)	**$25,770**	**$4,059**	**$21,711**	
All Drug Costs (modeled)	$12,348 [$2,439]	$1,234 [$58]	$11,113	<0.0001
Non-Acromegaly Drug costs (modeled)	$1,917 [$379]	$1,253 [$58]	$664	0.0833
Acromegaly Drug Costs (actual)	$9,511 [$2,545]	$0 [$0]	$9,511	0.0004

*Means adjusted by two-part regression models controlling for age, tenure, gender, marital status, race, exempt status, salary, region of the country, spouse vs. employee indicator variable, and Charlson Comorbidity Index score.

- There were no significant socioeconomic or demographic differences among those with acromegaly and their matched controls (**Table 1**).
- Patients with acromegaly demonstrated a higher likelihood of seeking health care services at the physician's office, inpatient setting, outpatient facility, laboratory, and other locations (which include ambulance and claims without a specific location code) (**Figure 1**).
- In addition, the number of healthcare services—the number of chargeable activities during each episode of care—associated with each LoC was greater for patients with acromegaly than for matched controls, except in the emergency department (**Table 2**).
- Total costs were higher for patients with acromegaly compared with their matched controls, except for use of emergency department, and cost differences by LoC were greatest for care given in the outpatient hospital/clinic, inpatient setting, physicians' office, and laboratory costs (**Table 3**).

CONCLUSION

- Acromegaly is associated with substantially increased utilization of healthcare services in nearly all LoCs and higher costs at each LoC (except ER services) compared with a matched cohort of control subjects without acromegaly.

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Presented at the 2020 Endocrine Society Annual Meeting, San Francisco

Author contributions Substantial contributions to study conception/design, or acquisition/analysis/interpretation of data: RAB, KAM, ARO, IAB, KY; Drafting of the poster [RAB,KAM], revising it critically for important intellectual content: ARO, RAB, KY, JDW; Final approval of the publication: all authors.

Medical writing support The authors thank Nathan Kleinman, of the HCMS Group [Cheyenne, WY, US] for comments on the draft and interpretation of the results and Stanton Mehr of SM Health Communications [Newtown, PA, US] for providing medical writing support/editorial support which was sponsored by Ipsen [Cambridge, MA, US] in accordance with Good Publication Practice guidelines.

This study was sponsored by Ipsen