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# The Economic Burden of Management of Pituitary Adenomas: A Propensity Score Matched Cost Analysis

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## Introduction

Healthcare spending has demonstrated an upward trend in high income countries over the last two decades.

Pituitary adenomas (PAs) are a rare but severe endocrine disorder, accounting for 10-15% of all diagnosed intracranial tumors.

Retrospective studies indicate that over 6000 Americans undergo PA surgery annually, with costs exceeding \$200 million.

An accurate evaluation of the longitudinal economic burden is crucial for to enhance efficiency and transparency in healthcare spending and develop cost-containment strategies.

## Objectives

This population-based study presents a comparative analysis to explore direct healthcare costs and utilization of treatment for PA patients in Canada.

## Methods

**Study Design:** Retrospective matched-cohort study using administrative health data from ICES, an independent corporation funded by Ontario. This study was approved by the Ottawa Hospital Research Institute Research Ethics Board (20170946-01H).

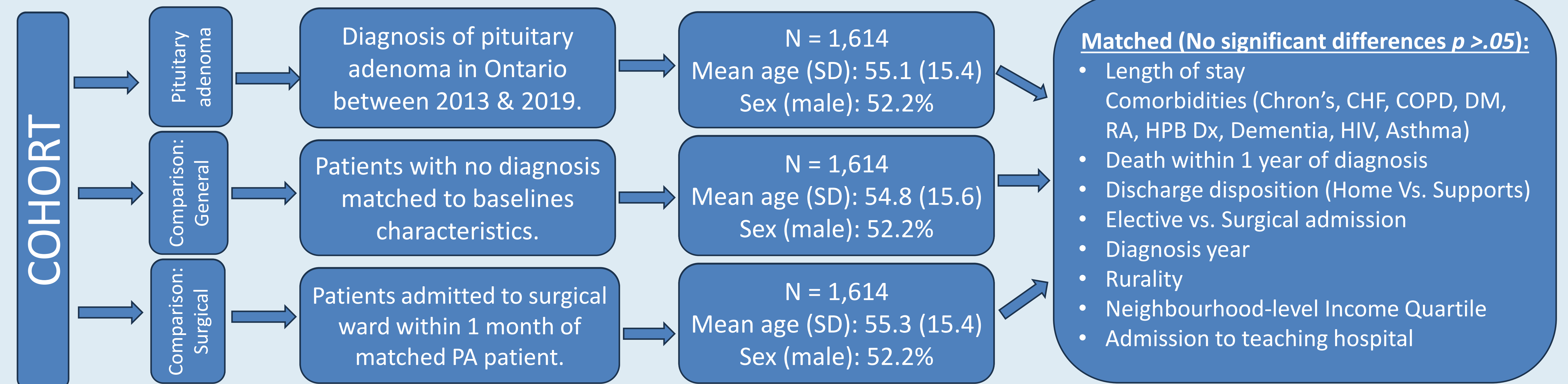
**Setting:** Ontario, the most populous province in Canada, contains over 14 million residents and represents approximately 40% of the Canadian population. The public system provides free care at the point of service for all medically necessary physician and hospital-based care.

**Population:** Adults with a PA diagnosis (>18 years) at of diagnosis and hospitalized during the index period (April 1, 2013 and March 31, 2019) with a Most Responsible Diagnosis (MRDx) of PA.

**Data Set:** Patient-level sociodemographic factors, including age, sex, and neighbourhood income were extracted. Data on cost from the publicly funded care, including hospital records from acute care, emergency department, inpatient rehabilitation, inpatient complex-continuing care, residential long-term care, physician billings, and outpatient drug prescriptions for eligible individuals were linked to the base cohort over the study period.

**Statistical Analysis:** Propensity score matched baseline characteristics. Generalized Estimating Equation (GEE) regression models with a negative binomial distribution were used to estimate relative rates across time periods. Cases or controls that either died or had incomplete data were excluded, and confidence intervals were calculated using empirical standard errors.

## Results



**FIGURE 1 (A): PITUITARY ADENOMA VS. GENERAL POPULATION**

	Time Period											
	Perioperative Period (+/- 180 days)		Follow Up Year 1		Follow Up Year 2		Follow Up Year 3		Follow Up Year 4		Follow Up Year 5	
	Pituitary Adenoma	General Population	Pituitary Adenoma	General Population	Pituitary Adenoma	Control	Pituitary Adenoma	Control	Pituitary Adenoma	Control	Pituitary Adenoma	Control
<b>Total Cost</b>	49,992	3,949	17,604	4,690	9,816	5,205	7,475	4,737	8,512	6,177	7,426	5,577
<b>Inpatient Hospitalizations</b>	24,796	693	6,820	908	2,569	1,516	1,297	1,124	2,207	1,868	1,256	1,045
<b>Hospital-Based Outpatient Clinics*</b>	2,800	319	2,458	297	1,182	354	926	297	819	327	778	330
<b>Same Day Surgery</b>	240	148	187	162	217	152	197	144	166	215	200	158
<b>Emergency Room Services</b>	701	115	437	132	238	157	189	159	201	182	182	206
<b>Physician and Diagnostic Evaluations</b>	20,075	1,333	4,393	1,377	2,618	1,403	2,163	1,257	2,167	1,453	1,918	1,409
<b>Prescription Drug Coverage<sup>#</sup></b>	1,952	1,661	2,052	1,819	2,248	1,830	2,627	2,096	2,297	1,893	2,653	1,911
<b>Total Cost RR (95% CI)</b>	<b>12.66 (10.87-14.75)</b>		<b>3.76 (2.99-4.72)</b>		<b>1.89 (1.48-2.40)</b>		<b>1.58 (1.29-1.93)</b>		1.38 (1.00-1.91)		1.33 (1.01-1.75)	

**TABLE 1 (B): PITUITARY ADENOMA VS. SURGICAL POPULATION**

	Time Period											
	Perioperative Period (+/- 180 days)		Follow up Year 1		Follow up Year 2		Follow up Year 3		Follow up Year 4		Follow up Year 5	
	Pituitary Adenoma	Surgical Population	Pituitary Adenoma	Surgical Population	Pituitary Adenoma	Surgical Population	Pituitary Adenoma	Surgical Population	Pituitary Adenoma	Surgical Population	Pituitary Adenoma	Surgical Population
<b>Total Cost</b>	49,776	51,109	17,354	27,703	9,856	15,290	7,505	11,521	8,535	13,008	7,538	15,204
<b>Inpatient Hospitalizations</b>	24,649	30,125	6,626	9,261	2,613	5,001	1,319	2,861	2,272	4,420	1,312	5,992
<b>Inpatient Rehabilitation</b>	46	487	803	2,199	167	227	44	259	104	274	21	417
<b>Hospital-Based Outpatient Clinics*</b>	2,830	2,459	2,495	2,035	1,202	1,049	946	864	835	822	795	749
<b>Same Day Surgery</b>	247	859	187	350	223	281	204	283	165	261	205	262
<b>Emergency Room Services</b>	694	800	435	711	237	376	192	306	195	315	184	392
<b>Physician and Diagnostic Evaluations</b>	20,019	11,960	4,367	5,092	2,624	3,048	2,187	2,501	2,174	2,481	1,923	3,049
<b>Prescription Drug Coverage</b>	1,959	2,531	2,057	3,110	2,258	2,834	2,642	2,786	2,310	2,449	2,655	2,445
<b>Total Cost RR (95% CI)</b>	0.97 (0.92- 1.03)		<b>0.63 (0.51-0.77)</b>		<b>0.64 (0.52 - 0.79)</b>		<b>0.65 (0.54-0.79)</b>		<b>0.66 (0.48-0.90)</b>		<b>0.50 (0.36- 0.68)</b>	

## Discussion

- Pituitary adenoma patients incur higher preadmission and admission costs.
- Inpatient hospitalization is the main cost driver.
- Specialist fees are the second-largest cost factor.
- Pharmacy fees make up only 4% of costs.
- PAs had lower 5-year post-op costs than a general hospitalized cohort.
- Hospital stay length affects costs significantly.

## Conclusion

- First study to analyze long-term costs of PA.
- Ontario's management costs are generally lower.
- Shorter hospital stays may be cost-effective.
- Findings inform healthcare policy on cost drivers.

