EPH216

Mapping the Burden and Management of Asthma, Severe Asthma, and Eosinophilic Asthma Across Ontario, Canada

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Why did we perform this research?

- Asthma is the third-most-common chronic disease in Canada,[1] affecting more than 3.8 million Canadians.[2,3] Globally, the prevalence of the disease has doubled over the last 20 years.[3]
- Asthma is associated with a significant BOI including psychological distress, diminished QoL, and high HCRU and healthcare costs.[3]
- Although SA represents <10% of asthma cases, ~50% of direct asthma-related healthcare costs are attributed to SA.[4] Annual hospitalization costs are more than two-times higher for patients with EA than for those without EA.[5]
- In Canada, the burden of asthma is known to be more pronounced for certain regions and populations,[6] although few studies have examined regional variations in treatment and outcomes specific to SA and EA.
- To better inform unmet needs related to healthcare resource use and patient outcomes, a study was conducted to characterize regional variations in the epidemiology, treatment, and HCRU burden associated with asthma, SA, and EA in Ontario, Canada.

How did we perform this research?

Design: Retrospective, observational cohort study

Data Set: Secondary data from Ontario health administrative databases[a]

Time Horizon: January 1, 2018, to December 31, 2023

Population: Patients with asthma aged ≥12 years were identified using ICD diagnosis codes[b] and validated case definitions. Among these individuals:

- Patients aged ≥65 years with SA were identified according to the CTS guidelines.[7c]
- Patients with EA were identified as those with a highest-recorded blood eosinophil count of ≥300 cells/µL.[8]

Outcomes: For asthma, SA, and EA, regional variations in annual:

- 1) prevalence rates[d]
- 2) respiratory-specific HCRU[d]
- 3) pharmacologic treatment (age ≥65 years only)

Analysis:

- Age-sex–standardized rates were calculated per PHU per 1,000 person-years (reference: 2023 population of Ontario, ~16 million).
- Regional variation was assessed according to mean, IQR, min, and max values per PHU outcome.

[a] Data were housed, linked, and analyzed by ICES; [b] Patients required two ICD-9-CM diagnosis codes (codes 493^^) for asthma in an outpatient setting and/or one ICD-10-CA diagnosis code for asthma (codes J45^^, J46^^) from hospital separation data within two consecutive years; the index date was defined as the first date a patient met this definition; [c] Included patients received dispenses of high-dose ICS therapy AND an additional asthma controller medication (e.g., LABA) within 1 year before the SA index date OR an OCS for ≥50% of the year preceding the SA index date[6]; [d] SA analyses were only conducted among patients aged ≥65 years due to limitations in data availability.

Supplementary material

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Abbreviations

BOI, burden of illness; **COPD**, chronic obstructive pulmonary disease; **CRSwNP**, chronic rhinosinusitis with nasal polyps; **CTS**, Canadian Thoracic Society; **EA**, eosinophilic asthma; **ED**, emergency department; **HCRU**, healthcare resource utilization; **ICD**, International Classification of Diseases; **ICES**, The Institute for Clinical Evaluative Sciences; **ICS**, inhaled corticosteroid; **IQR**, interquartile range; **LABA**, long-acting beta-2 agonist; **LAMA**, long-acting muscarinic antagonist; **OCS**, oral corticosteroids; **PHU**, Public Health Unit; **QoL**, quality of life; **SA**, severe asthma; **SD,** standard deviation.

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What did we find?

- From 2018 to 2023 in Ontario, prevalence rates of:
  - asthma decreased from 11.2% to 10.9%
  - SA decreased from 1.9% to 1.6%
  - EA increased from 5.7% to 6.4%
- A greater proportion of patients with SA were living in areas of highest material deprivation.
- In 2023, standardized rates (per 1,000 person-years) of respiratory-specific hospitalizations and ED and specialist visits varied widely across Ontario PHUs for each indication (**Table 2** and **Figure 1**).
- Use of ICS, LABA, and LAMA triple therapies was highest among patients with SA. Less than 5% of patients with asthma and EA used maintenance triple therapies in 2023.

Table 1. Patient characteristics, 2023

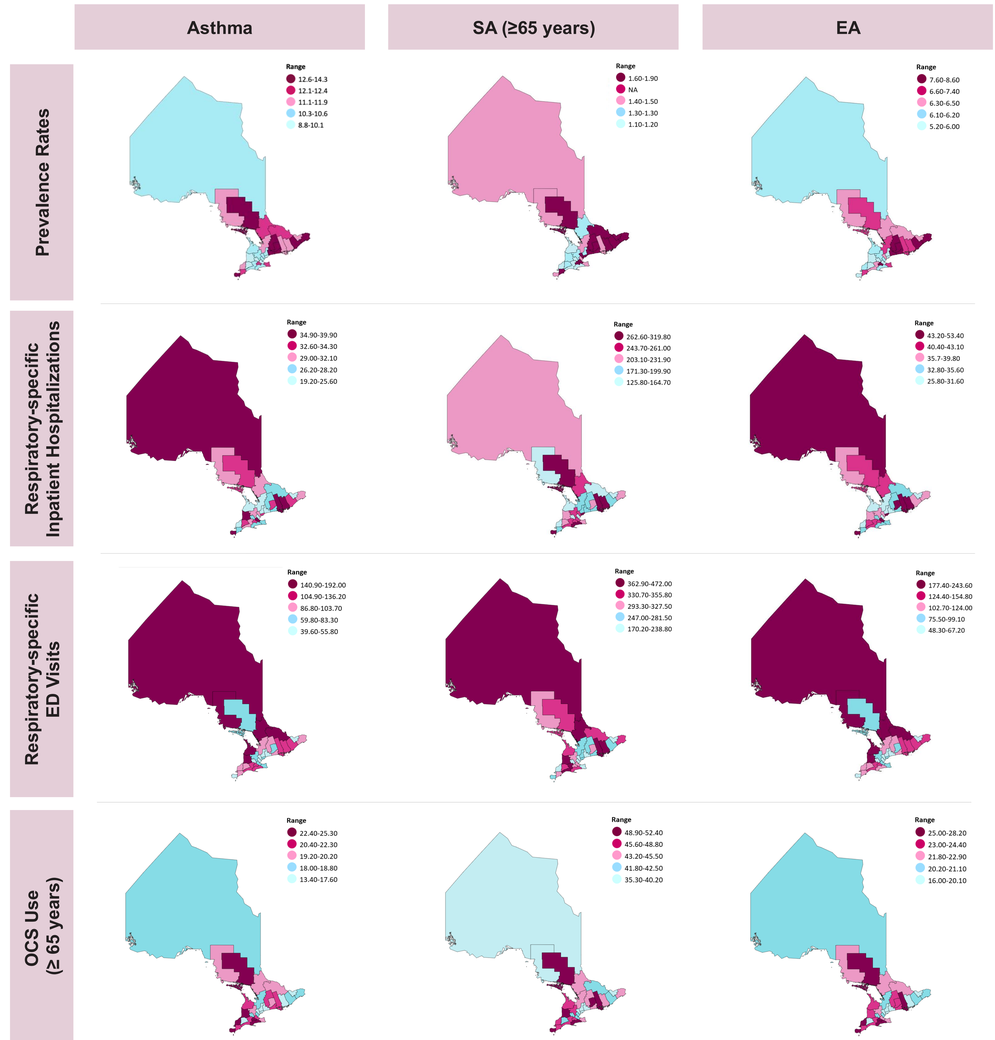
Outcome	Asthma (N = 1,483,372)	SA (≥65 years) (N = 46,992)	EA (N = 873,252)
Age, Mean (SD)	52.5 (18.6)	78 (7.8)	55.0 (18.7)
Female Sex, n (%)	869,463 (58.6)	29,839 (63.5)	513,269 (58.8)
Comorbidities, n (%)			
COPD	36,024 (2.4)	17,366 (37.0)	51,785 (5.9)
CRSwNP	70,849 (4.8)	4,627 (9.8)	53,755 (6.2)
Diabetes	274,021 (18.5)	19,140 (40.7)	201,893 (23.1)
Rurality, n (%)			
Urban	1,334,948 (90.0)	41,781 (88.9)	785,454 (89.9)
Rural	148,424 (10.0)	5,211 (11.1)	87,798 (10.1)
Q5	20.0	24.2	20.9

Table 2. Variations in age-sex standardized outcomes across Ontario PHUs for asthma, SA, and EA, 2023

Outcome	Asthma			SA (≥65 years)			EA		
	Mean (IQR)	Min	Max	Mean (IQR)	Min	Max	Mean (IQR)	Min	Max
Prevalence	11.5% (2.1%)	8.8%	14.3%	1.5% (0.3%)	1.1%	1.9%	6.6% (1.0%)	5.2%	8.6%
Inpatient hospitalizations[a]	29.9 (7.6)	19.2	40.1	214.3 (83.8)	125.8	319.8	37.5 (9.6)	25.8	54.5
ED visits[a]	103.4 (56.4)	39.6	248.8	304.1 (84.4)	170.2	472.0	123.1 (62.1)	48.3	261.1
Specialist visits[a]	271.4 (119.6)	119.1	522.8	1249.8 (862.2)	270.4	2131.4	334.9 (158.1)	143.6	622.5
ICS[b]	1.9% (0.6%)	1.0%	3.5%	4.9% (1.7%)	2.7%	8.3%	2.0% (0.5%)	1.2%	3.8%
ICS + LABA (single inhaler)[b]	9.0% (1.3%)	7.1%	12.4%	16.0% (2.3%)	13.5%	19.0%	10.1% (1.3%)	8.1%	13.6%
ICS + LABA (multiple inhalers)[b]	1.2% (0.2%)	0.8%	1.5%	2.7% (0.7%)	0.0%	4.0%	1.3% (0.2%)	0.9%	1.9%
OCS[b]	19.6% (4.0%)	13.4%	25.3%	44.1% (5.8%)	35.3%	52.4%	22.1% (3.9%)	16.0%	28.2%

[a] Respiratory-specific visits reported per 1,000 person-years; [b] Age ≥65 years.

Figure 1. Variations in standardized outcomes across Ontario PHUs for asthma, SA, and EA, 2023[a]



[a] Prevalence and OCS use reported as percentages; hospitalizations and ED visits reported per 1,000 person-years.

How might this impact current clinical practice?

- **In Canada, challenges exist in leveraging nationwide real-world data given differences in province-specific administrative database definitions, methodologies, and other factors.**
- **This study reveals substantial variability across Ontario PHUs related to prevalence rates, HCRU, and drug utilization for asthma, SA, and EA.**
- **To the authors' knowledge, this study is the first to demonstrate regional variations in the burden and care of EA across ON.**
- **These findings highlight ongoing inequities in the burden and care of asthma, SA, and EA. Efforts are needed to develop health system policies and processes that will increase consistency in access to optimal disease management and healthcare.**
- **These results can support root-cause analyses and implementation of region-specific interventions for asthma and its subtypes that will help improve patient outcomes, health equity, and health system performance.**

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Disclosures

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