Characteristics of Patients with Mild to Severe Asthma in Canada

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BACKGROUND

- Asthma affects approximately 3 million Canadians^{1,2}
- Exacerbations due to uncontrolled asthma account for 146,000 emergency visits per year^{3,4} and are associated with high levels of blood eosinophils^{5,6}
- Several associated diseases, such as gastro-esophageal reflux disease, allergic rhinitis, obesity, depression, diabetes mellitus, and cardiovascular disease may also contribute to its severity⁷

OBJECTIVES

 To compare patient characteristics, eosinophil levels, markers of asthma control, and risk of comorbidities in asthma patients categorized by disease-severity defined by medication requirements in the Global Initiative for Asthma (GINA) guidelines

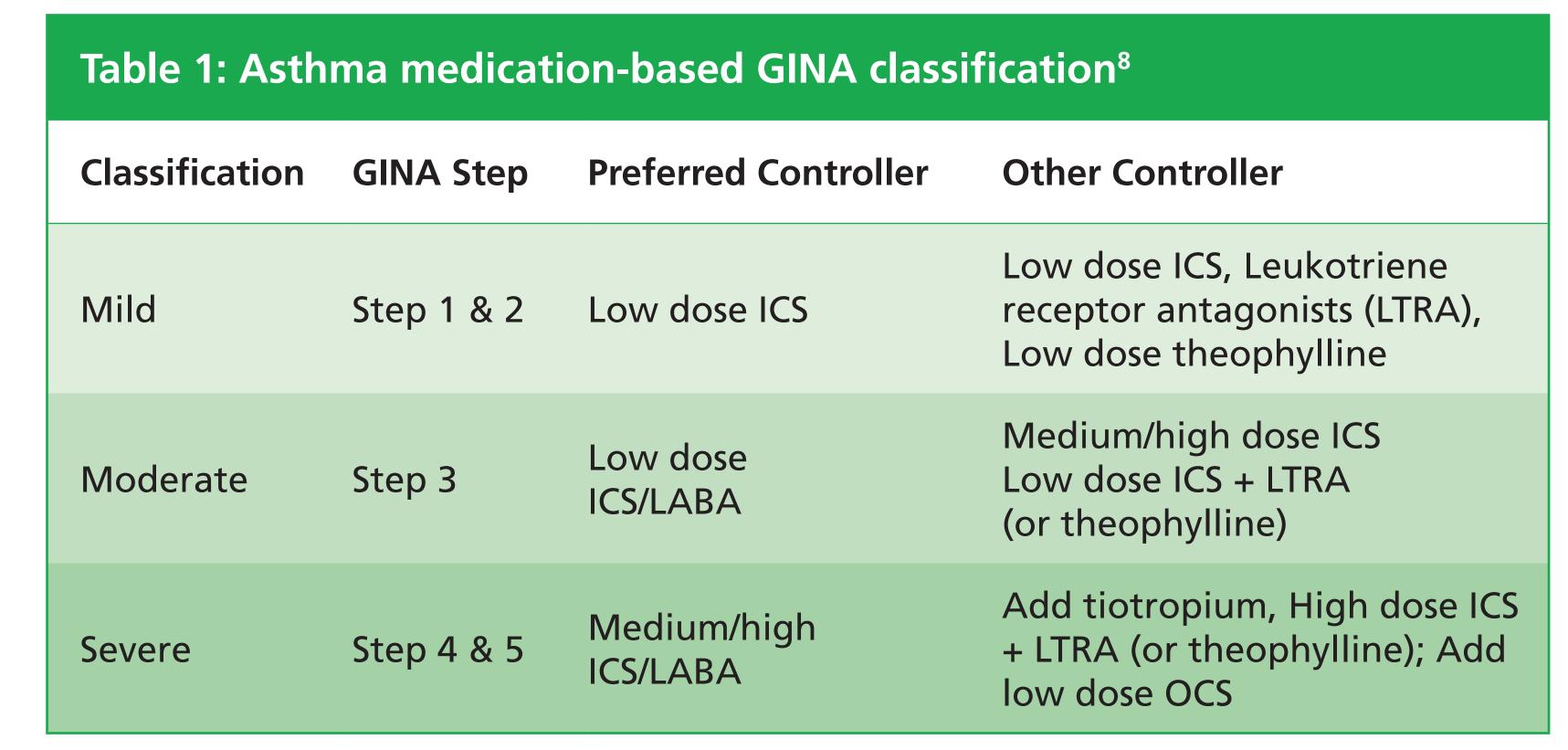
METHODS

Data Source

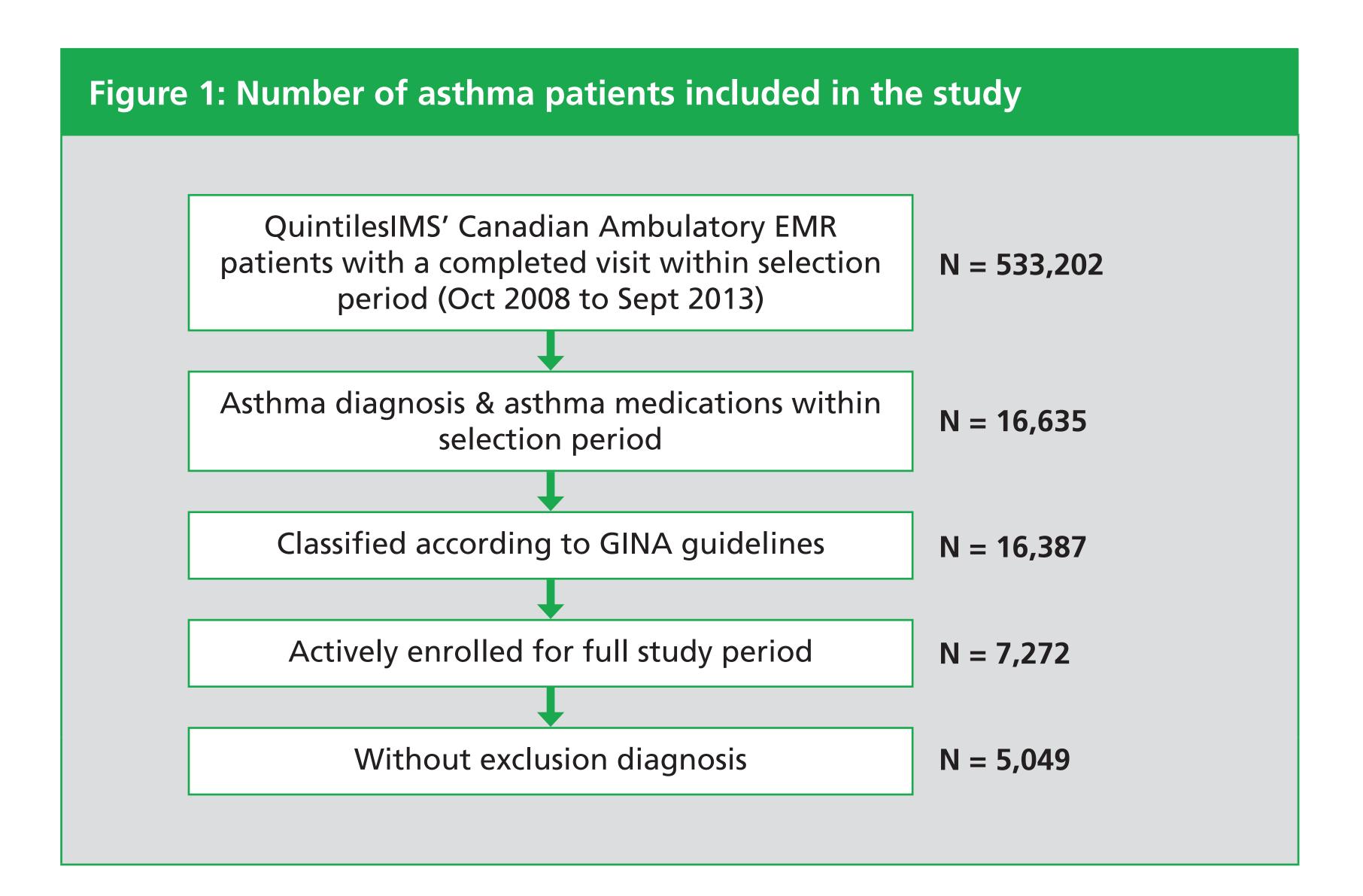
- QuintilesIMS' Canadian Ambulatory Electronic Medical Record (EMR) database
- longitudinal patient medical records for approximately 1,000,000 patients presenting to outpatient clinics in Ontario, Canada

Patient Selection

- Patients were selected over a period of 5 years (October 2008 September 2013) based on eligibility criteria:
- ≥1 asthma diagnosis and asthma medication prescription
- evidence of activity throughout 1 year baseline and 1 year follow-up
- no diagnoses of cancer, COPD, cystic fibrosis, emphysema, bronchiectasis, acute or chronic bronchitis
- Patients were classified into two severity groups, mild/moderate or severe, based on GINA criteria (Table 1, Figure 1)
- Data on patient characteristics included age, smoking history, body mass index (BMI), eosinophil levels, and diagnoses of selected comorbidities, e.g. depression, rhinosinusitis
- Asthma was defined as uncontrolled if the patient had:
- ≥1 exacerbation (use of an Oral Corticosteroid (OCS) or hospitalization for asthma)
- ≥1 at least one predicted forced expiratory volume in one second (FEV1) ≤80%
- ≥3 Short-Acting Beta2-Agonist (SABA) doses/week for mild patients or
 ≥10 SABA doses/week for moderate/severe patients, and
- ≥1 unscheduled physician visit for asthma



SABA = Short-Acting Beta2-Agonist; ICS = Inhaled Corticosteroid; LABA = Long-Acting Beta2-Agonist Bronchodilators; OCS = Oral Corticosteroid



Statistical Analysis

- Differences in patient characteristics between mild/moderate and severe groups were assessed using univariate tests (e.g. Wilcoxon Rank Sum, Mantel-Haenszel)
- Differences in risk of uncontrolled asthma and comorbidities between groups were assessed using the age- and sex-adjusted relative risk estimated from Poisson regression with robust error variance estimation⁹

RESULTS

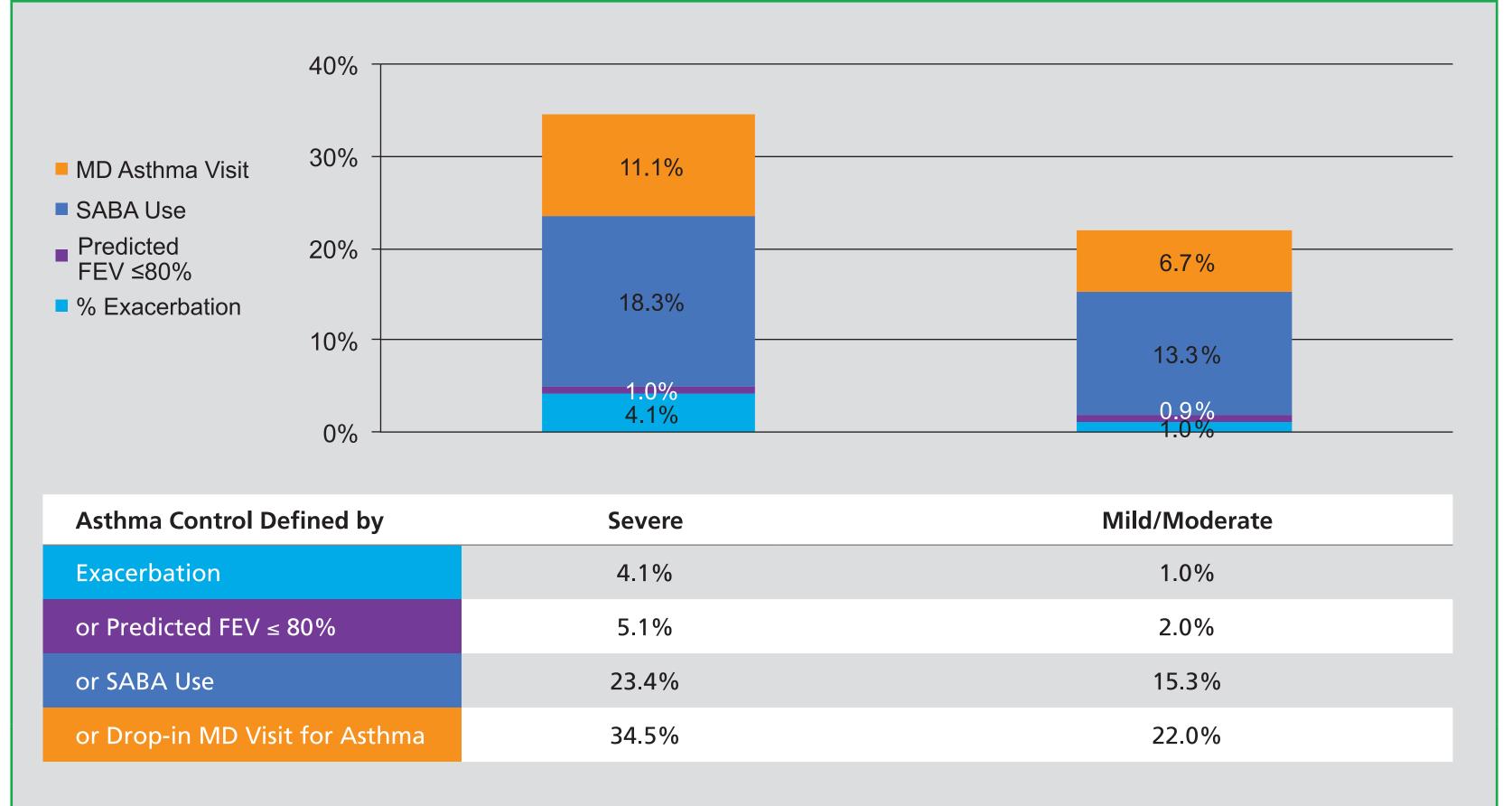
Patient Characteristics

- Based on GINA, of the 5,049 eligible asthma patients:
- 62% were classified as mild/moderate, and
 36.8% were classified as severe
- Severe patients were:
- older (median 28.0 yrs mild/moderate, 37.0 yrs severe; p<0.001),
- more likely to have a history of smoking (22.5% mild/moderate, 29.8% severe; p<0.001), and
 not different in BMI compared to mild/moderate (data available for
- not different in BMI compared to mild/moderate (data available for 789 asthma patients 18 yrs and older)

Asthma Control

 Uncontrolled asthma* was more common in severe patients (Figure 2, 22.0% mild/moderate, 34.5% severe; p<0.001) in 1 year follow-up

Figure 2: Asthma control in severe and mild/moderate patients during the follow-up period



*uncontrolled asthma: ≥1 exacerbation (use of an OCS or hospitalization for asthma), ≥1 predicted FEV1 ≤80%, ≥3 SABA doses/week for mild patients and ≥10 SABA doses/week for moderate/severe, and ≥1 unscheduled physician visit for asthma

Blood EOS Levels

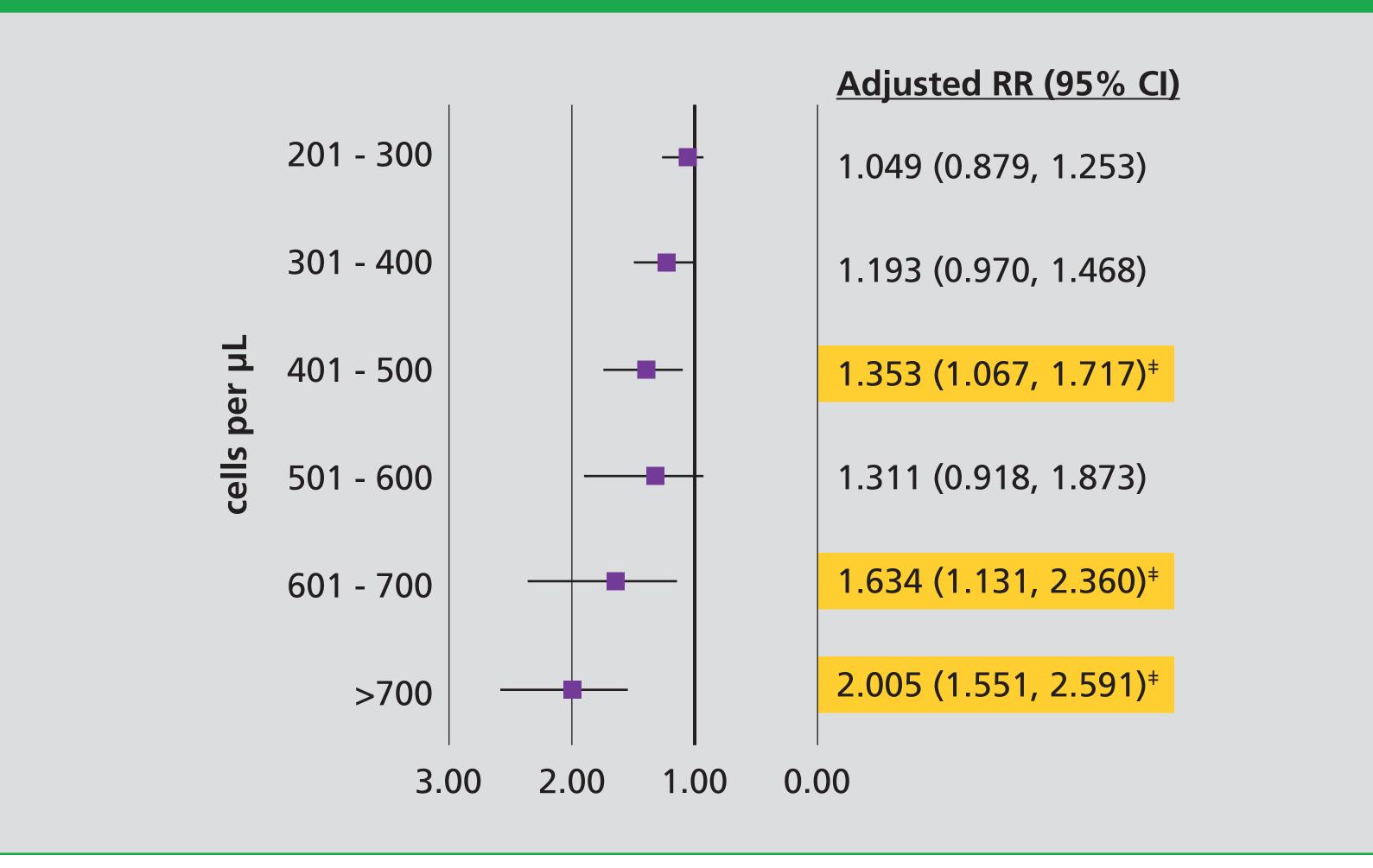
Severe Asthma:

 Severe asthma patients had a 35% greater risk of high EOS (≥400) levels (relative risk [RR]=1.35, 95% confidence interval [CI]=1.11, 1.64) than mild/moderate patients, when adjusting for age and sex

Uncontrolled Asthma:

- Relative to patients with the lowest blood eosinophil levels (0-200 cells/µL), the risk of uncontrolled asthma was significantly greater for patients with elevated eosinophil levels (Figure 3). Patients with blood EOS levels of:
- (401-500 cells/μL) had a 35% increased risk uncontrolled asthma,
- (601-700) a 63% increased risk, and
- (>700) a 100% increased risk

Figure 3: Age- and sex-adjusted risk of uncontrolled asthma in patients at different blood EOS levels[^] (201-300 cells/μL, 301-400, 401-500, 501-600, 601-700, >700) relative to patients with blood EOS levels in the 0-200 range

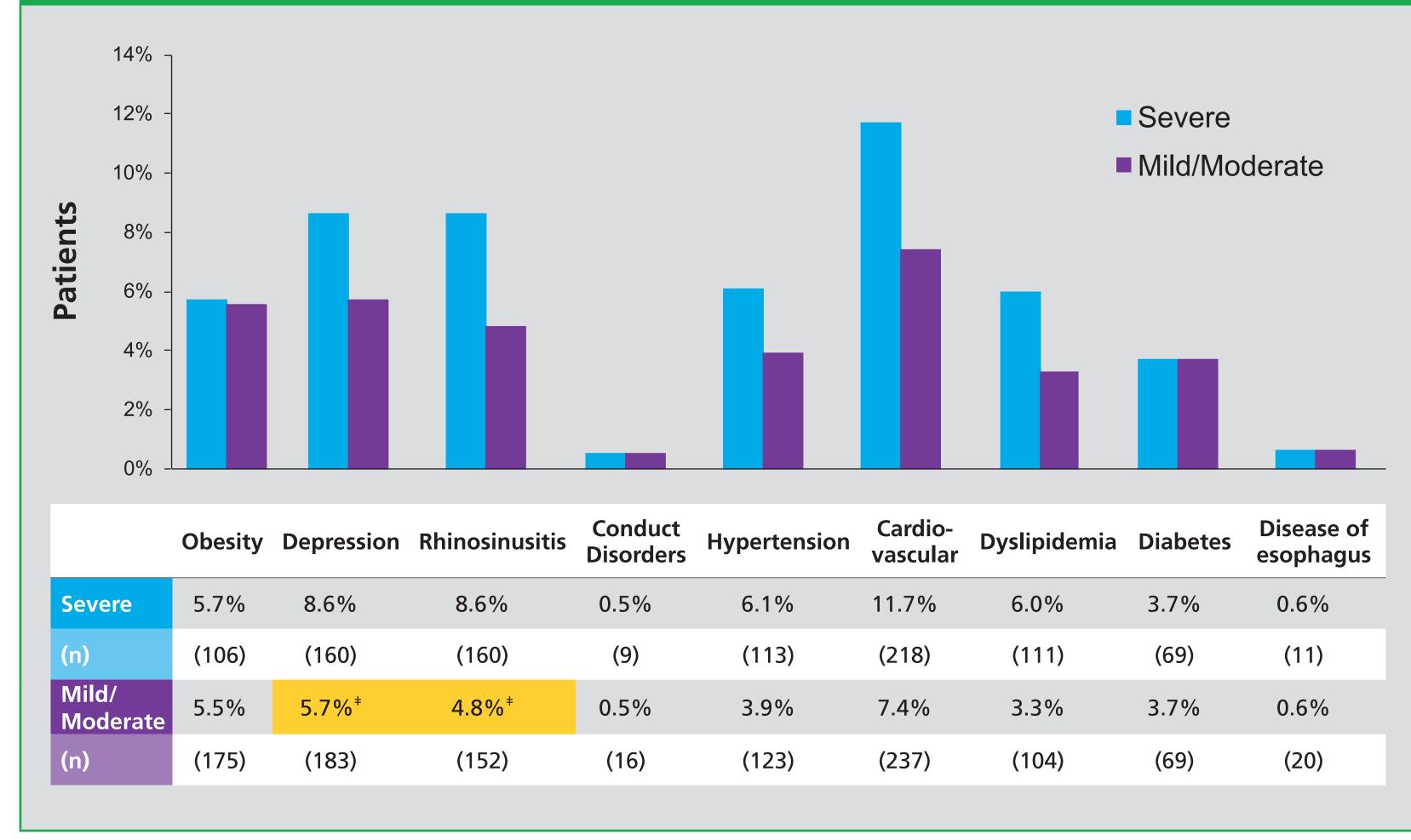


^ ~40% of patients had EOS levels recorded in the EMR [‡] is statistically significant

Comorbidities and Associated Conditions

- Controlling for age and sex, severe patients had:
- a 25% increased risk of depression (RR=1.25, 95%Cl=1.02, 1.55), and
- a 63% increased risk of rhinosinusitis (RR=1.63; 95%Cl=1.30, 2.03) (Figure 4)

Figure 4: Patients with severe asthma had a higher risk of depression and rhinosinusitis



* is statistically significant, (p<0.01)

CONCLUSIONS

- Our study in Canadian patients corroborates the findings of Price et al. (2015) and Fitzgerald et al. (2006) that severe asthma is associated with elevated EOS, and with poorer asthma control^{5,6}
- High blood EOS levels were found to be associated with uncontrolled asthma, supporting that blood eosinophils should be routinely obtained in asthma patients and monitored as possible predictors of severity and poor control
- When controlling for age and sex, correlations were found between depression and asthma, as well as between rhinosinusitis and asthma; associations with other comorbidities require further investigation
- More studies are needed to further characterize the various severities of asthma in order to identify and validate predictive factors that can significantly improve asthma care

STUDY LIMITATIONS

- 1. Pulmonary function and eosinophils were not available for all patients.
- 2. Prescriptions may not have been filled and patients may not have been adherent. However, prescriptions were used to classify patients into severity groups. These prescriptions were evidence of the physician's impression of asthma severity.
- 3. Hospitalization data was linked to the EMR and may be under-represented, possibly creating a bias.

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DISCLOSURES

This study was sponsored by Teva Pharmaceuticals (Frazer, PA, USA). SW served as a representative of the Asthma Society of Canada (ASC). SB, RJ, and XS are employees of Teva Pharmaceuticals.

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