

## Original Article

# Mental Health Services Claims and Adult Onset Asthma in Ontario, Canada

Teresa To, PhD<sup>a,b,c,d</sup>, Kandace Ryckman, MPH<sup>a,c</sup>, Jingqin Zhu, MSc<sup>a,b</sup>, Devon Williams, MSc<sup>a</sup>, Laura Y. Feldman, MPH<sup>a,c</sup>, Kristian Larsen, PhD<sup>a</sup>, and Andrea Gershon, PhD<sup>a,b,d,e</sup> Toronto, Ontario, Canada

**What is already known about this topic?** Living with asthma is associated with a decrease in quality of life, reductions in activities of daily living, and an increase in psychological stress, all of which are known to negatively impact mental health.

**What does this article add to our knowledge?** There is an increased risk of emergency department visits for mental disorders in the 1 year after being diagnosed with adult onset asthma compared with the 1 year before being diagnosed.

**How does this study impact current management guidelines?** This finding highlights the need for physicians to assess mental health needs of adults who are newly diagnosed with asthma and provide appropriate care to reduce acute care claims.

**BACKGROUND:** Living with asthma is associated with a decrease in quality of life due to reductions in activities of daily

living and increased psychological stress, both of which are associated with poor mental health outcomes.

**OBJECTIVE:** The objective of this study was to quantify the burden of mental disorders on the adult asthma population and compare the risk of mental health services claims (MHSCs) in the 1 year before and 1 year after asthma diagnosis.

**METHODS:** Ontario residents aged 25 to 65 years with incident physician-diagnosed asthma between April 1, 2005, and March 31, 2012, were included. MHSCs, which consisted of hospitalizations, emergency department (ED), and outpatient physician visits, were identified from universal health administrative data. Poisson regression models with repeated measures were used to estimate the relative risk (RR) of MHSCs for 2 time periods: 1 year after asthma diagnosis compared with the 1 year before and 2 years after compared with 2 years before.

**RESULTS:** A total of 145,881 adults had incident asthma. In the 1 year after asthma diagnosis, 27% had an MHSC. The risk of ED visits for any mental disorders increased by 13% in the 1 year after asthma diagnosis compared with the 1 year before (adjusted RR [aRR], 1.13; 95% confidence interval [CI], 1.06-1.21). This increased risk of ED visits was not found when comparing 2 years after asthma diagnosis with 2 years before. The risk for outpatient physician visits for substance-related disorders increased by 21% at 1 year (aRR, 1.21; 95% CI, 1.14-1.28) and 37% at 2 years (aRR, 1.37; 95% CI, 1.28-1.46). **CONCLUSIONS:** The significant comorbid burden of mental disorders in adults with newly diagnosed asthma highlights the need for primary care physicians to assess mental health needs and provide appropriate care. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017;■:■-■)

**Key words:** Asthma; Mental health; Mental disorders; Comorbidity; Epidemiology

<sup>a</sup>Child Health Evaluative Sciences, The Hospital for Sick Children, Toronto, Ontario, Canada

<sup>b</sup>Chronic Disease and Pharmacotherapy Research Program, Institute for Clinical Evaluative Sciences, Toronto, Ontario, Canada

<sup>c</sup>Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada

<sup>d</sup>Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada

<sup>e</sup>Division of Respiratory, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada

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Corresponding author: Teresa To, PhD, Child Health Evaluative Sciences, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, Canada. E-mail: [teresa.to@sickkids.ca](mailto:teresa.to@sickkids.ca).

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Previous research suggests an association between asthma and mental disorders including depression,<sup>1-11</sup> panic disorders,<sup>12,13</sup> schizophrenia,<sup>14,15</sup> substance abuse,<sup>12,16,17</sup> and suicide.<sup>18</sup>

**Abbreviations used**

*aRR*-Adjusted relative risk  
*CADG*-Condensed Aggregated Diagnostic Groups  
*CI*-Confidence interval  
*ED*-Emergency department  
*GEE*-Generalized estimating equations  
*ICD*-International Classification of Diseases  
*MHSC*-Mental health services claims  
*OASIS*-Ontario Asthma Surveillance Information System  
*OHIP*-Ontario Health Insurance Plan  
*OR*-Odds ratio  
*RR*-Relative risk

Those with comorbid asthma and mental disorders have significantly higher rates of mental health service utilization than those with only asthma or only mental disorders.<sup>19</sup> It is estimated that each year 1 in 5 Ontario adults living with asthma has a mental health services encounter with the health care system.<sup>20</sup> A systematic review of the literature found that having a mental health disorder increased the rates of asthma hospitalizations, emergency department (ED) visits, and general practitioner visits amongst adults with asthma.<sup>21</sup> Furthermore, the correlation between poor mental health and asthma is more pronounced amongst women,<sup>11,22</sup> older people,<sup>23,24</sup> those of lower socioeconomic status,<sup>22,23,25</sup> those who are obese,<sup>2,22</sup> and those who have additional comorbid health conditions.<sup>22,26</sup> Moreover, living with asthma is associated with a decrease in quality of life<sup>23,27-29</sup> due to reductions in activities of daily living<sup>10,19</sup> and an increase in psychological stress,<sup>30-32</sup> all of which are known to negatively impact mental health.

Although several studies have examined the relationship between asthma and mental health, few have done so using population-based and longitudinal data. This type of analysis will provide insights into the incremental burden of mental health services over people's baseline (ie, before asthma). The purpose of this study was to quantify the burden of mental disorders in the adult asthma population and compare the risk of mental health services claims (MHSCs) before and after the diagnosis of asthma. Two time points (ie, 1 year before compared with 1 year after and 2 years before compared with 2 years after) were used to estimate the risk of MHSCs.

**METHODS****Study population**

The Ontario Asthma Surveillance Information System (OASIS, [www.lab.research.sickkids.ca/oasis](http://www.lab.research.sickkids.ca/oasis)) is a registry of more than 2.1 million Ontario residents with physician-diagnosed asthma. It was created using health administrative data, beginning in 1996.<sup>20</sup> Health administrative data in Ontario contain claims within the provincially run universal health care system for the entire population. People were classified as having incident asthma if they had: (1)  $\geq 1$  asthma hospital admission or (2)  $\geq 2$  asthma Ontario Health Insurance Plan (OHIP) claims in 2 consecutive years (where the first claim is considered the diagnosis date). This case definition has been validated with 84% sensitivity and 76% specificity in adults.<sup>33</sup>

Individuals from the OASIS registry aged 25 to 65 years with incident asthma diagnosed between April 1, 2005, and March 31, 2012, were included in this study. A look-back window of 5 years was used wherein individuals must not have had any claims for asthma to ensure that the subsequent asthma claims represented new

onset of asthma, that is, incidence. Individuals without a valid health card number, age, or Ontario residence postal code were excluded from the study. Also, those with asthma diagnosed before April 1, 2005, and those who died or moved out of province less than 2 years after asthma diagnosis were excluded.

**Measures**

MHSCs were extracted from health administrative data housed at the Institute for Clinical Evaluative Sciences in Ontario, Canada. Hospital admissions were obtained from the Canadian Institute for Health Information Discharge Abstract Database, and adult inpatient mental health admissions to designated psychiatric beds from the Ontario Mental Health Reporting System. ED visits were obtained from the National Ambulatory Care Reporting System and outpatient physician visits from the OHIP Claims Database. Counts of MHSCs were obtained for 2 time periods (ie, 1 year before compared with 1 year after asthma diagnosis and 2 years before compared with 2 years after). The mental disorders examined in the study included anxiety disorders, mood affective disorders (eg, manic episodes, bipolar affective disorder, depressive episodes), personality disorders, schizophrenia, and substance-related disorder. These disorders were defined using the International Classification of Diseases, 10th Revision (ICD-10), Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, and OHIP diagnostic codes (see [Table E1](#), available in this article's Online Repository at [www.jaci-inpractice.org](http://www.jaci-inpractice.org)).

Age, sex, and resident postal code were obtained from the Ontario Registered Persons Database. Postal code information was used to discern rurality of residence and categorize individuals based on neighborhood-level income quintile. Comorbidities were defined using the Condensed Aggregated Diagnostic Groups (CADGs) from the Johns Hopkins ACG System Version 10.<sup>34</sup> The CADGs categorize ICD-9 and ICD-10 diagnostic codes based on severity and the likelihood of persistence of the respective health condition. The CADGs consist of a series of 12 variables that measure the expected health care utilization of an individual in the 2 years before a time point. The CADGs include conditions in the following categories: acute minor, acute major, likely to recur, chronic medical unstable, chronic medical stable, chronic specialty stable, eye/dental, chronic specialty unstable, prevention, and pregnancy. Two CADGs, "asthma" and "psychosocial," were not considered in the analysis because they overlapped with study population inclusion criteria and outcome measure.

**Statistical analysis**

Descriptive statistics were used to compare the numbers and proportions of MHSCs in the 1 year after asthma diagnosis. Those with at least one MHSC in the 1 year after asthma diagnosis were compared with those with no MHSCs in the 1 year after asthma diagnosis. An odds ratio (OR) with 95% confidence interval (CI) was calculated for covariates. Refer to [Table E2](#) (available in this article's Online Repository at [www.jaci-inpractice.org](http://www.jaci-inpractice.org)) for detailed information about the count of MHSCs in the 1 year before and after asthma diagnosis stratified by mental disorder.

A Poisson regression model was used to model the count of MHSCs for mental disorders overall, as well as for each disorder (SAS version 9.3, SAS Institute, Cary, NC). Repeated measures using generalized estimating equations (GEE) were used to assess the risk of MHSCs before asthma diagnosis for each individual compared with their own MHSCs after asthma diagnosis. Two time periods (1 year before compared with 1 year after and 2 years before compared with 2 years after) were examined. This study assumed an independent correlation matrix type for the GEE

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