

Severe Asthma

What is Severe Asthma?

Though patients with mild-to-moderate asthma can experience difficulty breathing it is especially difficult for those with Severe Asthma where symptoms can be life-threatening. In either case, patients can't participate in daily activities if their disease is uncontrolled.

Similar to those with mild-moderate asthma, patients with Severe Asthma also have disease that is chronic however they have more difficulty achieving control of their disease, and will need a greater number of medications and often at higher doses.¹ They will require more medical care than patients with mild-to-moderate disease.

How is Severe Asthma diagnosed?

More steps are taken to arrive at a diagnosis of Severe Asthma² compared to mild-to-moderate asthma. As in mild-to-moderate asthma, healthcare providers will take a detailed medical history, listen for wheezing on examination of the chest, and assess for underlying allergic and non-allergic triggers. Underlying disease such as eczema or allergic rhinitis may be clues that allergy is present. Allergy skin testing may be performed to evaluate if specific allergic triggers are present that can result in asthma attacks.

In addition, healthcare professionals will likely also conduct objective examinations of lung function including spirometry³, or peak expiratory flow (how fast a person can exhale starting from full inhalation), and in some case sputum cell counts, which indicate the presence, type, and extent of inflammation in the airways. These objective tests in addition to history will help determine if a patient has Severe Asthma, and will inform treatment choices for patients. Family physicians should refer patients with Severe Asthma to a specialist to confirm their diagnosis and assist in management.

What is the prevalence of Severe Asthma?

It is estimated that as many as 250,000 Canadians suffer from Severe Asthma. These are also the patients who are more likely to die from asthma, compared to patients with mild-to-moderate disease. Each year, about 250 Canadians die from asthma.⁴ Globally, 250,000 patients with asthma die prematurely on an annual basis because of their condition.⁵

How is Severe Asthma treated and managed?

Like patients with mild-to-moderate asthma, patients with Severe Asthma should try to minimize their

- 1 Chung KF, Wenzel SE, Brozek JL, et al. International ERS/ATS guidelines on definition, evaluation and treatment of Severe Asthma. *Eur Respir J* 2014; 43: 343-373.
- 2 Ibid.
- 3 Luk LJ, Rotella MR, Stillman LJ, Wise SK. Assessing asthma in the otolaryngologist's office. *Current Opinion in Otolaryngology & Head and Neck Surgery*. 2017 Feb 23.
- 4 Rowe, B, et al. (2010). Admissions to Canadian hospitals for acute asthma: A prospective, multicentre study. *Canadian Respiratory Journal*, 17(1), 25-30.
- 5 Bousquet, J. et al (2010). Uniform definition of asthma severity, control, and exacerbations: document presented for the World Health Organization Consultation on Severe Asthma. *The Journal of Allergy and Clinical Immunology*, 126(5), 926-938.

exposure to triggers, both allergic and non-allergic, that exacerbate their asthma.

As is the case mild-to-moderate asthma, patients take inhaled medications to control the underlying inflammation in their airways, and medications that relax the muscles around the airways and treat symptoms like wheezing, cough, or shortness of breath.

Unlike patients with mild-to-moderate asthma, patients with severe disease usually take oral corticosteroids in addition to their inhaled corticosteroids to provide additional control of the inflammation in their airways.

There has been a search for alternative treatments to oral corticosteroids because their long-term use is associated with side effects, including weight gain which can make asthma worse. Other side effects associated with long-term use of oral corticosteroids include the development of cataracts, osteoporosis, and elevated blood sugar that can trigger diabetes. In a study including 808 people with Severe Asthma, it was found that 93% of them had one or more conditions linked to their oral corticosteroid use including type II diabetes, osteoporosis, dyspeptic disorders, and cataracts.⁶

Research is shedding light on the sub-types of asthma or “phenotypes”. Severe Asthma can be eosinophilic.⁷ Eosinophils are a type of white blood cell which are part of the body’s immune system. For about 40% of patients with Severe Asthma, eosinophils drive their asthma, and oral/inhaled corticosteroids have been the mainstay of treatment.

Identifying the subtype of asthma that a patient has, for example, eosinophilic, presents an opportunity for precision medicine. As an example, the biologic therapy omalizumab that is approved for asthma is effective in allergic eosinophilic asthma.⁸

It is a goal of asthma care to empower patients with asthma to manage their disease. Accordingly, personalized Asthma Action Plans are instrumental for optimal self-management of this chronic condition.⁹

What are the economic and social burdens in Canada related to Severe Asthma?

Severe Asthma takes a serious toll on patients and on Canada’s healthcare system. Patients with Severe Asthma will often need more medical care and will be visiting hospital emergency rooms, and visiting their family doctors and specialists. In 2015, asthma attacks led to more than 70,000 visits to emergency rooms in Canada.¹⁰ The cost of asthma to the Canadian economy is expected to climb to \$4.2 billion by

- 6 Sweeney J, Patterson CC, Menzies-Gow A, et al. Comorbidity in severe asthma requiring systemic corticosteroid therapy: cross-sectional data from the Optimum Patient Care Research Database and the British Thoracic Difficult Asthma Registry. *Thorax*. 2016 Apr;71(4):339-46.
- 7 Chung KF. Expert Review of Respiratory Medicine. 2017 Apr 7.
- 8 Schleich FN, Manise M, Sele J, Henket M, Seidel L, Louis R. Distribution of sputum cellular phenotype in a large asthma cohort: predicting factors for eosinophilic vs neutrophilic inflammation. *BMC Pulmonary Medicine*. 2013;13:11. doi:10.1186/1471-2466-13-11.
- 9 Gatheral TL, Rushton A, Evans DJ, et al. Personalised asthma action plans for adults with asthma. *Cochrane Database of Systematic Reviews*. 2017 Apr 10;4:CD011859.
- 10 Canadian Institute for Health Information: Asthma Emergency Department Visits: Volume and Median Length of Stay, 2014-2015, <http://indicatorlibrary.cihi.ca/display/HSPIL/Asthma+Emergency+Department+Visits%3A+Volume+and+Median+Length+of+Stay>

2030.¹¹

According to one study, children with Severe Asthma were more likely (9.1%) to miss seven days or more of school than children with mild (5.7%) or moderate disease (5.3%).¹²

In terms of a social burden, Severe Asthma as a chronic condition impairs an individual's ability not only to breathe but to work and live a happy and healthy life. With increased disease severity, a patient's quality of life becomes progressively worse. Sadly, depression is a co-morbidity that occurs with Severe Asthma.¹³

What are the differences between mild-to-moderate asthma and Severe Asthma?

Patients with Severe Asthma are more reliant on their asthma medications. A cross-Canada survey conducted by the Asthma Society of Canada looking at the impact of Severe Asthma found that the majority of respondents (83.5%) said they use their controller medication once a day, and about seven out of every 10 said they use it at least twice a day. A significant portion (42.2%) of respondents with Severe Asthma said they use their reliever medication once a day, and 28.8% said they use it at least twice daily.

Patients who have mild-to-moderate asthma can generally control their disease with medications. But patients with more severe illness, who are on high doses of medications including oral corticosteroids, still may find themselves visiting hospital emergency rooms because of an asthma attack and unable to control their disease. They may find that they have to typically adjust their daily lives, be it missing work, missing school, or not participating in physical activities. The asthma attacks experienced by patients with Severe Asthma may even result in death.

One of the other differences between mild-to-moderate asthma and Severe Asthma is that patients with severe disease are more likely to have co-morbidities or co-existing medical conditions. These include obesity, obstructive sleep apnea, and gastroesophageal reflux disease (reflux of stomach contents into the esophagus).

Medications called biologics, many of which are taken by injection, offer the possibility of controlling Severe Asthma.¹⁴ Some of the biologics that are available in Canada to treat Severe Asthma include omalizumab, reslizumab, and mepolizumab. Still others, like benralizumab, are currently under investigation and may be available in Canada in the future. The biologics carry a higher price tag than standard asthma medications: the annual cost of omalizumab in Canada ranges from just under \$8,000 for a patient receiving one vial monthly to more than \$47,000 for a patient receiving three vials every two weeks, according to the Canadian Agency for Drugs and Technologies in Health.

11 Conference Board of Canada (2012) Cost Risk Analysis for respiratory health in Canada, <http://www.conferenceboard.ca/e-library/abstract.aspx?did=4585>

12 Kohen D: Asthma and school functioning. *Health Rep* 2010, 21:35-45.

13 Lavoie K, Cartier A, Labrecque M, et al. Are psychiatric disorders associated with worse asthma control and quality of life in asthma patients? *Respiratory Medicine*. 2005, 99:1249-57.

14 Tabatabaian F, Ledford DK, Casale TB. Biologic and New Therapies in Asthma. *Immunology and Allergy Clinics of North America*. 2017 May;37(2):329-43.