Asthma

Backgrounder

What is asthma?

- Asthma is a chronic disease characterised by airway inflammation and bronchoconstriction. When a person with asthma comes into contact with an asthma trigger (e.g. viral infection, pollen, smoke), their airways can become more inflamed, swollen and constricted and produce excess mucus. These reactions cause the airways to become narrower and irritated, making it difficult to breathe.
- People suffering from asthma experience recurrent episodes of wheezing, breathlessness, chest tightness and coughing. These episodes may be punctuated by periods of more severe and sustained deterioration in control of symptoms, termed an acute asthma exacerbation or asthma attack.
- There is no single cause of asthma, but certain factors may increase the likelihood of developing asthma, including genetic factors and the environment.
- Recurrent asthma symptoms frequently cause sleeplessness, daytime fatigue, reduced activity level and school and work absenteeism.
- Asthma severity is now classified on the basis of the intensity of treatment required to achieve control of symptoms.
- Asthma severity may change over time, and depends not only on the underlying severity of the disease, but also its responsiveness to treatment.

What are the risk factors for developing asthma?

- Asthma tends to run in families, which means that an individual is more likely to develop asthma if someone in his or her family already has it.
- The strongest risk factors for developing asthma are a combination of genetic predisposition with environmental exposure to inhaled substances and particles that may provoke allergic reactions or irritate the airways, such as:
  - indoor allergens (eg. house dust mites and animal hair)
  - outdoor allergens such as pollens and moulds
  - tobacco smoke
  - chemical irritants in the workplace
  - air pollution
- Other triggers can include cold air, extreme emotional stress such as anger or fear, physical exercise and even certain medications.

What is the prevalence and economic burden of asthma?
- Asthma is a common disease that is rising in prevalence worldwide, with the prevalence highest in industrialised countries.
- Estimates of the numbers of people affected by asthma worldwide vary from 100 to 300 million, with these numbers growing to as many as 400-450 million people worldwide by 2025.
- Worldwide, approximately 180,000 deaths are attributable to asthma each year, although there is considerable regional variation in mortality rates.
- The economic costs associated with asthma are estimated to rank as one of the highest among chronic diseases. Globally, the economic costs associated with asthma exceed those of tuberculosis and HIV/AIDS combined. Developed economies can expect to spend 1 to 2% of their healthcare budget on asthma.

How is asthma diagnosed?
- The characteristic symptoms of asthma include episodes of breathlessness, wheezing, cough and chest tightness. Typically these symptoms are variable, are brought on by exposure to allergens, cold air, or exercise, and are worse at night.
- A clinical diagnosis of asthma may be confirmed by measurements of lung function (spirometry or peak expiratory flow) to assess the severity of airflow limitation (due to bronchoconstriction and inflammation), its reversibility with a short-acting inhaled bronchodilator, and its variability.
- Spirometry measures:
  a) FEV1 (forced expiratory volume in one second) -- the volume of air (in litres) exhaled in the first second when the patient inhales fully and exhales with as much force, and as quickly, as possible
  b) FVC (forced vital capacity) -- the total volume of air (in litres) exhaled when the patient inhales fully and exhales completely with as much force, and as quickly, as possible
- The FEV1/FVC ratio is normally greater than 0.75 (0.90 in some children). Values less than these figures suggest airflow limitation.
- Peak flow measurements may be taken using a portable meter into which the individual breathes as hard and as fast as he or she can, taking the highest of three consecutive readings.
- A diagnosis of asthma may be confirmed from:
  a) An improvement in peak flow measurements >20% or >60 litres/min after inhalation of a short-acting inhaled bronchodilator
  b) A diurnal variation in peak flow (morning vs. evening readings) >20%
The onset of asthma symptoms are often triggered by allergens. Therefore physicians often measure a patient's allergic status to identify risk factors to avoid.

The diagnosis of asthma in children under 5 years and in the elderly can be more difficult. In children, asthma may present like recurrent chest infections; in the elderly, symptoms may be confused with heart failure.

**How is asthma treated?**

- By avoiding asthma triggers, it is possible to help reduce the severity of asthma.
- Although asthma cannot be cured, appropriate management can control the disease and enable people to enjoy a good quality of life.
- The treatment of asthma is determined primarily by the severity of the symptoms. Care is stepped up with the aim of gaining control of symptoms; it is stepped down for patients who have maintained control for at least three months (see diagram)

- Inhaled glucocorticosteroids (ICS) are the cornerstone of asthma treatment; by controlling airway inflammation and reversing structural changes in the airway walls, ICS treatment aims to control asthma symptoms and reduce the risk of exacerbations.
- Bronchodilators (see below) are also a key component of treatment for asthma patients, and are given either on an as-needed or regular basis to relieve or prevent symptoms.
- However, a significant number of patients suffer from uncontrolled asthma despite the available treatment options. They can continue to have symptoms and lifestyle restrictions, and might even require emergency care.
Epidemiological data have shown that, despite having treatment with inhaled corticosteroids (ICS) / long-acting beta2 agonists (LABA), many adults with asthma remain symptomatic and may have asthma exacerbations, resulting in a high unmet need for improved treatments.

**What is the role of bronchodilators in asthma?**

- Airway narrowing in asthma occurs as the result of airway smooth muscle contraction, oedema, thickening of the airway wall (re-modelling), and an increased secretion of mucus.
- Bronchodilators, by relaxing the smooth muscle in the airways, may be effective in relieving or preventing asthma symptoms.
- Treatment guidelines recommend the addition of a LABA bronchodilator as an effective treatment option in patients not controlled on an ICS alone.
- LABAs should not be used as monotherapy in asthma as these medications do not appear to influence airway inflammation; the bronchodilation they induce may mask a progressive deterioration in an asthma patient's condition.
- The potential benefits of a long-acting anticholinergic bronchodilator, in the long-term management of asthma, are currently under investigation as a means of addressing symptoms in the significant numbers of asthma patients not controlled on ICS/LABA therapy.

**What does asthma mean for the patient?**

- Asthma has a significant physical and emotional impact on those who suffer from the disease. Recurrent asthma symptoms frequently cause sleeplessness, daytime fatigue, reduced activity levels and school and work absenteeism.
- Asthma often results in a decline in physical activity and the disruption of the patient’s ability to lead a full life, interfering with everyday tasks and participation in family routines. This can result in the patient feeling depressed and frustrated.
- A significant number of patients suffer from uncontrolled asthma despite the availability of recommended treatment options.

**European Respiratory Society Annual Congress 2012 Boehringer Ingelheim tiotropium in asthma data**

Abstract title: *Tiotropium reduces asthma exacerbations in asthmatic patients with persistent airflow obstruction uncontrolled despite treatment in accordance with guidelines*

Poster number: P1796
Session: C8, Session 214, 08:30-10:30, Monday, 03 September 2012

Abstract title: *Tiotropium provides sustained bronchodilation in asthmatics with persistent airflow obstruction uncontrolled despite treatment in accordance with guidelines*

Poster number: P2187
Session: Halle A-11, Session 249, 12:50-14:40, Monday, 03 September 2012

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1 Tiotropium is not licensed for the treatment of asthma
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References