

Viral infections, COVID-19 and asthma: Preventing viral exacerbations of asthma

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Asthmatics are particularly vulnerable to viral illnesses, which cause the vast majority of asthma exacerbations. The most common viruses responsible for these exacerbations are the human rhinovirus and influenza virus. Influenza vaccine provides a reasonable prevention strategy for influenza infection, but there is not an effective vaccine against the rhinovirus. This is a major reason for effective control of chronic asthma and strategies to prevent viral upper-respiratory tract infections in asthmatics. COVID-19 does not appear to be more severe in asthmatics, especially if they are well controlled. This virus also does not seem to be more common in asthmatics. However, in times of pandemic virus diseases, it is necessary that asthma and allergic rhinitis are well controlled. It is important to distinguish COVID-19 from asthma exacerbations, because the treatments differ. Asthma therapies are not contraindicated in COVID-19-infected patients, as adverse events do not occur in this group.

S Afr Med J 2021;111(5):400-401. <https://doi.org/10.7196/SAMJ.2021.v111i5.15707>

A number of viruses are known to exacerbate symptoms in asthmatics – chief among these are the rhinovirus and influenza virus.

Rhinovirus

The human rhinovirus is a picornavirus, a small RNA virus of which there are 100 serotypes. General protective measures are necessary, as there is not an effective vaccine against this virus.

Influenza virus

Influenza is an RNA virus, which belongs to the family orthomyxoviridae. It is classified into 3 types, A, B and C, on the basis of the antigenicity of the nucleoprotein (NP). Type A, which is widespread in nature in birds and mammals, is the most important type. It is further divided into subtypes on the basis of the antigenicity of the haemagglutinin (HA) protein and the NP. In humans, only H1, H2 and H3 and N1 and N2 in the combinations H1N1, H2N2 and H3N2 have so far been associated with regular outbreaks of human influenza. On rare occasions, the non-human viruses have crossed the species barrier from birds to infect humans, but these have only caused sporadic cases of influenza and have not established themselves in the human host to the extent of being transmissible between humans. Each of the human subtypes, H1N1, H2N2 and H3N2, are further subdivided into strains on the basis of more subtle antigenic properties of the HA protein.

Types B and C influenza virus are found exclusively in humans. They are not classified into subtypes, but each type is subdivided into strains.

Influenza vaccine strategy

Influenza vaccine forms the most important basis for prevention of influenza disease. Type C is a cause of minor upper-respiratory tract infection and is therefore not included in the vaccine.

Indications in children

The indications in children are the following:

- all children at high risk of complications from influenza, including

those with chronic pulmonary (including asthma), cardiac, renal, hepatic, endocrine, neurological, metabolic or immunological disease, which increase the risk of severe influenza

- children receiving chronic aspirin therapy.

Additionally, it is recommended that adults and children who are family contacts of young children or contacts of people at high risk of influenza should be vaccinated to protect these vulnerable children. In some countries, all young healthy children (6 - 59 months of age) are routinely immunised.

New viruses

COVID-19 is caused by SARS-CoV-2.^[1] The disease may present in many ways, ranging from asymptomatic cases to patients with severe symptoms, with or without pneumonia. Most patients will have mild disease. Symptoms include fever, upper-respiratory tract coryza, cough and acute lower-respiratory tract infection. Patients with common allergic diseases and asthma do not develop unusual or more severe symptoms.

COVID-19 in asthmatics

Currently, there are limited data on the effects of COVID-19 in individuals with asthma. Three early studies demonstrated no link to asthma.^[1-3] However, in an initial review from the USA, cases of COVID-19 in individuals with comorbidities have shown that those with chronic lung disease, including asthma, may have a higher risk for hospitalisation when infected with the virus.^[4] This nonetheless does not clarify whether patients with asthma are at greater risk of becoming infected or whether those who do become infected have an increased risk for hospitalisation. Early data from New York State suggested that asthmatics had a lower mortality rate than non-asthmatics when infected with COVID-19.^[5]

It therefore seems that asthma is not a risk factor for hospitalisation and mortality from COVID-19.^[6,7] A recent study suggests that eosinophils in allergic asthma mitigated the risk of severe COVID-19-related morbidity, hospitalisation and death.^[8]

According to the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), the highest risk groups include:^[4,9]

- people caring for someone who has COVID-19
- people >65 years of age
- people who live in a nursing home or long-term care facility
- women who are pregnant
- people with chronic medical conditions, especially if not well controlled, e.g.:
 - body mass index >40
 - serious heart conditions
 - diabetes
 - chronic kidney disease and on dialysis
 - liver disease
- immunocompromised patients, such as those on cancer treatment
- chronic lung diseases.

General principles to prevent asthma exacerbation in viral diseases

Individuals with asthma should take precautions when any type of respiratory illness spreads in their community. Two key components to prevent asthma exacerbations are: maintaining asthma control and avoiding respiratory infections.

The most important advice to asthmatics to protect themselves is to keep their asthma under control. This advice continues to remain unchanged.

Patients should continue their controller therapy, which usually includes an inhaled corticosteroid. There is no evidence to suggest that inhaled corticosteroids would alter outcome should the asthma patient become infected with COVID-19; therefore, patients should be reassured regarding this issue. To ensure continued treatment, patients' caregivers are advised to maintain adequate supplies.

Management of acute asthma during COVID-19

Mild asthma exacerbations may be managed at home with telephonic advice of the treating doctor. Patients and doctors can agree on the therapy that should be used in an asthma action plan. Older patients (>6 years of age) with difficult-to-control symptoms could benefit from a peak-flow meter, as it will help to differentiate between asthma symptoms and COVID-19 symptoms.

All severe asthma exacerbations, irrespective of cause, require the three principles of treatment advocated in guidelines, i.e. oxygen, systemic steroids and increased bronchodilator use. Oral steroids are not contraindicated in viral exacerbations.^[10]

Two strategies that may be wise during COVID-19, are to limit nebuliser therapy to avoid droplet spread, and to use high-flow oxygen under specialised supervision.

Advice for asthmatics to avoid viral-induced exacerbations

The common steps individuals take to avoid influenza and other respiratory infections also protect them from COVID-19:

- keep a distance from others (social distancing, ~1 m)
- avoid people who are ill
- avoid crowded venues
- wash your hands often for 20 - 30 seconds, always after coughing or sneezing, and if there is no access to running water, use an alcohol-based hand cleanser

- clean your surroundings regularly to disinfect surfaces, but avoid disinfectants that produce asthma exacerbations.

Wearing a mask to protect asthmatics from COVID-19 in public spaces is recommended by the WHO and CDC.

Other viral diseases during COVID-19

Unfortunately, COVID-19 will overlap with seasonal upper- and lower-respiratory tract infections in children. In South Africa, autumn is usually characterised by respiratory syncytial virus (RSV) and rhinovirus paediatric bronchiolitis, and as these come to an end, influenza begins.^[11] However, during 2020 - 2021, it has been noted that the RSV season is atypical and resulting in a higher number of admissions.^[12]

Other allergic conditions during COVID-19

It appears that neither asthmatics nor allergic individuals are at special risk of COVID-19. However, the same suggestions and advice apply – be safe and be careful.

For individuals with allergic rhinitis, it is especially important to continue using regular treatments, especially nasal steroids.^[13] These are safe and do not increase the risk of becoming infected with COVID-19. For rhinitis flare-ups, a short course (≤1 week) of a topical decongestant, such as oxymetazoline, is recommended, and careful differentiation of respiratory tract symptoms between allergic rhinitis and COVID-19 is required.

Declaration. None.

Acknowledgements. I thank Dr F Mustafa for her suggestions for the manuscript.

Author contributions. Sole author.

Funding. None.

Conflicts of interest. None.

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Accepted 18 March 2021.