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Managing asthma in the COVID-19 pandemic and current recommendations from professional bodies: a review

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ABSTRACT

Objective: To provide a summary of the management of asthma in the current COVID-19 pandemic by examining and comparing the recommendations from various professional bodies.

Data sources and study selection: Websites of known respiratory professional bodies were searched for COVID-19 guidance related to asthma. Subject matter experts were also consulted for useful resources. Resources that were targeted at healthcare professionals were included, while those targeting patients and the general public were excluded.

Results: There is currently little data to suggest that asthma protects from or increases the risk of COVID-19, nor is there any data to support strong recommendations for or against specific asthma treatments. Physicians should continue to manage asthma according to existing accepted asthma guidelines and recommendations. All prescribed medications, especially inhaled corticosteroids, should be continued, and, where indicated, oral corticosteroids and biologic therapies should still be used. Nebulizers and spirometry should be avoided where possible to reduce the risk of viral transmission. A detailed history should be taken to differentiate asthma exacerbations from COVID-19.

Conclusion: Understanding similarities and differences among the recommendations of the various professional bodies will aid in medical decision-making in managing asthma in the COVID-19 pandemic. Health professionals should also consider the individual needs, preferences and values of their patients and the unique characteristics of their local healthcare systems.

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Introduction

The Coronavirus disease 2019 (COVID-19), caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was recognized in December 2019, where it started as a local outbreak of a respiratory illness in Wuhan, China. Since then, the virus has rapidly spread throughout China, and subsequently the rest of the world, evolving into a global pandemic (1). Similar to previous novel coronavirus diseases such as the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), the disease is capable of causing respiratory failure and death (2). One might anticipate that patients with chronic respiratory diseases, particularly asthma and chronic obstructive pulmonary disease (COPD), would be at increased risk of SARS-CoV-2

infection and more severe presentations of COVID-19. However, Halpin and colleagues (3) have examined preliminary data from China as well as previous data for SARS, and found that both asthma and COPD appear to be under-represented in the comorbidities reported for patients with COVID-19.

While there is currently no evidence to suggest a need to make drastic changes to the treatment or management of chronic respiratory conditions, patients with chronic respiratory diseases have unique characteristics that need consideration and mitigation. Given that even the general population has various concerns related to their economic, physical and mental well-being (4), it is likely that patients with chronic respiratory diseases have their own specific concerns and even misconceptions which need to be addressed as well. Practitioners in primary care have also raised

questions pertinent to the care for patients with chronic respiratory diseases.

It is therefore imperative that evidence-based guidelines are developed to guide clinical practice. Typical guidelines are based on evidence-based medicine, which demands careful examination of the evidence, and is time-consuming (5). However, in dealing with a pandemic and a rapidly evolving environment, it is a challenge to provide timely information while faced with the lack of robust scientific evidence.

Encouragingly, several international professional bodies have responded to provide recommendations on the management of chronic respiratory diseases such as asthma in the current context of the COVID-19 pandemic. However, they acknowledge that they were not able to follow the usual rigorous process for guidance development, and, instead, have developed the recommendations based on currently available evidence and expert opinion.

As such, this article aims to provide a summary of the management of asthma, by examining and comparing the recommendations from various professional bodies in the management of asthma in the current COVID-19 pandemic. Where available, existing literature would be examined to provide further information. It is hoped that understanding similarities and differences among the recommendations will aid healthcare professionals in their medical decision-making, considering the individual needs, preferences and values of their patients and the unique characteristics of their local healthcare systems.

Methods

A search for "asthma" and "COVID" on PubMed yielded a total of eight search results, as of May 2020. Websites of known respiratory professional bodies were also searched for COVID-19 guidance related to asthma. Subject matter experts were also consulted for useful resources. Resources that were targeted at healthcare professionals were included, while those targeting patients and the general public were excluded.

Results

The following resources were identified: the Global Initiative for Asthma (GINA)'s recent update to their Global Strategy for Asthma Management and Prevention (6), which included a section with interim guidance on the management of asthma in the context of the COVID-19 pandemic; the National Institute for Health and Care Excellence (NICE)'s COVID-19 rapid

guideline for severe asthma (7); the British Thoracic Society's (BTS) Advice for Healthcare Professionals Treating People with Asthma (adults) in relation to COVID-19 (8); and the National Asthma Council Australia (NACA)'s section in the Australian Asthma Handbook on managing asthma during the COVID-19 pandemic (9).

General management of stable asthma

For most people with well controlled asthma, having asthma does not seem to increase the risk of infection from SARS-CoV-2 or developing complications due to COVID-19 (3). There is also insufficient information to suggest that an infection with the coronavirus may trigger an asthma exacerbation. Hence, patients should continue their controller medications, ensure optimal control of asthma, and follow the other advice for the general public during this period (e.g. ensuring good personal hygiene, staying at home as much as possible, wearing masks in public areas, practising social distancing).

While there is evidence that wearing respirators (e.g. HFM dual cartridge and filtering facepiece N95 masks) may have physiologic effects on patients with respiratory disease (10), there are no known adverse effects from wearing surgical masks and cloth masks.

Physicians should continue to manage asthma according to existing accepted asthma guidelines. It is recommended that all asthma patients continue all of their prescribed medications (6).

The professional bodies generally recommend that patients should be provided with an updated Written Asthma Action Plan (WAAP) (6,7,9). An action plan informs the patient on how to recognize worsening asthma, how to increase their reliever and controller medications, and when to seek medical help. Having an action plan may help reduce visits to healthcare facilities which may increase the risk of exposure to SARS-CoV-2.

NICE recommends minimizing face-to-face contact where possible (7). For well-controlled patients, consider deferring non-essential face-to-face appointments. Patients can be offered telephone, video, or email consultations. Alternative ways to deliver prescriptions and medicines, such as postal services, can be considered. As always, patients should be advised to ensure that they have a sufficient supply of their medication at home, and to order them in plenty of time to ensure they do not run out (8). Even before the COVID-19 pandemic, there have been an increasing number of medication shortages worldwide in recent years (11). The COVID-19 pandemic has led to

even more disrupted major supply lines worldwide, and the pharmaceutical supply chain has not been spared, with more than 60% of the world's active pharmaceutical ingredients being made in China (12). Globally, there have been anecdotal reports of patients stockpiling medications (11). Such sudden increases in demand could have a considerable and detrimental effect on the medication supply chain. It should therefore be emphasized to patients that they do not need to over order or stock up on their inhalers (8). Patients should be reassured of the continued availability of medications based on rational levels of demand and implementing policies to prevent unnecessary stockpiling (11). These could include limits on the quantity of medication dispensed (e.g. one month's supply at time).

Inhaled corticosteroids (ICS) and oral corticosteroids (OCS)

While adherence to asthma treatment, in particular ICS, was applicable even before the emergence of COVID-19, emphasis on adherence to controller therapy is even more important due to concerns that use of corticosteroids may worsen COVID-19 outcomes. The misconception could have arisen from a misinterpretation of recommendations from the World Health Organization (WHO). The WHO currently recommends against the use of systemic corticosteroids to treat COVID-19 (13). This recommendation was made in view of current evidence suggesting a lack of effectiveness and possible harms when corticosteroids are used in viral pneumonia. In particular, a systematic review of observational studies of corticosteroids administered to patients with SARS reported no survival benefit and possible harms, such as avascular necrosis, psychosis, diabetes, and delayed viral clearance (14). A more recent review by Russell et al (15) examining the data for clinical outcomes of corticosteroid use in coronavirus and similar outbreaks similarly found no good evidence of benefit from corticosteroids and agreed that there might be possible harms. However, the WHO acknowledges the role of systemic corticosteroids when indicated for other reasons, which includes the management of asthma (13). Patients with asthma are therefore expected to continue to benefit from appropriate use of ICS and OCS. In addition, poor control of asthma leading to an exacerbation may necessitate a visit to a healthcare facility, which then increases the risk of exposure to SARS-CoV-2.

The professional bodies are unanimous in advocating that asthma patients continue using their medications at prescribed doses (6–9). This includes patients requiring even high-dose ICS. Where appropriate, such as when following one's WAAP, or when patients experience an asthma exacerbation, short courses of OCS should be started.

Management of severe asthma

For patients with severe asthma who are on regular maintenance OCS, treatment should be continued to reduce the risk of severe exacerbations (6). However, the lowest possible dose should be used to maintain control of asthma. Where appropriate, biologic therapies should be used in severe asthma patients who qualify for them, to reduce OCS exposure and complications arising from long term usage. There is currently no evidence that biological therapies for asthma suppress immunity (7,8). When patients are started on a new biologic, apart from taking into account the usual risks and benefits of treatment, existing or potential modifications to one's service should also be considered, in order to make sure that patients do not face disruption to their biologic therapy after initiation (7).

Nebulizer use

GINA (6), the Australian guidelines (9), and the American College of Allergy, Asthma and Immunology (ACAAI) (16) recommend against the use of nebulizers, in view of the risk of transmitting infection to other patients and to healthcare workers. Nebulizers generate aerosol particles in the size of 1–5 µm, which may be emitted into the ambient environment (17). These particles have the potential to carry bacteria and viruses, and may be propelled over a longer distance than that involved in natural dispersion patterns (18). Their use may therefore increase the risk of infection transmission. On the other hand, NICE (7) and BTS (8) advise that patients may continue to use their nebulizer, as they are of the view that the aerosol comes from the fluid in the nebulizer chamber and will not carry virus particles from the patient.

Regardless of the risk of generating viral particles, there is substantial evidence that nebulizers are not superior compared with metered-dose inhalers (MDIs) with valved holding chambers (19). In view of the theoretical risk of infection transmission, and the lack of benefit in most patients, nebulizers should be avoided, and existing patients switched to MDIs with spacers, unless unavoidable. This may include patients with

severe, life-threatening respiratory disease (e.g. those with severe or impending respiratory arrest, or those with hypoventilation or ventilation compromise, continuous nebulization, end-stage COPD, cystic fibrosis); or patients who are uncooperative or are unable to follow the directions required for using a MDI with spacer; or patients with a history of demonstrated poor response to MDI with spacer.

Where nebulizer use is unavoidable, appropriate infection control precautions should be taken. In the healthcare setting, the patient should be isolated, preferably in a negative-pressure area, or, if such an area is unavailable, a single room should be used with the door closed (9). Staff administering nebulizers should wear full personal protection equipment (PPE) against airborne exposures, including impervious gown and gloves, N/95 or P2 masks, and protective eyewear, during and for at least 30 min after the nebulizer treatment (9).

Recently, some companies manufacturing nebulizers have provided filters to use with their device. While the efficiency of these filters in preventing viral transmission and the magnitude of the risk of acquiring coronavirus through filtered nebulizers are not fully known, they are effective in capturing exhaled aerosol droplets (17). If available, these filters should be used to further reduce aerosol exposure.

If the patient is using the nebulizer at home, it should be done alone, in a location that minimizes exposure to non-infected members of the household (16). The ACAAI recommends locations such as outside the house on a porch or patio or in a garage, where air is not recirculated into the home. Appropriate care should also be taken to clean all the surfaces in the room or area where nebulization is performed. As always, patients should be reminded not to share their inhalers and devices with anyone, and to wash their hands before and after using their equipment, and to clean their equipment after each use and regularly using a detergent, or to follow the manufacturer's cleaning instructions (6,7).

Role of spirometry

GINA, the Australian guidelines and NICE recommend that lung function testing should be avoided (6,7,9). As with nebulizer use, spirometry can disseminate viral particles, and expose staff and patients to the risk of infection.

Instead of relying on spirometry, medical practitioners should perform good history taking and physical examination to aid diagnosis and use clinical judgment to initiate treatment.

If spirometry is needed urgently for clinical management, strict infection control measures should be adopted. Examples of such measures include washing hands before and after each test, the use of PPE, including gloves, gown and surgical mask, use of a spirometer that enables the attachment of a single-use bacterial/viral filter to the mouthpiece for each test, performing spirometry in only one designated area within the practice, with minimal furniture that can easily be cleaned and disinfected, and with no other people present, as well as disinfecting all surfaces of the spirometer and surrounds between patients (9).

Recognizing exacerbations and differentiating from COVID-19

COVID-19 presents varied clinical features, ranging from asymptomatic cases to acute respiratory distress syndrome (ARDS). The most common symptoms at onset of COVID-19 include fever, cough, and shortness of breath (20,21). Many cases may be mild, with no pneumonia manifestations, or may only present with nonspecific symptoms such as headache, diarrhea, sore throat, fatigue and rhinorrhea (21). Moreover, emerging evidence suggests that some cases that are already contagious may be asymptomatic (22). Even if symptomatic, there are also many similarities in presentation between COVID-19 and respiratory diseases such as asthma, as well as the common cold and flu. [Figure 1](#) compares the symptoms of the common cold, flu, allergies, and respiratory illness such as COVID-19.

All these provide a significant diagnostic challenge at the best of times and will be much harder now because of pressure to try and maintain home therapy, as well as to prevent unnecessary testing for COVID-19. The current lack of evidence in distinguishing between worsening asthma due to other infections or COVID-19 is acknowledged by GINA (6).

In view of the lack of evidence, should a patient present with respiratory symptoms, a detailed history must be taken. Typical triggers of the patient's asthma should be considered, and testing for COVID-19 and further management will be guided by local health authority guidelines.

If the patient presents with symptoms of pneumonia, NICE's COVID-19 rapid guideline for managing suspected or confirmed pneumonia in adults in the community can be used to assess symptoms that may help to differentiate COVID-19 pneumonia from bacterial pneumonia ([Table 1](#)) (23).

Symptoms	Coronavirus* (COVID-19) Symptoms range from mild to severe	Cold Gradual onset of symptoms	Flu Abrupt onset of symptoms	Seasonal Allergies Abrupt onset of symptoms
 Length of symptoms	7-25 days	Less than 14 days	7-14 days	Several weeks
 Cough	Common (usually dry)	Common (mild)	Common (usually dry)	Rare (usually dry unless it triggers asthma)
 Shortness of breath	Sometimes	No**	No**	No**
 Sneezing	No	Common	No	Common
 Runny or stuffy nose	Rare	Common	Sometimes	Common
 Sore throat	Sometimes	Common	Sometimes	Sometimes (usually mild)
 Fever	Common	Short fever period	Common	No
 Feeling tired and weak	Sometimes	Sometimes	Common	Sometimes
 Headaches	Sometimes	Rare	Common	Sometimes (related to sinus pain)
 Body aches and pains	Sometimes	Common	Common	No
 Diarrhea	Sometimes	No	Sometimes for children	No

*Information is still evolving. **Allergies, colds and flus can all trigger asthma, which can lead to shortness of breath. COVID-19 is the only one associated with shortness of breath on its own. Sources: Asthma and Allergy Foundation of America, World Health Organization, Centers for Disease Control and Prevention. edited 3/27/20 • aafa.org/covid19

Figure 1. Comparison of symptoms between different respiratory conditions.

Management of concomitant allergic rhinitis

Allergic rhinitis is common in patients with asthma. Proper treatment of allergic rhinitis with intranasal corticosteroids (INCS) may be associated with less asthma-related hospitalizations and emergency department visits (24). The Allergic Rhinitis and its Impact on Asthma (ARIA) and European Academy of Allergy and Clinical Immunology (EAACI) have released a joint statement to

recommend that INS be continued in allergic rhinitis, even in COVID-19 infection (25). Similar to recommendations for ICS and OCS, stopping INCS is not advised. More sneezing after stopping them may lead to more spreading of the coronavirus. Moreover, such treatment may avoid unnecessary SARS-COV 2 testing and doctor's visits, since patients may confound allergic induced nasal symptoms and cough with signs of virus infection (25).

Table 1. National institute for health and care excellence (NICE) recommendations on differentiating viral COVID-19 pneumonia from bacterial pneumonia.**COVID-19 viral pneumonia may be more likely if the patient:**

- Presents with a history of typical COVID-19 symptoms for about a week
- Has severe muscle pain (myalgia)
- Has loss of sense of smell (anosmia)
- Is breathless but has no pleuritic pain
- Has a history of exposure to known or suspected COVID-19, such as a household or workplace contact.

A bacterial cause of pneumonia may be more likely if the patient:

- becomes rapidly unwell after only a few days of symptoms
- does not have a history of typical COVID-19 symptoms
- has pleuritic pain
- has purulent sputum.

	GINA	NICE	BTS	NACA
Continue inhaled corticosteroids (ICS).	✓	✓	✓	✓
Treat acute exacerbations with short courses of oral corticosteroids (OCS).	✓	✓	✓	
Provide updated written asthma action plans (WAAPs) to reduce healthcare visits.	✓	✓	✓	✓
Avoid nebulisations. Use metered-dose inhalers (MDIs) with spacers instead..	✓			✓
Avoid spirometry during this period.	✓	✓		✓
Continue vaccinations, where appropriate.	✓			✓
Ensure sufficient supply of medications.		✓	✓	
Use the lowest dose of OCS as maintenance. Consider biologics for severe asthma patients who qualify. Continue biologics.	✓		✓	
Consider video/telephone consultations to minimise face-to—face contact.			✓	✓

Figure 2. Summary of guideline recommendations for managing asthma during the COVID-19 pandemic.**Vaccinations**

There is currently no vaccine available for COVID-19, although there are as many as 115 vaccine candidates in development (26). However, the majority are still in exploratory or pre-clinical stages, and it may well be 2021 before a vaccine could be available for use (26). While GINA has always recommended influenza vaccinations and considered pneumococcal vaccinations as other therapies used in asthma (6), the various professional bodies' recommendations for COVID-19 do not have specific recommendations regarding vaccinations, except for the Australian guidelines, which included influenza and pneumococcal vaccinations as part of general measures to promote optimal asthma control. (9)

However, influenza causes significant morbidity and mortality even in the general population, and is also known to contribute to some asthma exacerbations (6). People with asthma are also at higher risk

of pneumococcal disease. Hence, where indicated, patients with asthma should be encouraged to receive the influenza and pneumococcal vaccines. By protecting against these respiratory diseases, the need for visits to healthcare facilities is reduced, which in turn decreases the risk of exposure to SARS-CoV-2. By reducing these respiratory infections, healthcare resources can also be conserved for managing the COVID-19 pandemic (27).

Discussion

In general, recommendations from the various professional bodies advise that physicians should continue to manage asthma according to existing accepted asthma guidelines and recommendations. Figure 2 shows a summary of recommendations from the professional bodies as well as how the recommendations compare. In summary, the key points are:

- Physicians should continue to manage asthma according to existing accepted asthma guidelines and recommendations.
- All asthma patients should continue all of their prescribed medications, especially ICS.
- Where indicated, such as for acute exacerbations of asthma, short courses of OCS should be given.
- Patients should be provided with updated WAAPs to help them maintain asthma control in periods of worsening, and to reduce the need to visit healthcare facilities.
- For severe asthma patients on maintenance OCS, the lowest dose of OCS should be given. Biologic therapies should be considered for patients who qualify for them, to limit the need for OCS as much as possible.
- While patients should be advised to ensure that they have a sufficient supply of their medication at home, it should be emphasized that they do not need to over order or stock up on their inhalers.
- Nebulizers and spirometry should be avoided where possible to reduce the risk of viral transmission. When employed, proper precautions should be used as per the current guidance consensus to prevent the spread of SARS-CoV-2.
- A detailed history should be taken to differentiate asthma exacerbations from COVID-19.
- INCS should be continued in patients with allergic rhinitis.
- Vaccinations, such as for influenza and pneumococcal disease, should continue to be part of routine care for asthma patients.

Conclusion

Our understanding of how asthma may be affected by COVID-19 is evolving. There is little data to suggest that asthma protects from or increases the risk of COVID-19, nor is there any data to support strong recommendations for or against specific asthma treatments. Until more information is available, guidance provided by the various respiratory professional bodies will be useful in guiding healthcare professionals in managing asthma patients in the context of the current COVID-19 pandemic.

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Declaration of interest

The authors declare no affiliations with or involvement in any organization or entity with any financial or non-financial interest related to this manuscript.

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