

## Special Article: COVID-19: Pandemic Contingency Planning for the Allergy and Immunology Clinic

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### Executive Summary

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Word Count: 4375

Tables/Text Boxes: 5

Figures: 3

eTable/Text Boxes:5

eSupplement: 5

References: 60

Abbreviations: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); coronavirus disease 2019 (COVID-19); World Health Organization (WHO); angiotensin-converting enzyme 2 receptor(ACE2); Middle East Respiratory Syndrome (MERS) coronavirus (MERS-CoV); case fatality rate (CFR); Centers for Disease Control and Prevention (CDC); reverse transcriptase polymerase chain reaction (RT-PCR); powered air-purifying respirator (PAPR); personal protective equipment (PPE)

Keywords: SARS-CoV-2; COVID-19; allergy; allergy immunotherapy; asthma; food allergy; venom allergy; allergic rhinitis; primary immunodeficiency; urticaria; angioedema; atopic dermatitis

Funding: Dr. Greenhawt is supported by grant #5K08HS024599-02 from the Agency for Healthcare Research and Quality

Conflicts of Interest:

Matthew Greenhawt is supported by grant #5K08HS024599-02 from the Agency for Healthcare Research and Quality; is an expert panel and coordinating committee member of the NIAID-sponsored Guidelines for Peanut Allergy Prevention; has served as a consultant for the Canadian Transportation Agency, Thermo Fisher, Intromune, and Aimmune Therapeutics; is a member of physician/medical advisory boards for Aimmune Therapeutics, DBV Technologies, Sanofi/Genzyme, Genentech, Nutricia, Kaleo Pharmaceutical, Nestle, Acquestive, Allergy Therapeutics, Allergenis, Aravax, and Monsanto; is a member of the scientific advisory council for the National Peanut Board; has received honorarium for lectures from Thermo Fisher, Aimmune Therapeutics, DBV Technologies, Before Brands, multiple state allergy societies, the American College of Allergy Asthma and Immunology, the European Academy of Allergy and Clinical Immunology; is an associate editor for the Annals of Allergy, Asthma, and Immunology; and is a member of the Joint Taskforce on Allergy Practice Parameters

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Nicholas Rider: Consultant/Scientific Advisory Boards: Horizon Therapeutics, CSL Behring, Takeda Pharmaceuticals; Royalties: Kluwer Wolters; UpToDate Topic Contributor. Grant Funding: Jeffrey Model Foundation

David Fleischer: Dr. Fleischer received institutional research funding from DBV Technologies; institutional research funding from Aimmune Therapeutics; has served as a consultant and received personal fees from DBV Technologies, Aimmune Therapeutics, Kaleo Pharmaceutical, INSYS Therapeutics, Abbott, Allergenics, Acquestive, and Nestle; is a non-paid member of the scientific advisory council for the National Peanut Board and a non-paid member of clinical advisory boards for Food Allergy Research & Education and Food Allergy and Anaphylaxis Connectivity Team.

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David Stukus: Consultant for DBVTherapeutics, Before Brands, and Abbott Nutrition.

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Jay Portnoy has received financial support from Thermofisher, Kaleo, TEVA, Novartis, Hycor, and Boehringer-Ingelheim.

Dana Wallace has received financial support from Mylan, Kaleo, Optinose, ALK, Bryan, and Sanofi

Nicholas Hartog: Horizon Pharmaceuticals—speaker and advisory board; Takeda—speaker; Orchard Therapeutics—advisory board.

Elena W.Y. Hsieh: is supported by NIH NIAMS K23AR070897, the Boettcher Foundation Webb-Waring Biomedical research grant, the CARRA large grant, the Jeffrey Modell Foundation Translational Award, and Takeda Pharmaceuticals.

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## **Abstract**

**Background:** In the event of a global infectious pandemic, drastic measures may be needed that limit or require adjustment of essential ambulatory allergy services to those that could not be interrupted without significant health risk to the individual. However, no rationale for how to prioritize service shut down and patient care exists.

**Methods:** A consensus-based ad-hoc expert panel of allergy/immunology specialists from the US and Canada developed a service and patient prioritization schematic to temporarily triage allergy/immunology services. Recommendations and feedback were developed iteratively, using an adapted modified Delphi methodology to achieve consensus.

**Results:** During the ongoing pandemic while social distancing is being encouraged, most allergy/immunology care could be postponed/delayed, or handled through virtual care. With the exception of many primary immunodeficiency patients, patients on venom immunotherapy, and asthma patients of a certain severity, there is limited need for face-to-face visits under such conditions. These suggestions are intended to help provide a logical approach to quickly adjust service to mitigate risk to both medical staff and patients. Importantly, individual community circumstances may be unique and require contextual consideration. The decision to enact any of these measures rests with the judgement of each clinician and individual healthcare system.

**Conclusions:** Pandemics are unanticipated and enforced social distancing/quarantining is highly unusual. This expert panel consensus document offers a prioritization rationale to help guide decision-making when such situations arise and an allergist/immunologist is forced to reduce services or makes the decision on his or her own to do so.

## **Key Messages:**

**What is already known on this topic:** Allergy/immunology clinical practice and research are not immune to natural disasters or global pandemics. In rare circumstances, a clinician may be forced to reduce services offered or make this decision voluntarily.

**What does this article add to our knowledge:** This consensus document provides a rationale for how to prioritize patients and service provision in the case of elective or mandated ambulatory care reduction in services.

**How does this study impact current management guidelines:** This is the first document to describe an approach during an unprecedented need for prioritization of allergy/immunology services, which can serve as a resource in a current or future natural disaster or pandemic where medical services are rationed at the federal, state, or local level.

## **EXECUTIVE SUMMARY**

### **COVID-19: Pandemic Contingency Planning for the Allergy and Immunology Clinic**

#### **Introduction**

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exhibited a pattern of pandemic spread in a few short months, as countries and communities struggle to rapidly design effective strategies to prevent spread of the novel coronavirus. The virus has been named SARS-CoV-2 and the disease it causes “coronavirus disease 2019” (COVID-19).(1, 2) **For further background of the pandemic please [click here](#).** Community transmission is now evident, and it is clear that SARS-CoV-2 is a highly contagious virus.(3, 4) The spectrum of disease ranges from severe respiratory illness and fatality from these complications (particularly in the elderly and those with co-morbidities) to asymptomatic spread(1, 5, 6), with the proclivity of SARS-CoV-2 for person-to-person transmission in asymptomatic individuals presenting one of the most vexing problems from a public health standpoint.(1) Given the rapid and pervasive spread the WHO declared SARS-CoV-2 a pandemic on March 11, 2020, and on March 13, 2020 the President of the United States declared a national emergency in the United States, consistent with similar actions taken in several other countries.(7, 8) ([figure 1](#)) **For the full introduction, please [click here](#).**

#### **Prevention and Control**

While vaccine development is underway it is unlikely a vaccine will be available in 2020.(1) The CDC has recommended use of personal protective equipment (PPE) by healthcare workers including standard, contact, and airborne precautions and with the use of eye protection. This means healthcare workers caring for a patient with suspected COVID-19 should wear a gown, gloves and either an N95 respirator plus face shield and goggles or a powered air-purifying respirator (PAPR); however, the CDC also notes that a face mask may be substituted for an N95 respirator if one is not available, and a negative pressure room may be reserved for patients undergoing aerosol-generating procedures.(1, 2) However, this information is fluid and may continue to change. Common sense strategies to control the spread of SARS-CoV-2 are detailed in [text box e1](#) and FAQ's in [text box e2](#).(2, 9) During the COVID-19 pandemic the concept of social distancing has also been incorporated into prevention strategies with the CDC recommending avoiding close contact (less than 6 feet) with people who are sick.(2, 9) **For the full prevention and control section, please [click here](#).**

#### **Emergency Social Distancing—Prioritizing Care in the Event of Ambulatory Service Rationing**

In the presence of a highly contagious global pandemic, decisions will need to be considered regarding the short-term rationing of services, keeping a perspective that many allergy/immunology services are elective and can be managed without face-to-face interaction, or deferred outright for short periods of time. This is prefaced by stating that such measures would be for emergency purposes only, such as at the present time, where the US President has declared a national state of emergency.(8) As COVID-19 becomes more pervasive, recommended and mandated social distancing becomes more pronounced. Several countries have initiated widespread quarantine measures to try to contain and mitigate the spread SARS-CoV-2. During a pandemic where a national state of emergency has been declared and quarantine measures are recommended or mandated, “red zone” measures must be considered.

(2, 7, 8) A helpful view of a stratified approach is presented in [figure 2](#). Much of what follows relates to “red zone” operations. Some of the suggestion below may be most appropriate to a greater level of social distancing and quarantine than exists in the moment, and as such the clinician must view these as conditional recommendations to be incorporated within context-specific, evolving situations.

Again, we want to ensure all readers understand that this is a suggested framework, and furthermore a framework only to be considered in the setting of a global emergency during a time when nations, societies, and institutions are facing drastic pandemic measures in a “red zone” situation. Ultimately, any decision to reduce or shift service resides within the sole autonomy of the clinician, their practice, their healthcare system, and their community. **For the full social distancing section, please [click here](#).**

### **Telehealth – Expanding Services During the Pandemic**

Telehealth and virtual patient encounters can be central in delivering allergy services within a risk stratified context of the SARS-CoV-2 pandemic. The ability to integrate telecommunications, information systems, and patient care has been in place for over four decades and has been gaining traction across medical specialties, even before the emergence of COVID-19.(10, 11) **For the full telehealth section, please [click here](#).**

### **Acute Services Reduction: Guidance for Service Reduction/Prioritization by Specific Conditions**

Please click on the following condition-specific guidance for service reduction and patient prioritization.

- [Asthma](#) (and [figure 3](#), approach to asthma triage during a pandemic)
- [Allergic Rhinitis](#)
- [Immunotherapy and Biologics](#)
- [Food Allergy, Eosinophilic Esophagitis \(EoE\), Drug Allergy, and Anaphylaxis](#)
- [Allergic Skin Disorders](#)
- [Immunodeficiency](#)
- [An Approach to Shared Decision-Making In These Circumstances](#)
- [Communication with Patients](#)

### **Conclusions**

A pandemic response during a global emergency is a highly unusual and atypical circumstance from business as usual. The framework described herein represents a course of action in a highly specific and temporary situation, necessary only in a most extreme and improbable circumstance, where there is a state of emergency and a pandemic risk that outweighs the risk of deferral of an office visit for the allergic condition. Please keep in mind that these are suggestions that must be conditioned on individual “on the ground” circumstances. They are not mandates or forced actions. The decision to enact any of these measures rests with the clinician and individual healthcare system. These suggestions are intended to help provide a logical approach to quickly adjust service to mitigate risk to both medical staff and patients during the ongoing pandemic while social distancing is being encouraged. Importantly, individual community circumstances may be unique and require contextual consideration. We acknowledge that taking actions to limit face-to-face access may have financial implications in terms of lost revenue, fixed operating



costs, and unclear reimbursement for telehealth and that advocacy on the part of professional organizations may be both appropriate and necessary to leverage some share of federal resources during this pandemic.(8) If nothing else, we can fall back on the old adage “remember your training”. We are some of the most highly trained and adept medical specialists in the world. We can and will persevere through any challenge that the specialty faces.

For access to the full, unabridged document, please click [here](#).

## **Introduction:**

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exhibited a pattern of pandemic spread in a few short months, as countries and communities struggle to rapidly design effective strategies to prevent spread of the novel coronavirus. The virus has been named SARS-CoV-2 and the disease it causes “coronavirus disease 2019” (COVID-19).(1, 2) China first notified the World Health Organization (WHO) of several cases of a human respiratory illness that were linked to an open seafood and livestock market in the city of Wuhan in December 2019, which appears to have originated in chrysanthemum bats.(1, 3) World-wide community transmission is now evident, and it is clear that SARS-CoV-2 is a highly contagious virus.(3) Cases have been identified across the globe, and on one cruise ship alone more than 700 infections were reported, demonstrating the high level of potential contagion.(1, 4) The spectrum of disease ranges from severe respiratory illness and fatality from these complications (particularly in the elderly and those with co-morbidities) to asymptomatic spread(1, 5, 6), with the proclivity of SARS-CoV-2 for person-to-person transmission in asymptomatic individuals presenting one of the most vexing problems from a public health standpoint.(1) Of note, based on data at the time of drafting this document, serious illness appears to occur in ~14%-16% of cases.(2, 6) However, we cannot stress enough that these are fluid situations which may change hourly. Given the rapid and pervasive spread the WHO declared SARS-CoV-2 a public health emergency of international concern on January 30, 2020 and a pandemic on March 11, 2020, and on March 13, 2020 the President of the United States declared a national emergency in the United States, consistent with similar actions taken in several other countries.(7, 8) Information is sparse in some instances, and inconsistent in others, but there is anticipated widespread caseload across the North America and an urgent need to match the pace of the outbreak to the capacity of national healthcare systems to serve the needs of affected individuals in an urgent and timely manner. ([figure 1](#)) It is incumbent on each physician to monitor the day-to-day evolution of the pandemic in their region, and to be prepared to implement the recommendations of authorities and experts. The situation is changing quickly and requires a rapid, flexible, and informed response.

## **Biology, Epidemiology, Clinical Presentation, and Management**

While this is more fully summarized elsewhere, the biology of the virus is of some interest. Please see [e-supplement 1](#) for additional information on biology, epidemiology, clinical presentation, and management of COVID-19. **The practicing allergist should keep in mind that there is overlap with allergic rhinitis, influenza, viral upper respiratory tract infection, and asthma in the early stages with respect to certain upper respiratory symptoms, which only later progresses to more clearly defined COVID-19 symptoms.**

The overall case fatality rate (CFR) has been estimated around 2.3%, but is highly variable and may be as high as 8 to 15% in higher risk populations.(1, 6, 12) Healthcare workers are not immune, as noted by the finding that 3.8% of cases occurred in healthcare workers. Of 1,716 COVID-19 infections in healthcare workers, 14.8% were classified as severe, and 5 deaths were reported (CFR 0.3%).(6) There is some speculation that insufficient access to testing and intensive care services (secondary to equipment and space shortages) may contribute to some of the fatality rate variation. Again, it should be emphasized that data reporting and event rates are fluid and changing rapidly.

## **Prevention and Control Measures for Healthcare Workers**

While vaccine development is underway, it is unlikely that a vaccine will be available in 2020.(1) Key strategies for containing the virus and limiting its spread include identifying and quarantining of infected individuals and those at high risk for infection. However, this approach due to a lack of timely and accurate testing, as discussed above, and overlap of mild COVID-19 with seasonal viral infections. The CDC has recommended the use of personal protective equipment (PPE) by healthcare workers including standard, contact, and airborne precautions and the use of eye protection. This means healthcare workers caring for a patient with suspected COVID-19 should wear a gown, gloves and either an N95 respirator plus face shield and goggles or a powered air-purifying respirator (PAPR); however, the CDC also notes that a face mask may be substituted for an N95 respirator if one is not available, and a negative pressure room may be reserved for patients undergoing aerosol-generating procedures.(1, 2) As is with any of this information, this is fluid and may continue to change. Common sense strategies are important in controlling the spread of SARS-CoV-2 and are detailed in [text box e1](#).(2, 9) During the COVID-19 pandemic the concept of social distancing has also been incorporated into prevention strategies with the CDC recommending avoiding close contact (less than 6 feet).(2, 9)

During the pandemic, self-quarantine of asymptomatic healthcare providers resulting from exposure to sick patients or family members may limit their ability to provide care. [Telehealth](#) may provide an additional resources in these circumstances, and providers may consider implementing systems to facilitate virtual care from home.

## **Emergency Social Distancing—Prioritizing Care in the Event of Ambulatory Service Rationing**

In the presence of a highly contagious global pandemic, decisions will need to be considered regarding the short-term rationing of services. It is important to note that many allergy/immunology services are elective and can be managed without face-to-face interaction, or deferred outright for short periods of time. Not only will these considerations be important for patient health and safety, but it will also be important to consider those healthcare workers who are within the high-risk group as specified by the CDC. A strong argument can be made that we must diligently protect our workforce by realigning present priorities to limit face-to-face patient interactions where possible, particularly for healthcare workers.(13) Relevant, though admittedly 16 year old data from a US allergy/immunology 2004 survey found that the average age of the allergy and immunology physician workforce was 53 years in 2004 vs 51 years in 1999, with physicians working longer before retiring.(13)

To provide an approach to triaging allergy/immunology services during the COVID-19 pandemic, a consensus-based ad-hoc expert panel of allergy/immunology specialists from the US and Canada developed a service and patient prioritization schematic to temporarily adjust allergy/immunology services. Recommendations and feedback were developed iteratively, using an adapted modified Delphi methodology to achieve consensus.

A hierarchy for understanding these scenarios is detailed in [figure 2](#), which depicts a graded approach to how allergy and immunology services may need to be adjusted during an emerging pandemic. As COVID-19 becomes more pervasive, recommended and mandated

social distancing becomes more pronounced. Several countries have initiated widespread quarantine measures to try to contain and mitigate the spread SARS-CoV-2. Drastic measures were initially taken in Wuhan limiting travel, and on March 9, 2020 the Italian government released a decree prohibiting movement in public places except for “justifiable reasons” such as commuting to work, obtaining basic necessities (i.e., food shopping), and for health emergencies. The decree cancelled sporting events and public gatherings and closed schools, universities, and recreational facilities through April 3.(14) On March 13, France announced plans to close nonessential businesses and Spain announced a nationwide lockdown.(15)

A helpful view of a stratified approach is presented in [figure 2](#). In this context, “green zone” represents normal operations, “yellow zone” defines operations during emergence of a contagious pandemic illness with signs of possible community spread, “orange zone” relates to a pandemic with a state, local, and/or national emergency declared, and “red zone” would be implemented in the setting of a declared emergency with full or partial quarantine measures recommended for all citizens (i.e., school closings or governmental imposed social distancing restrictions).

During a pandemic in which a global health emergency has been declared, “red zone” measures must be considered. (2, 7, 8) The remainder of this document deals with a rationale to enact such “red zone” measures. It must be explicitly stated that the following framework serves only as a suggestion and should only be considered within the context of a global emergency during a time when nations, societies, and institutions are facing drastic pandemic measures in a “red zone” situation. The recommendations must also be considered with the understanding that normal services will eventually resume, and that such recommendations only represent contingency plans for prioritization of staff, space, and patients, with an expected timeline of 6 months or less. Thus, the remainder of this document aims to make recommendations regarding how clinicians can consider prioritizing who needs to be seen, weighing the risks and benefits of what that may involve in terms of risk of infection, space constraints, and staff availability. Ultimately, any decision to reduce or shift service resides within the sole autonomy of the clinician, their practice, their healthcare system, and their community.

Much of what follows relates to “red zone” operations. Some of the suggestion below may not be required at the moment, and as such the clinician must view these as conditional recommendations to be incorporated within context-specific, evolving situations.

### **Telehealth and Other Methods of Virtual Encounters– Expanding Services During the Pandemic**

Telehealth can be central in delivering allergy/immunology services within a risk stratified context of the SARS-CoV-2 pandemic. Telehealth has the potential to help with social distancing. Several advantages that telehealth offers are 1) it can limit exposure of providers to potentially infected patients, particularly if they are older or have health problems, 2) it can reduce exposure of patients, many of whom have conditions such as asthma or immunodeficiency disorders, to other infected patients, and 3) it can provide access to rapid evaluation for potential COVID-19 infection reducing the likelihood that they will go to an

urgent care clinic or ED where they have increased risk of virus exposure. To provide telehealth services to patients it is important to remember that the provider must be licensed to practice medicine in the state where the patient is located. Please see [e-supplement 2](#) for additional information on telehealth.(10, 11, 16-22). The AAAAI and ACAAI Telemedicine/Telehealth toolkits can be valuable resources.(23, 24)

While telehealth may be a valuable and critical resource, challenges will include triaging patient diagnoses and severity to allow patients with more acute need immediate access to services.(25-29) For example, a patient requiring assessment of possible idiopathic anaphylaxis would likely require more immediate access to this service than a patient needing follow-up for well-controlled asthma or allergic rhinitis. In other circumstances discussed below, patients with well-controlled allergic disease may be able to appropriately defer both face-to-face and telehealth visits. Clinicians will also need to be aware of potential pitfalls of virtual care. For example, the case of unstable asthma in a patient with poor perception of dyspnea or during a significant exacerbation. However, telehealth can also be an excellent tool for many allergic conditions for those with less severe and stable conditions, such as in those with seasonal allergies who need a brief reassessment and refill of their prescriptions before their allergy season. In the current context, especially if formal telehealth services are not available, virtual care may also need to be dispensed using telephone, electronic medical record patient portal messaging and e-visits, including in the event of absolute emergencies. For many situations, incorporating phone triage as a first step may be helpful, particularly in areas where the clinical situation may lack clarity as to the acuity or pressing need for the patient to be seen, and then working towards maximizing telehealth or other means of virtual care where social distancing can be preserved and healthcare needs can still be met. This document seeks to provide a rationale to be considered for such instances.

As a general approach, no recommendations will be an ideal fit for every unique clinician, situation, or practice setting. Each clinician must use their judgement in making decisions about which services may be deferred, which may be offered using virtual care, and which will require in-person care. The goal of this document is to provide a resource for consideration in rather unusual circumstances, rather than to give any directives. Specific conditions are discussed below. Text boxes are provided for suggested service adjustments for patients with specific conditions

### *Specific Conditions*

#### *Asthma*

**For asthma specific recommendations on service reduction, please see [text box 1](#), and see [figure 3](#) for an approach to triaging an asthma exacerbation in this setting.** Asthma is a major health problem around the globe.(30) Since SARS-CoV-2 is a respiratory pathogen, it is important to know what risk asthma patients have in this time of a COVID-19 pandemic. There are relatively little data at this time to demonstrate a specific increased risk for COVID-19 from asthma, or an increased disease pathology in asthma patients infected with SARS-CoV-2. However, this association could evolve. Early published data from China note that asthma was not a strong risk factor for severe COVID-19 disease. One study of 140 COVID-19 patients found none with asthma (31), and in a larger study of 1,099 hospitalized patients, asthma was not

described. (32) In this larger study, chronic obstructive lung disease (COPD) was noted in patients hospitalized with COVID-19, but the rate of patients with COPD who had COVID-19 (1.1%) was lower than the rate of COPD in the general Chinese population (which is at least 10%).(33) Data from Korea also indicate asthma is not a relevant comorbidity.(12) Together these data suggest the risk of severe COVID-19 may not be dramatically elevated in those with asthma or COPD. However, these data are based on hospitalized patients and may have significant limitations due to selection and reporting bias. It is also important to note that asthma appears under-diagnosed and reported in China, with an estimated prevalence of only 4.2%.(34) The actual risk of disease in those with asthma or COPD within the broader Chinese population or those of non-Chinese background is not known, and may evolve with additional data reporting.

Beyond the direct risk of the infection itself, there is also a risk of experiencing an asthma exacerbation triggered by coronavirus infection. Prior pandemic coronaviruses (SARS-CoV and MERS-CoV) have not been associated with asthma exacerbations, but there are non-pandemic coronaviruses that circulate annually and have been reported to cause asthma exacerbations (35, 36). Nonetheless, it is imperative that asthma patients implement appropriate steps to ensure their asthma is under controlled, to limit the chance for a more serious exacerbation.

#### **Knowledge about the potential use of corticosteroids in treating COVID-19 is evolving.**

Currently the WHO and the CDC recommend that in the general population with COVID-19, systemic corticosteroids should be avoided because of a potential for prolonged viral replication that was observed in MERS-CoV patients. However, there is also acknowledgement that there may be a role for systemic corticosteroids when indicated for other reasons, such as septic shock.(2, 37-39) For example, in one study of 309 ICU patients with MERS-CoV, 151 received corticosteroids acutely, and those who received corticosteroids were more likely to receive mechanical ventilation (93.4% vs 76.6%,  $p < 0.0001$ ), had higher 90-day crude mortality (74.2% vs 57.6%,  $p = 0.002$ ), and had delayed viral clearance. Of note, mortality rates did not differ by corticosteroid use when adjusted by time-varying confounders.(38) Approximately 20%-30% of hospitalized patients with COVID-19 have pneumonia and may require intensive care for respiratory support (2, 39), thus it is important to appreciate that corticosteroids may have distinct roles in treating lung injury versus airway inflammation. Recently, Russell et al. summarized current evidence in relation to the use of corticosteroids for mitigating lung injury from coronaviruses and concluded there is likely to be a lack of efficacy in COVID-19 lung injury.(40)

However, it is important to differentiate between the use of corticosteroids for treatment of COVID-19, and their use as a controller medication for management of a chronic disease, like asthma. As mentioned, it is most important to maintain asthma control, and the lack of patients with co-morbid asthma being noted in COVID-19 studies or data reporting suggests that asthmatics may not be at a greatly increased risk of more serious disease – even with the use of corticosteroids as part of a controller regimen. In fact, it may be more likely that an asthma patient would have an exacerbation from other causes, including seasonal pollen exposure or a virus other than SARS-CoV-2, if they stopped regular use of indicated controller therapy based on best evidence. An exacerbation could require them to enter the healthcare system, which would put them at increased risk of being exposed to SARS-CoV-2 during the current pandemic.

Until studies in asthma patients with SARS-CoV-2 have been performed and show evidence to the contrary, a prudent recommendation would be to continue to manage asthma according to current asthma guideline based recommendations.(30)

Of note, nebulizer use is discouraged unless essential during this pandemic, because use of nebulized therapy is more likely to aerosolize SARS-CoV-2 and increase risk of contagion. As such, asthma therapy delivered by metered dose inhaler would be most appropriate both in the healthcare setting and at home.(41-43)

Methodologically sound and high quality evidence supports administration of a number of biologic agents -- targeting IL-5, IL-4/IL-13, and IgE – for appropriately selected patients with refractory moderate-severe persistent asthma.(43) There is no evidence which suggests immune response to COVID-19 will be impaired in asthma patients treated with anti-IL5 (anti-IL5Ra), anti-IL4/IL13, or anti-IgE medications. In the absence of any data indicating a potential for harm, it would be reasonable to continue administration of biologic agents during the COVID-19 pandemic, in patients for whom such agents are clearly indicated and have been associated with efficacy.(44, 45)

In summary, understanding of the intersection between asthma and COVID-19 is evolving. There are currently scant data to indicate the degree of risk (or protection) from disease, and no data to support strong recommendations for or against specific asthma treatments. Until more information suggests otherwise, it is strongly recommended that physicians continue to manage asthma according to existing accepted asthma guidelines.(30) Ensuring that those with asthma have their condition under optimal control is the best deterrent against a poor outcome from any viral respiratory tract infection, and there is a high likelihood that this recommendation also extends to SARS-CoV-2.

### *Allergic Rhinitis*

Under red-zone circumstances, there are no recommendations for prioritizing the evaluation of new patients or return visits of established patients with allergic rhinitis. Face-to-face visits for evaluation and management of patients with allergic rhinitis can generally be postponed, or shifted to telehealth visits for initiation or monitoring of care as an alternative. **Therefore, with rare exception (or “unless there are extenuating circumstances”) service reduction for this allergic rhinitis would be strongly recommended as pandemic management and isolation measures continue to escalate.** While telehealth and phone triage do remain as available options, telehealth utilization comes with the caveat that other diagnoses may need these limited resources with higher priority. Skin testing to inhalants may not be appropriate; it may be prudent to postpone such testing or to perform in vitro serum specific IgE testing as an alternative, with the understanding this would also entail entering a health care environment for performance of phlebotomy. Such patients would be better managed via avoidance measures and administration of medication(s) as indicated based on best evidence.(46)

### *Immunotherapy and Biologics*

Allergen immunotherapy and biologic therapy are valued treatment options for the care of many allergic/immunologic disorders.(47) However, in some cases they represent alternatives to other

front-line medical management, and in some settings are a preference-sensitive care option as a first line therapy. **For immunotherapy and biologics specific recommendations on service reduction, please see [text box 2](#).**

#### *Food Allergy, Eosinophilic Esophagitis (EoE), Drug Allergy, and Anaphylaxis*

**For food allergy, eosinophilic esophagitis, drug allergy, and anaphylaxis specific recommendations on service reduction, please see [text box 3](#).** Many patients with food allergy, EoE, and anaphylaxis are generally healthy with the exception of other allergic comorbidities such as asthma, allergic rhinitis, or eczema. With limited exception, most of the care of these conditions would reasonably qualify under temporarily non-essential ambulatory elective services, which could be delayed or deferred in the short to intermediate term (a few weeks to even a few months) with no anticipated significant serious untoward effects. The majority of the care for patients with these conditions could forego any face-to-face visits in the short-term, and if necessary be addressed through virtual care until the pandemic subsides. Many such patients could likely forego any care in this time interval. When considering what is critically necessary, routine food allergy follow up visits, and many new referrals should be considered to fall under a more elective category, where such visits could be handled via telehealth, potentially. Food challenges, with limited exceptions, would also follow suit. Research visits for ongoing study protocols and food allergy immunotherapy visits for initiation and escalation could also be delayed, with the possible exception of food challenge visits at the end of a study interval where delay would risk influencing the primary/secondary outcomes. However, sponsors are likely issuing their own directives for handling this, which should be followed unless the local facility issues guidance that supersedes that of the sponsor with regards to access to space or staff. Where possible, it is recommended that there be planning to provide telehealth visits without testing to provide essential diagnostic management and make medication adjustments, or a plan to address this through phone triage. **In the setting of a pandemic with quarantine measures, unless there is a critical acute nutritional need for introduction of a key nutrient, it is likely that all food challenges would be deferred.** As the COVID-19 pandemic is fluid and evolving, suggestions for additional triage are offered in [text box 3](#).

#### *Allergic Skin Disorders*

**For allergic skin disorder specific recommendations on service reduction, please see [text box 4](#).** In patients with urticaria, angioedema, and atopic dermatitis, the majority of visits can be considered under the non-urgent category where face-to-face care can be postponed or conducted via phone triage or telehealth.(48, 49) Nearly all follow-up visits could fall under this guidance. Use of telehealth, e-visits, or digital photography can be of use to help visualize any rash, which can reduce the need for face-to-face visits. For patients with known hereditary angioedema who develop an acute episode, triage to region-specific urgent or emergency care facilities is appropriate. If it is possible to obtain on-demand therapy for home administration, this would also be recommended.

#### *Immunodeficiency*

**For immunodeficiency specific recommendations on service reduction, please see [text box 5](#).** Immunodeficiency is one of the few potential areas of service where exceptions may have to be made to continue to provide routine face-to-face services. These patients may be at higher



baseline increased risk from COVID-19 complications, community-acquired, and nosocomial infections; however, the degree of this risk is still a matter of speculation.(50, 51) As is the rational with other conditions, telehealth should be encouraged and certain care can be postponed, but face-to-face care may be necessary for more severe illness. Many of the de-prioritizations of other routine care is to preserve unfettered access to care for patients with higher acuity conditions.

### **Shared Decision-Making**

Shared decision-making (SDM) is a patient-centered process whereby the patient and their clinician have a discussion regarding care or treatment options, in which patient values and preferences are considered in the context of the medical decision-making process to determine the best management option (52, 53). Please see [e-supplement 3](#) for additional information on shared decision-making during the pandemic.

### **Communication with Patients**

The vast majority of patients utilize the internet and social media to find health related information.(54, 55) Please see [e-supplement 4](#) for additional information on communicating with patients during the pandemic.

### **Practice Implications**

With the declaration of reduction of on non-essential medical services, physicians in private small or solo-practices may have significant concerns about practice sustainability in times of uncertainty. Please see [e-supplement 5](#) for practice implications of COVID-19 reduction in services.

### **Conclusions**

The new decade has begun with unprecedented challenges. While we each hope the COVID-19 pandemic will be contained and mitigated as soon as possible, we all have personal roles and professional duties to our patients and our larger society. A pandemic response during a global emergency is a highly unusual and atypical circumstance from business as usual. The framework described herein represents a course of action in a highly specific and temporary situation, necessary only in a most extreme and improbable circumstance, where there is a state of emergency and a pandemic risk that outweighs the risk of deferral of an office visit for conditions within the spectrum of allergic/immunologic disorders.

Please keep in mind that these are suggestions that must be conditioned on individual “on the ground” circumstances. They are not mandates or forced actions. The decision to enact any of these measures rests with the judgement of each clinician and individual health system. These suggestions are intended to help provide a logical approach to quickly adjust service to mitigate risk to both medical staff and patients during the ongoing pandemic while social distancing being encouraged. Importantly, individual community circumstances may be unique and require contextual consideration. The expert panel acknowledges that taking actions to limit face-to-face

access may have financial implications in terms of lost revenue, fixed operating costs, and unclear reimbursement for telehealth and that advocacy on the part of professional organizations may be both appropriate and necessary to leverage some share of federal resources during this pandemic.(8) However, the broader financial implications and economic impacts of the COVID-19 pandemic are beyond the scope of this document.

While SARS-CoV-2 presents the allergy/immunology community with a challenge on an unprecedented scale, it is not the first coronavirus we have encountered in the last few decades.(56, 57) It is likely that this will not be the last pandemic we encounter and strategies which may be proven effective for COVID-19 may inform our future approach in unexpected disasters we hope will never come to pass. Still, as we meet this challenge with compassion, humility, and common sense, it will again be evident that an ounce of prevention is worth a pound of cure – in our clinic, community, nation, and world. If nothing else, we can fall back on the old adage “remember your training”. We are some of the most highly trained and adept medical specialists in the world. We can and will persevere through any challenge that the specialty faces.

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## **Text Box 1: Service Adjustment for Asthma**

The following hierarchy of service adjustments could be considered:

- 1) Do not “step down” any daily controller medicine on any patient during the COVID-19 pandemic, unless this is clearly favorable from an individualized standpoint, with careful consideration of the balance between benefit and harm/burden, and the patient has had the opportunity to participate in the medical decision-making process. Consider use of virtual care resources.
- 2) Consider prioritizing the care of high-risk patients, as defined by the CDC/WHO in the particular epidemic, over other groups. COVID-19 infection, from the currently available information, appears to have a milder course and less aggressive attack rate in children, including children with asthma.
- 3) For patients with asthma of any severity who are exhibiting worsening control or an acute exacerbation, follow COVID-19 screening protocols to determine their risks of COVID-19 infection and need for COVID-19 testing at a designated facility. (Figure 3) If their exacerbation is mild and can be managed by virtual care, this is encouraged. If the exacerbation is more than mild, COVID-19 risk must be considered in determining if a face-to-face visit is necessary, and at what location (office vs. ED with negative pressure rooms available if the patient will be undergoing an aerosol generating procedure) is most appropriate. (2) If the allergy/immunology office does not have PPE available, it would be recommended that no patients with a co-potential for an asthma exacerbation and COVID-19 be seen at that office, the patient should instead be seen at another facility capable of COVID-19 isolation which is staffed and equipped to assess and manage asthma.
- 4) Postpone face-to-face routine follow-up visits with any patients with mild-moderate or well-controlled asthma. Consider virtual care options for these patients, including telehealth, to ensure that there is continuity of care.
- 5) Postpone all face-to-face visits for patients with asthma any severity who have been well-controlled in the past 6-12 months, including no record of emergency department (ED) visits, who have had  $\leq 1$  oral steroid bursts or hospitalizations in the immediate 6 months, or  $\leq 2$  exacerbations in the past year. Use virtual care options to make sure they have an adequate supply of asthma medications, and to dispense care if entering into a time of year where the patient typically struggles with control.
- 6) Prioritize virtual care to assess patients with asthma of any severity who have required ED care or been hospitalized for an exacerbation within the past 3-6 months, have received 2 or more oral steroid courses in the past 3-6 months, or have required 1 or more dose escalations/additions of any daily controller medication in the past 3-6 months.
- 7) Suspend screening of any patient for entry into asthma clinical trials.
- 8) For patients currently in a research protocol, follow directions of the sponsor, and consider utilizing virtual care resources as permitted.

## **Text Box 2: Service Adjustment for Immunotherapy and Biologics**

The following hierarchy of service adjustments could be considered:

- 1) For patients with allergic rhinitis, immunotherapy should *not* be initiated, unless there are unusual circumstances, such as a patient with unavoidable exposure to a trigger that has resulted in anaphylaxis or asthma-related hospitalization, where no other alternative is feasible for the short-to-intermediate term.
- 2) While home allergen immunotherapy may be considered within a paradigm of shared decision-making in highly exceptional circumstances, it does represent a departure from general standards of care. However, for patients receiving venom immunotherapy who are clearly informed of risk and benefits and have completed a process of informed consent, have not experienced a prior systemic reaction, do not have comorbidities or medication use that would make anaphylaxis more severe/difficult to treat, are appropriately educated on the process of appropriate storage, handling and administration of allergen immunotherapy, and have self-injectable epinephrine at home, home administration could be a consideration during the pandemic.(47)
- 3) For patients currently receiving inhalant allergen immunotherapy for allergic rhinitis, consider schedule modification (e.g., widening the interval between injections to every 2 weeks for buildup and every 6 weeks for maintenance), or suspending treatment until the pandemic measures have been lifted, with the exception of patients with unavoidable exposure to a trigger that has resulted in anaphylaxis, or hospitalization for asthma-related consequences where no other alternative is feasible for the short-to-intermediate term.
- 4) There should be no change in service for initiation or build-up venom immunotherapy (VIT) of patients with a history of a systemic reaction to venom, as this is a life-threatening condition, and this is an essential service. Patients on maintenance VIT can be spaced to every 2-3 months, if they have been on maintenance for at least a year.(58, 59)
- 5) No VIT should be initiated or continued for patients with either large local reactions or a history of an isolated cutaneous systemic reaction.(58, 59)
- 6) Initiation of biologics should be done at home with visiting healthcare services. If this is not available or possible, then in-office initiation can occur, preferably with a maximum of 1-2 visits and then transition to home administration in the overwhelming majority of cases, unless there are unusual circumstances or if this is not feasible.(60) Although omalizumab has been approved in Europe for home administration after uneventful administration of 4 doses in clinic, currently home administration of omalizumab in the US prior would represent a departure from usual care and as such risks and benefits should be clearly discussed and informed consent documented.(44, 45)
- 7) For patients on maintenance dose of biologics, consider converting the patient to a pre-filled syringe for potential home administration if this is available (home administration was recently shown to be safe and cost-effective for anti-IL-5 and anti-IgE therapy(60)), versus the risk/benefit of missing one or several doses. However, some patients may need to be seen face-to-face for biologic administration, which underscores the need for resource prioritization as outlined above.



### **Text Box 3: Service Adjustment for Food Allergy, Eosinophilic Esophagitis (EoE), Drug Allergy, and Anaphylaxis**

The following hierarchy of service adjustments could be considered:

- 1) Reschedule all food/drug challenges except for the following scenarios:
  - a) Milk, soy, or hydrolysate formula introduction in an infant where there is a critical nutritional need for this to be introduced to provide a caloric source, and there is a history prompting safety concern where this could not be introduced at home. Examples may include a milk or soy FPIES or EoE cases or where either formula is being considered as the alternative source and there is strong parental preference to not change to elemental formula; concern for hydrolysate tolerance in a milk allergic infant; or cases where there is highly suspected milk/soy allergy misdiagnosis that is resulting in such formula being withheld and there is an urgency for directly supervised re-introduction. Elemental formulas could also be empirically considered.
  - b) Other critical essential grain/nutrient in an infant that has either been unnecessarily withheld due to misdiagnosis and there is an urgency for directly supervised re-introduction secondary to nutritional concern.
  - c) Introduction of a common essential nutrient/food in a non-infant with widespread avoidance and there is an urgency for directly supervised re-introduction, such as a G-tube fed child where a change from an elemental to other nutrient based food is necessary due to nutritional concern.
  - d) Critical concern that peanut has been withheld unnecessarily in a high-risk infant for the purposes of early introduction and supervised introduction is needed due to previously identified peanut sensitization.
  - e) Drug allergy patient where there is an urgent or critical need for drug allergy de-labeling, challenge, or desensitization.
  - f) Vaccine challenge in any immunocompromised individual.
  - g) This would imply that until pandemic response measures are removed, that the following challenges are considered elective and be deferred (or in in some instances considered for telehealth):
    - All baked milk or egg challenges.
    - Elective early allergen introduction in any non-high-risk infant (consider telehealth).
    - Introduction of peanut, tree nut or seed where the child is sensitized to one of more of these items, but has not ever ingested these previously, and testing was motivated by known/suspected allergy to another tree nut or seed and the item was previously withheld or not introduced. This infers that any challenges to confirm tolerance for cross-reactivity will be deferred in the interim.
    - Reintroduction of non-critical nutrients in children tested for food allergy secondary to eczema, where the food has been avoided for more than 2 years, starting in infancy (consider telehealth).
    - Reintroduction of foods being avoided for EoE (consider telehealth).
    - Routine reintroduction to establish tolerance for outgrown IgE mediated food allergy or FPIES.

- Evaluation of children referred with food sensitization drawn as a panel and/or in the absence of a specific history suggesting symptomatic ingestion, including testing done for the evaluation of atopic dermatitis (consider telehealth).
  - Non-emergent drug challenges for the purposes of de-labeling where there is no immediate plan for administration in the next 30 days.
  - Vaccine challenges in any immunocompetent individual.
- 2) We recommend suspending the routine advice on allergy action plans to seek emergency care/call 911 after epinephrine use, unless symptoms do not immediately resolve without recurrence after a single dose of epinephrine.(61)
  - 3) The following should be strongly considered with regards to routine allergy visits:
    - a) Postpone any return visits where the patient has been seen within the previous 12-18 months and there has been no interim history of reaction or suspicion of new food allergy (consider telehealth).
    - b) Postpone any new patient visit not involving suspected IgE mediated allergy to the common 8 foods plus seed or FPIES, any EoE visits for the purposes of dietary elimination testing (could defer to GI guidance about the need for new or routine endoscopic evaluation of possible EoE, but suggest that this be postponed; consider telehealth).
    - c) Postpone any face-to-face new or return patient visit for suspected allergic proctocolitis (consider telehealth).
    - d) Postpone any new or return drug/vaccine reaction visits or evaluations where re-administration is not anticipated in the next 6 months (consider telehealth).
    - e) Postpone any second opinion or transfer of care where the patient has or has had another allergist, or visits from out of region patients (consider telehealth).
    - f) Postpone new onset, non-recurrent idiopathic anaphylaxis evaluations (consider telehealth). Recurrent idiopathic anaphylaxis should be prioritized to telehealth or face-to-face evaluation.
  - 4) Defer initiation and up dosing of any food immunotherapy treatment. All patients should be held at their current dose until normal services resume.
  - 5) Defer new and follow-up evaluations for food allergy, anaphylaxis, or EoE study visits, and discontinuation of all interim research visits (consider telehealth).

#### **Text Box 4: Service Adjustment for Allergic Skin Disorders**

The following hierarchy of service adjustments could be considered:

- 1) New patient visits for particularly severe cases or suspected angioedema, in particular events with pharyngeal/laryngeal, abdominal, or genital involvement can be prioritized for face-to-face visits or telehealth. Such patients may need laboratory work-up for hereditary angioedema. Much of the visit could be conducted via virtual care, with orders placed for phlebotomy as appropriate (and available).
- 2) For patients with established hereditary angioedema under good control without any remarkable episodes in the past 6 months, it would be in their best health care interest to be managed by virtual care.
- 3) Visits for new onset of lesser severity of angioedema can be postponed (consider telehealth).
- 4) Visits for new evaluation of chronic urticaria can be postponed, with referring physicians given instructions to start the patient on QD-BID dosing of potent non-sedating antihistamines (e.g., cetirizine, fexofenadine, or loratadine), according to best evidence, pending resolution of the COVID-19 pandemic.(48) Evidence suggests that laboratory testing can be postponed or deferred in most patients with chronic spontaneous urticaria.(62, 63) Patients with refractory urticaria could be considered for telehealth or a face-to-face visit to recommend further evaluation and management including initiation of omalizumab in properly selected patients.(49)
- 5) Face-to-face visits for ongoing evaluation of established chronic urticaria can be deferred, in particular if this condition has been well controlled in the past 6 months, and issues or medication adjustments handled through phone triage or telehealth.
- 6) For new evaluation of atopic dermatitis, severity of the illness as assessed by the referring physician should be strongly considered. Visits for mild atopic dermatitis evaluation may be deferred and the patient managed with topical corticosteroids under the direction of the referring provider. A recommendation to escalate potency within a certain range of topical corticosteroids can be provided. For moderate atopic dermatitis, consider telehealth evaluation. For severe disease, in particular in an infant, or in a patient with extensive body surface area involvement and a history of superinfection, face-to-face visits may be necessary and should receive priority over any other patient with atopic dermatitis. For return patient visits for atopic dermatitis, the same general principles apply, with extended consideration for the use of telehealth in the more severe patients who have demonstrated improvement in lieu of face-to-face visits.
- 7) In the context of atopic dermatitis without a history of acute food reaction, food allergy screening should be deferred. No skin or serologic allergy testing evaluation without a discernable, probable food trigger is advised given this is low yield, and represents a poor prioritization of services.(64-68)
- 8) Initiation of biologic therapy for atopic dermatitis should be weighed very carefully, but remains a viable option as this is administered at home, and requires limited face-to-face supervision. This can be managed via visiting nurse services or via phone triage.

## **Text Box 5: Service Adjustment for Immunodeficiency**

The following hierarchy of service adjustments could be considered:

- 1) Patients with a known exposure, as well as acutely ill patients with primary immunodeficiency with or without a history of a known exposure must be investigated for SARS-CoV-2. It is particularly important for patients known to have T cell immunodeficiency, athymia, or SCID, to seek medical care immediately upon presentation of symptoms (fever, cough)
- 2) Monitoring for infections other than SARS-CoV-2 is required. Immunodeficiency patients may have a myriad of infections other than SARS-CoV-2 (such as liver abscesses, osteomyelitis, meningitis, bacteremia, PJP, and all of these would require face-to-face evaluation if suspected). Patients with bronchiectasis in particular may need close monitoring, given infectious issues at baseline related to this which may place such individuals at risk. Patients with central lines and/or neutropenia will still require blood cultures and antibiotics if they become ill (depending on their clinical scenario).
- 3) New cases of suspected SCID or other T-cell deficiencies should continue to be seen and assessed as would occur under normal service operations. Such patients should be brought back to a clean room immediately upon arrival to the clinic/office. It may be reasonable to initially evaluate consultations for abnormalities on newborn screening by telehealth.
- 4) Radiographic service access may be needed to help distinguish between COVID-19 and what could be a lobar or otherwise complicated pneumonia (bacterial).
- 5) If a patient has not already transitioned immunoglobulin replacement therapy to home services (IV/SC), they will still need to come into their infusion centers. Plans must be made to ensure that home immunoglobulin replacement services continue, as this is an urgent therapy. It is unlikely any current immunoglobulin supply has SARS-CoV-2 antibody protection or is contaminated with the virus. Given that this is a donor-dependent therapy, this could affect future supplies. Patient may wish to consider transitioning to home immunoglobulin replacement (IV/SC).
- 6) Autoimmune phenomena must be tended to promptly. Concern for autoimmune cytopenias or enteropathy need prompt evaluation, treatment, and monitoring.
- 7) For those patients receiving various immunosuppressive agents that require therapeutic drug level monitoring phlebotomy services must be accessible to monitor for toxicities. This is critical for autoimmune and transplant (BMT/solid organ) patients.
- 8) Patients who are also being treated for malignancy should continue receiving chemotherapy.
- 9) Telehealth should be considered for routine/annual follow-up, and in many cases it may be reasonable to defer routine monitoring labs, imaging, and PFTs for several months.
- 10) Telehealth may be considered for acute visits for possible infections that are low acuity, (i.e., otitis media, sinusitis, superficial skin infections).
- 11) Telehealth may be considered for initial consultations of patients referred for possible immunodeficiency; however, in some circumstances face-to-face evaluations and access to ancillary laboratory services may be needed.
- 12) Clinicians should review routine self-care exam measures with patients, such as palpation of lymph nodes, joints, and cavities that in some conditions may be prone to abscess

development, and recommend a frequency to patients within which these should be performed.

### **Text Box e1. Personal Protective Measures Against Pandemic Infection(2)**

- Hand washing with soap and water for at least 20 seconds
- Use of an alcohol-based hand sanitizer that contains at least 60% alcohol if soap and water are not available
- Use tissues to cover coughs and sneezes then discard in the trash, and cough/sneeze into the crook of your elbow
- Clean / disinfect frequently touched objects and surfaces
- If you are sick, stay home
- Consider social distancing (the CDC defines this as remaining out of congregate settings, avoiding mass gatherings, and maintaining distance (approximately 6 feet or 2 meters) from others when possible) and reduction of non-household contacts to a minimum (e.g., no hand shaking, kissing, or other cordial contact)

## **Text Box e2: COVID-19 FAQ's**

### **What is COVID-19?**

COVID-19 is a new form of coronavirus first identified in December 2019. Coronaviruses in general are not new and are a common cause of colds and upper respiratory infections. We don't yet know why this new form, COVID-19, is more severe.

### **How is COVID-19 spread?**

COVID-19 is thought to spread mainly person-to-person, through respiratory droplets in coughs or sneezes. It can live on surfaces as well through these droplets.

### **What is the time period when COVID-19 can spread?**

Unfortunately, people can spread infection to others before symptoms first appear. It can then be spread for up to 14 days after symptom onset (possibly longer).

### **What are the symptoms of COVID-19?**

The majority of people experience mild illness but severe illness and death can occur. Fever, cough and shortness of breath are the most common symptoms.

### **How is COVID-19 treated?**

There are no current vaccines, or anti-viral treatments to use when someone is acutely infected. Treatment relies on supportive care to treat symptoms when they occur.

### **When should I seek emergency care?**

Seek immediate medical attention if you have difficulty breathing, persistent chest pain or pressure, sudden confusion or inability to stay awake. These are not the only reasons someone may need emergency care – call your doctor for other concerns. Call any emergency department or medical provider BEFORE arrival to allow them to put precautions in place.

### **Can I get tested for COVID-19 at your office?**

The indications for testing as well as availability for testing are constantly changing. Please refer to our website for current information or call our office with any questions.

### **When should I cancel my regularly scheduled allergy appointment?**

Some non-urgent visits will likely be cancelled for you. If your visit hasn't been canceled, please call to discuss any specific concerns prior to arrival, especially if you have had recent travel to high risk countries or contact with anyone with known/suspected COVID-19. Also call before arrival if you have had fever/cough in the past two weeks.

### **Is it safe to come to your office?**

We are taking all recommended precautions to prevent spread of COVID-19, including reassessing what care must be done in a face-to-face manner, screening all patients and accompanying family members, regularly disinfecting exam rooms and public areas, and staying up to date with current recommendations from the local Department of Public Health.

### **I'm getting allergy shots – what should I do?**

Please refer to our website for up-to-date information. We may need to change the way we administer allergy shots and will notify patients as soon as possible of any changes. Unless you hear differently, please continue your current schedule. However, for some patients, this may be held for the time being, and doses missed.

### **Will your office be closing?**

We may need to adjust the number of appointments or types of visits depending upon future spread of COVID-19. Please refer to our website for the most up to date information.

### **What if I have asthma? How will COVID-19 affect me?**

We don't have a lot of information regarding risk of asthma exacerbation with COVID-19. For now, we recommend continuing all currently prescribed daily asthma medications, calling our office if you have had frequent symptoms or needed your rescue inhaler more often, and starting your asthma treatment plan as soon as possible if symptoms occur.

**Are steroids harmful if someone has COVID-19?**

It does not appear that inhaled steroids or short courses of oral steroids are harmful for treatment of asthma. Risk of stopping regular use of inhaled steroids include a loss of asthma control and possible need for treatment with oral steroids. Please do not stop any medications without discussing with your doctor.

**I have an immune deficiency – what precautions should I take?**

Please contact your doctor directly to discuss any necessary precautions. There are a wide range of immune deficiencies that may have different risk. All general precautions should be followed as outlined above.



## e-supplement 1

### BIOLOGY, EPIDEMIOLOGY, CLINICAL PRESENTATION, AND MANAGEMENT

The biology of SARS-CoV-2 is of interest as it uses densely glycosylated spike (S) protein to enter host cells and bind to the angiotensin-converting enzyme 2 (ACE2) receptor (expressed in type II alveolar cells), similar to the 2003 coronavirus that caused severe acute respiratory syndrome (SARS-CoV). Preliminary data suggests the coronavirus may have originated in bats and undergone recombination in the pangolin (a scaly anteater), an endangered and commonly trafficked mammal.(1) But in contrast to epidemic 2003 SARS which spread to more than two dozen countries before it was contained, global spread has been more dramatic with SARS-Cov-2. During November 2002 – July 2003, a total of 8,090 probable SARS cases were reported to the WHO with only 8 US cases having laboratory evidence of SARS-CoV.(1, 56) Similarly, while the Middle East Respiratory Syndrome (MERS) coronavirus (MERS-CoV) first reported in Saudi Arabia in 2012 was associated with a high mortality rate, only 2 cases in the United States ever tested positive.(57) However, SARS-CoV-2 has proven more infectious and elusive than its cousins SARS-CoV-1 and MERS-CoV, with 2,952 COVID-19 cases and 57 deaths occurring in in the United States alone, as of March 15, 2020. In Canada, there were 250 confirmed cases and 1 death as of March 15, 2020.(2) As of this date there have been 156,400 confirmed COVID-19 cases with 5,833 deaths worldwide, though variations in testing availability may suggest this is a potential underestimation of the true caseload. On a positive note, however, there are currently 73,968 total recovered cases reported worldwide as of March 15, 2020.(37) These numbers are expected to rise.

While the incubation period of SARS-CoV-2 was initially reported at 1 to 14 days with a median of 5 to 6 days, it may be as long as 24 days.(1, 5) The virus is spread by large droplets, but also possibly stool and blood.(1) Of note, healthcare transmission is high, with one study indicating 41% of 138 cases to be presumptively healthcare acquired.(39) Clinical presentation involves fever (77%-98% of patients), dry cough (46%-82% of patients), shortness of breath (3-31%), and fatigue or myalgia (11%-52%). Symptoms may also include headache, sore throat, abdominal pain, and diarrhea.(1, 2) Laboratory features include lymphopenia (70%) and eosinopenia (52.9%), and imaging often reveals bilateral patchy infiltrates on chest x-ray and ground-glass opacities on chest CT.(1, 31) **Certain upper respiratory symptoms overlap with allergic rhinitis and influenza in the early stages, which only later progresses to more clearly defined COVID-19 symptoms, a point that the practicing allergist/immunologist should keep in mind.**

The overall case fatality rate (CFR) has been estimated around 2.3%, but is highly variable and may be as high as 8 to 15% in higher risk populations.(1, 6) For example, in a recent report of 72,314 COVID-19 cases in China, no deaths occurred in children younger than 9 years of age, but the CFR for patients 70 to 79 years was 8.0%. The age-adjusted CFR was highest in patients 80 years and older (14.8%). In patients with critical illnesses the CFR was 49.0%. Pre-existing conditions also increase risk, with a CFR of 10.5% for cardiovascular disease, 7.3% for diabetes, 6.3% for chronic respiratory disease, 6.0% for hypertension, and 5.6% for cancer.(6) Data from Korea are similar.(12) Healthcare workers are not immune, as 3.8% of cases occurred in healthcare workers. However, of 1,716 COVID-19 infections in healthcare workers, though 14.8% were classified as severe, only 5 deaths were reported (CFR 0.3%). There is some

speculation that insufficient access to testing and intensive care services (secondary to equipment and space shortages) may contribute to some of the fatality rate variation. Again, it should be emphasized that data reporting and event rates are very fluid and rapidly changing.

There have been limitations to timely and accurate testing for COVID-19 at the onset of this pandemic. It is important to note that as access to accurate and timely testing becomes more widely available, a larger number of patients will be identified, including those with mild and asymptomatic disease, thereby potentially causing the calculated CFR to fall. Prior to and initially after the declaration of a pandemic, barriers included recommendations by the World Health Organization (WHO) and national and regional public health agencies to limit testing based on a combination of travel and exposure history together with symptoms, though these recommendations have markedly evolved to become sufficiently inclusive as the pandemic spread has become more rapid. Additionally, current testing requires a laborious and time-consuming process available only in specialized laboratories, utilizing multiple steps and with limitations that inherently slow the process and increase the risk for errors. Access to rapidly deployed field test kit available at the point-of-care, currently in development, will significantly improve public health efforts to contain the virus and limit its spread.

Management of COVID-19 is currently limited primarily to supportive care. Antiviral agents with effectiveness against SARS-CoV-2 are not yet known, though the nucleoside prodrug remdesivir is under investigation, in addition to other agents including lopinavir, ritonavir, and favilavir, and both chloroquine and hydroxychloroquine.(1)

## e-supplement 2

### **Telehealth – Expanding Services During the Pandemic**

Telehealth can be central in delivering allergy services within a risk stratified context of the SARS-CoV-2 pandemic. The ability to integrate telecommunications, information systems, and patient care has been in place for over four decades and has been gaining traction across medical specialties, even before the emergence of COVID-19.(10, 11) Both the American Academy of Allergy, Asthma, and Immunology (AAAAI) American College of Allergy, and the Asthma, and Immunology (ACAAI) have been strong advocates to advance telehealth to allow allergy/immunology services to expand and most directly serve patients where they are needed.(10, 16) An excellent example of telehealth in practice is its use in penicillin allergy de-labeling.(17, 18). Telehealth services has also been shown to be a viable alternative option to face-to-face visits for the management of patients with a variety of conditions in the spectrum of allergic/immunologic disorders, including asthma.(22)

Providers who wish to limit their exposure to infected patients may choose to see patients from their home. To do this, patients would go to the allergist's office where they could be seen by the allergist using facilitated telehealth. This type of facilitated visit should be done using 2-way video using a HIPAA-compliant platform. (25) To perform a physical exam, which is only required for an initial visit, digital exam equipment including a stethoscope and hi-resolution camera with an otoscope adaptor would be required. (26) Established patients do not require a physical exam unless medically necessary, so if the practice were limited to such patients, it is not necessary to acquire digital exam equipment. With appropriate training, a nurse in the allergist's office could serve as the tele-facilitator. If other providers are present in the office during the visit, procedures such as skin testing could be performed. This type of visit limits the provider's exposure to infectious diseases; however, it does not reduce the patient's exposure.

To reduce patient exposure, established patients could be seen from their home. (27) This can be done if the visit is performed either with a 2-way video connection or by telephone. Since 2018, Medicare has paid for virtual visits with patients who have an established relationship with a physician provided that the communication is 1) not related to a medical visit within the previous 7 days and 2) does not lead to a medical visit within the next 24 hours. (28) One requirement is that the patient must verbally consent to virtual check-ins in advance and the consent must be documented in the medical record prior to the patient using the service. Billing for these virtual check-ins is specific to the technology used such as telephone (HCPCS code G2012 or CPT codes 99441-99433) or by video (HCPCS code G2010). Another option is to charge patients a flat fee for service (typically \$49.95 for general services and \$79.95 for specialty services) to use direct to consumer telehealth from their home. This avoids the need to meet requirements set out in the CPT codes but is not reimbursable by health plans.

Medicare also pays for patients to communicate with their doctors without going to the doctor's office using online patient portals. These types of individual communications, like the virtual check ins, must be initiated by the patient; however, practitioners may educate beneficiaries on the availability of this kind of service prior to patient initiation. The communications can occur over a 7-day period. The services may be billed using CPT codes 99421-99423 and HCPCS codes G2061-G206, as applicable.

One advantage of setting up a telehealth service during COVID-19 is that it can establish the infrastructure for an ongoing telehealth service after the current situation is over. telehealth has been shown to be effective for managing patients with chronic conditions (29) and it is as effective for managing asthma as in-person visits. (22) While there is nothing good about a pandemic with COVID-19, it can be seen as an opportunity to introduce telehealth into an allergy practice.

In the setting of a US national emergency, US Congressional and Executive Branch actions are expected expand telehealth services provided by healthcare providers during the emergency.(19) Specifically it is expected that the US Department of Health and Human Services (HHS) will waive or modify telehealth Medicare requirements, which in practice could greatly expand telehealth services by allowing practice across state lines via relaxing the originating site requirement. Additional expansions are planned to allow provision of a follow-up visit by phone with audio-visual interaction, such as through an iPhone or android platform. This expanded telehealth coding may be limited to established patients and still require necessary documentation to support the evaluation and management (E/M) code along with a telehealth place of service (POS) code, and a potential modifier if required by a commercial payer.(19, 20) Specific details of expected changes are evolving.

## **e-supplement 3**

### **Shared Decision-Making**

Shared decision-making is a preferred alternative to physician-informed, physician-directed paternalistic decision-making. This is a valued approach where there are preference-sensitive care options, defined as conditions with multiple treatment options having significant tradeoffs and varying potential outcomes, with decisions reflective of personal values and preferences.(69)

The emergence of the COVID-19 pandemic creates unique challenges to SDM, because societal interests may play a larger role in the doctor-patient interaction than in a non-pandemic setting. Infection control becomes critical to patients and clinicians alike, but face-to-face visits will have larger implications beyond the clinic that may not be appreciated in the moment. However, SDM can direct decision-making and choices to seek face-to-face vs telehealth encounters, particularly prior to escalation to a “red zone” threat level (Figure 2). However, even in a “red zone” threat level SDM will likely continue to play a role, although this will be significantly limited– for example in decisions whether or not to postpone a course of aeroallergen immunotherapy or simply mark the course completed after three years of therapy. However, it must be acknowledged that in the setting of a pandemic national emergency, when faced with restrictions on ambulatory services, the clinician and patient will each have more limited access to resources that would be more available in non-emergent settings, and some decisions will be made on their behalf. What may be more challenging than limiting healthcare access in non-urgent situations is directing a patient with conditional health risk which exceeds the risk of contracting COVID-19 to break social distancing and seek face-to-face care. Here, the clinician must take the time clearly explain facts and the options, along with their outcomes.

## **e-supplement 4**

### **Communication with Patients**

The current COVID-19 pandemic has served to illuminate the best and worst impacts of living in our digital age. Information regarding this pandemic is being updated continuously across all platforms, including misinformation, incomplete information taken out of context, pseudoscientific promises of miracle ‘cures’, and proliferation of anecdotal reports. During such times, patients need sources of information that they can trust. Allergists/immunologists should respond to this need by extending the long-standing trust developed through years of face-to-face encounters to online resources.

There are three main areas where allergists/immunologists should provide information and communication with their patients online: general updates, office specific changes to normal practice, and social media. Allergists/immunologists should discuss the need to rapidly update their existing website and social media channels with the personnel involved in day-to-day operations of these resources. Discussion topics should include current capabilities for updating information, decisions regarding the creation of new content and curation of existing content, and strategy regarding topics to address. Mailing letters to patients may be the preferred method of communication for some, but this does not allow for dissemination of rapidly changing updates and critical information.

Allergists/immunologists should post information on their website and social media channels regarding frequently asked questions surrounding COVID-19, see text box e2 for an example template to consider. It is imperative that this messaging echoes the recommendations of vetted public health authorities such as the CDC or WHO. Patients will need to understand infection transmission (including incubation period for exposure and acute illness), symptoms, risk for specific populations, and why public health measures such as social distancing are important. Practices can either link to readily available resources on the CDC website or create their own content through infographics, blog posts, or new content on their website.

Allergists/immunologists have a responsibility to offer evidence-based information and where evidence is lacking, use vetted resources to support opinions or discuss areas lacking in current understanding. However, it is of the utmost importance for each clinician to remember our clinical “lane” with respect to what we do and do not care for, so that we limit potential misinformation or information that may conflict with that of another clinician who is more responsible for particular care for that individual.

In addition to posting general information regarding COVID-19, allergists/immunologists should use online resources to provide information surrounding any changes to their practice setting. If done properly, this can serve as a portal for sharing timely information to large numbers of patients and reduce burden on practice resources, such as telephone calls. Information should be regularly updated and include current restrictions in regard to screening questions and emphasize that all patients should call prior to arrival if they have had travel to any countries currently listed as high risk or contact with someone who has known or suspected COVID-19 infection in the last 14 days, as well as fever > 100.4 F and/or acute cough. As discussed above, patients with allergic rhinitis and/or asthma who have acute symptoms may overlap significantly with those who have COVID-19. As such, allergists/immunologists should consider posting information on

their website or social media channels regarding important differences between these conditions, as well as indications for COVID-19 testing. In addition, as new protocols are implemented regarding telehealth visits, changes to immunotherapy appointments or schedules, or contact precautions, this information should be updated as rapidly as possible online.

Lastly, allergists/immunologists need to understand the influence that social media has on medical decision-making.<sup>(55)</sup> Even if medical professionals are not actively using social media, they need to identify key areas of misinformation to develop anticipatory guidance during individual encounters and when posting online. Current examples include misinformation surrounding risk of corticosteroids in patients with asthma, risk of infection/severe exacerbation among individuals with asthma, and promotion of non-evidence based remedies or preventative treatments such as homeopathy, supplements, vitamins, and alternative/complementary medicine. Allergists/immunologists who already utilize social media as medical professionals should adopt a similar approach as outlined above regarding dissemination of best practice guidelines and public health measures. Specific issues pertaining to patient privacy, social media policies, and personal accounts need to be reviewed with ALL staff working in medical offices. It is imperative that no member of any medical practice post information to their personal social media accounts regarding use of isolation/PPE in the office, patients who were tested or positive for COVID-19, or any members of the staff tested or positive for COVID-19. Such posts have high potential to induce panic among patients and their family members who may have visited the office recently or been in contact with those individuals.

## **e-supplement 5**

### **Practice Implications**

Practice implications of COVID-19 reduction in services include: (i) imposed or voluntary 14-day physician and/or staff quarantine, (ii) practice restrictions after actual physician COVID-19 infection, (iii) financial reduction due to decline in consultation and follow-up assessments, immunotherapy visits and reduction in diagnostic testing, and (iv) resulting staff lay-offs or termination. These concerns are very real and valid and understandably there are no easy solutions to these problems. It is critical staff stay at home when ill.

In the event of isolation, whether precautionary, after exposure or after infection, all attempts should be made to ensure that ongoing patient care coverage be arranged with other clinicians. In many situations, telehealth solutions can be provided during times of quarantine.

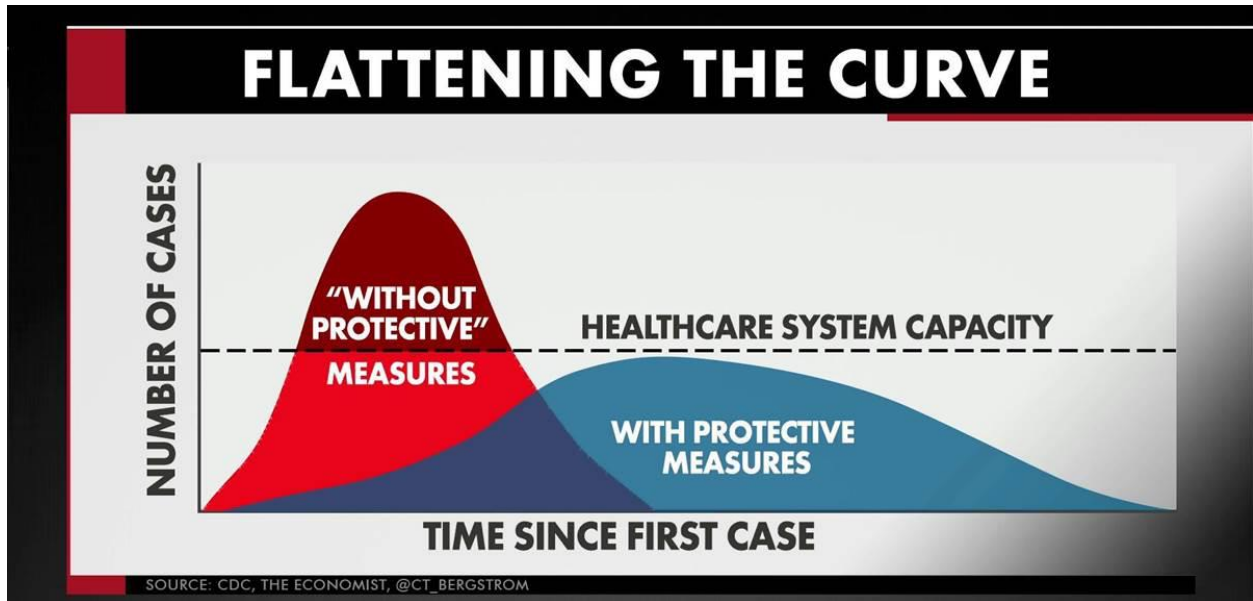
It is the hope that virtual care services will provide some compensation for medical assessments although this may vary depending on jurisdiction and may be less than typical clinical services provided by the allergist. If reduction of clinical assessments and diagnostic testing is implemented, then clinics will see a significant reduction in revenue. This reduction in income may have effects on immediate financial needs, long-term financial planning and may significantly impact those that are close to retirement or just starting practice. Difficult discussions with staff who perform these assessments and diagnostic procedures may need to occur and lay-offs may be necessary due to fiscal limitations. Early and clear communication is essential to ensure that all staff are aware of future practice implications and potential office closures and/or lay-offs. Some office insurance policies provide overhead expense coverage for scenarios that may take effect during medically-necessitated quarantine or pandemic outbreaks.

Allergists/immunologists will continue to place social responsibility and professionalism ahead of personal financial expectations when making decisions about clinic closures, diagnostic reductions and personal quarantine. At the end of the day, physicians and other health care providers must follow federal, state/provincial, and municipal regulations and imposed directions to avoid penalty/recourse

We recognize the significant implications this viral pandemic has on the both physicians and clinic staff and hope that many of these practice modifications are short-term.



Figure 1: Theoretic Model of Pandemic Caseload vs. Healthcare Infrastructure Capacity



Obtained at [https://media14.s-nbcnews.com/j/MSNBC/Components/Video/202003/n\\_hayes\\_curve\\_200309\\_1920x1080.nbcnews-fp-1200-630.jpg](https://media14.s-nbcnews.com/j/MSNBC/Components/Video/202003/n_hayes_curve_200309_1920x1080.nbcnews-fp-1200-630.jpg); Accessed March 13, 2020

Figure 2: Proposed Paradigm of Pandemic Threat Levels Affecting Normal Allergy/Immunology

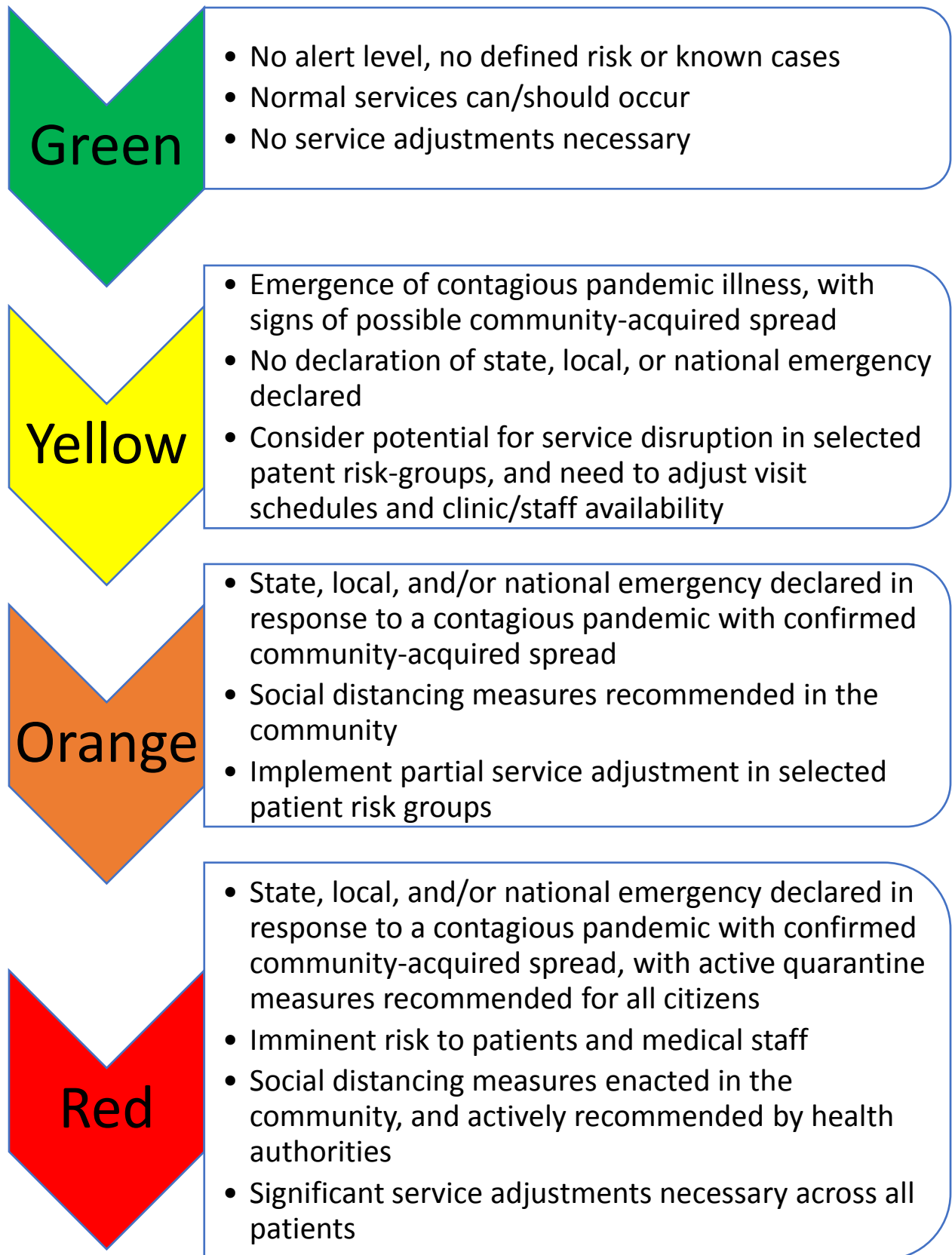


Figure 3: Triage Approach to the Patient with an Asthma Exacerbation During a Pandemic

