EDITORIAL
INFECTIOUS DISEASE

A global respiratory perspective on the COVID-19 pandemic: commentary and action proposals

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This paper offers practical and feasible actions to be implemented at patient, healthcare provider and community level to combat COVID-19 while attending, maintaining and strengthening ongoing health management in people with lung diseases https://bit.ly/30yNyhP

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Introduction

The novel coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1, 2]. The World Health Organization (WHO) declared the COVID-19 outbreak a pandemic on 11 March, 2020, demanding effective national and global mitigation measures, strong public health response and coordination. To date, the SARS-CoV-2 pandemic has affected over 5 million individuals worldwide with an overall 7.02% (median 3.41%, ranges 0.06% to 31.25%) case fatality ratio (European Center for Disease Prevention and Control dashboard: www.ecdc.europa.eu, as of 22 May, 2020) [3]. This ratio may be overstated since it is based primarily on hospitalised or notified cases.

Lung diseases affect hundreds of millions of people around the world across all ages and levels of socioeconomic status. According to the Global Burden of Diseases (GBD) Study 2017, there were 3.2 million deaths due to COPD and 495000 deaths due to asthma [4]. Furthermore, all-age prevalent cases of chronic respiratory diseases (CRDs) totalled 545 million, of which approximately 50% were due to COPD and the other 50% to asthma [5].

Despite a high burden of CRDs worldwide, CRDs (such as asthma or COPD) have not been consistently identified as a significant comorbidity for COVID-19 [6]. For example, in Wuhan, the prevalence of asthma in COVID-19 patients was merely 0.9% [7], compared to markedly higher prevalence rates of 4.5% to 9% among US COVID-19 patients [8, 9]. In the UK, about 14% of admitted COVID-19 patients had asthma [10], and the ISARIC (International Severe Acute Respiratory and Emerging Infection Consortium) also reported similar prevalence rates (16% with chronic pulmonary disease and 13% with asthma) [11]. In contrast, the US CDC reported CRDs (mainly asthma) as the second most prevalent comorbid condition in hospitalised COVID-19 patients aged 18–29 years [12].

These reported discrepancies may be attributable to the overall under-diagnosis of CRDs, some level of protection provided by atopy [13], or the use of inhaled corticosteroids [14]. It is unclear whether patients with asthma or COPD are at higher risk of developing COVID-19 and if the risk varies depending on other socioeconomic and demographic factors [12, 15]. For example, the risk of COVID-19 infection may be higher in individuals with chronic diseases and who are in low- and middle-income countries (LMICs) with a high prevalence of malaria, pulmonary tuberculosis or HIV co-infection. In many LMICs, accessibility to healthcare in general is suboptimal, and has worsened, not only through COVID-related lockdowns, but also by resource diversion/transfer to treat COVID-19 [16, 17]. Therefore, ensuring healthcare support for vulnerable populations in LMICs, such as timely access to adequate treatments for CRDs and other infectious diseases (tuberculosis, HIV and malaria), is paramount. Others have also suggested that therapies used by patients with CRDs may reduce the risk of infection or of developing symptoms leading to diagnosis [15]. Lower respiratory function, ineffective immunity and treatments that may increase their susceptibility to infection, are possible causes of their higher risk of unfavourable outcomes after a common cold, influenza or other infections [18–22]. Worsening respiratory symptoms may be a result of their underlying disease or a consequence of the superimposed infection [20]. Reports from various countries ranked CRDs among the most frequent comorbidities associated with ICU admissions, need for mechanical ventilation and deaths [15, 20, 23, 24]. A recent systematic review and meta-analysis [25] also reported a four-fold increased odds of development of severe COVID-19 associated with COPD and two-fold odds related to ongoing smoking and the development of severe COVID-19. However, today, there is still uncertainty regarding the actual magnitude of the risks of unfavourable outcomes attributable to COVID-19 in patients with CRDs.

Further research is needed to fully understand the association between underlying CRDs and COVID-19.

Action proposals

The authors of this paper are active members of the Global Alliance against chronic Respiratory Diseases (GARD, www.gard-breathefreely.org/), a WHO alliance consists of national and international organisations, medical and scientific societies, patient organisations, institutions and agencies, all working with the common goal of reducing the global burden of CRDs. GARD members are frontline healthcare providers and researchers from over 80 countries. Our shared vision is *a world where all people breathe freely* and our activities are divided into four areas: *advocacy, partnership, national plans on prevention and control and surveillance*. In this document, we summarise our hands-on experience and lessons learned according to three perspectives: 1) patient level: interactions with healthcare providers; 2) healthcare provider level: real-time experience sharing; and 3) community level: environmental impact, air pollution.

Our main focus remains on actions concerning CRDs in the context of the pandemic. Globally, many people with underdiagnosed and undertreated CRDs are at risk of complications from COVID-19. We should therefore ask: *What can we do about it?* Our reflections and experiences are still evolving with the pandemic, and we hope that they may foster deeper thoughts and considerations into how to move forward in relation to the heavy respiratory burden in times of COVID-19.

Patient level (including interactions with healthcare providers)

Using the National Health Insurance data between January 2000 and August 2003 to study the impacts of the previous severe acute respiratory syndrome (SARS) epidemic on medical service utilisation in Taiwan, Chang *et al.* [26] reported significant reductions in ambulatory care (23.9%) and inpatient care (35.2%) during the 2002–2004 SARS epidemic. This was largely attributed to the fears of SARS that generated a widespread avoidance of the healthcare system.

Preliminary reports have suggested that this may also be occurring in the COVID-19 pandemic [27]. During the pandemic, people in many cities across the world were ordered to comply with social distancing, to stay at home and work from home. Individuals with a chronic condition, such as asthma and COPD, may opt to stay home, even when their symptoms flare up, rather than to seek healthcare. In general, mid- or long-term isolation or quarantine may be associated with increased levels of depression, stress and anxiety [28], and worsened symptom control and decreased quality of life in people with asthma and COPD [29–32]. Post-SARS, chronic disease patients not affected by SARS presented with worsened disease/symptom control [26].

Today, face-to-face medical consultation is not the only option. With the wide usage of smartphones, patients and healthcare providers are able to use readily available apps with videos (*e.g.* Facetime or WhatsApp) or audio *via* phone to conduct e-consultation and to provide routine and unscheduled "virtual

TABLE 1 Proposed actions at the patient level

1) Advocacy and partnerships

- Endorse and encourage compliance with recommendations on national plans and guidelines against global pandemics that were put forward by the WHO
- Promote and implement health literacy measures to the general population, with a focus on CRDs and symptoms such as cough and breathlessness in the context of epidemics and pandemics
- Advocate and promote acceleration of research and development in novel and neglected infectious diseases, preparedness against pandemics in the context of an international network
- Advocate data collection on characteristics of COVID-19 in regard to its infectiveness and tropism to respiratory cells and risk of interstitial pneumonia and ARDS
- Partner with and support countries, healthcare professionals and researchers in investigating how differently COVID-19 affects different vulnerable populations (*e.g.* older adults *versus* children, men *versus* women, those with any underlying respiratory diseases, different comorbidities, different socioeconomic status), which may yield insights into disease pathogenesis, informing precision-health management and development of therapeutics
- Partner with and support GARD countries, healthcare professionals and researchers in studying the risk of COVID-19 among people with CRD
- Develop and implement strategies to offload the overstretched healthcare systems (overworked, overexposed healthcare and essential service workers) by supporting self-management, and reducing avoidable hospital admissions from CRD
- Enforce/ensure institutional and local plans pertaining to sufficient essential supplies (*e.g.* personal protective equipment, diagnostic and screening tests, medications) in combating an epidemic/pandemic; *i.e.* improve epidemic preparedness

2) Patient groups

- Promote strong and regular interaction with respiratory patient groups and associations for articulated actions regarding validated patient information on COVID-19 infection and CRDs
- Direct patients to reliable websites such as the WHO COVID-19 dashboard (www.who.int/emergencies/diseases/novel-coronavirus-2019) and the International Primary Care Respiratory Group (www.ipcrg.org/news/covid-19-open-source-sources-of-information) for information
- Emphasise to patients the importance of hand-washing, social and physical distancing; stay at home and maintain self-isolation if infected
- Raise awareness of the importance of good practice of disease self-management (*e.g.* asthma, COPD), healthy lifestyles (healthy eating, smoking cessation, exercise, *etc.*) to help reduce comorbidities that make individuals more susceptible to COVID-19 infection or severe progression
- Explain to patients the importance of not discontinuing their CRD medications (*e.g.* ICS), but when in doubt, contact their healthcare provider (www.who.int/emergencies/diseases/novel-coronavirus-2019)
- Promote smoking cessation (including water pipe or hookah) as not only is smoking a recognised risk factor for many chronic diseases, including COPD, hypertension, cardiovascular disease, and respiratory tract infections, it has been reported that smoking is also most likely associated with the negative progression and adverse outcomes (including ICU support, mechanical ventilation and death) of COVID-19 [50], and the sharing of a mouth piece in water pipe smoking could facilitate the transmission of COVD-19
- Underscore the importance for patients with sleep respiratory disorders to continue with continuous positive airway pressure therapy during the pandemic in order to maintain high level of immunological defences
- Support and share information on occupational risks and COVID-19 (*e.g.* healthcare workers and other essential service workers)

WHO: World Health Organization; CRD: chronic respiratory disease; COVID-19: coronavirus disease 2019; ARDS: acute respiratory distress syndrome; GARD: Global Alliance against chronic Respiratory Diseases; ICS: inhaled corticosteroid; ICU: intensive care unit.

visits" [33–35]. This may help patients reduce their anxiety and depression, empower disease self-management, and protect patients and healthcare workers during the pandemic. However, this may increase health inequity as technology use is not evenly distributed across global populations and may be particularly absent in the most at risk populations for age, cultural, education and financial reasons. COVID-19 has affected vulnerable populations disproportionately across China and the world [36]. Solid social and scientific evidence to tackle health inequity in the current COVID-19 pandemic is in urgent need.

This is a unique opportunity to promote and implement health literacy measures for the general population, with a focus on COVID-19 and CRDs. The public is anxious and eager for information. Regretfully, the information on the internet is frequently misleading, often driving one's attention away from the most important measures for prevention, early diagnosis, home isolation and identification of symptoms requiring medical care [37]. All organisations devoted to CRDs must communicate regularly with the public to deliver the key messages supported by science and endorsed by the health authorities. Communications with the use of infographics should be considered so that everyone will be able to absorb and use it. Proposed actions are outlined in table 1.

Healthcare provider level (including real-time experience sharing)

COVID-19 is a novel coronavirus disease. As such, the effectiveness of prevention measures, therapy options, variant phenotypes, morbidity and mortality risks, short- and long-term disease sequelae, mental health consequences and length of immunity remains unknown. Today, we are still questioning whether COVID-19 is just a respiratory disease, or affects other systems too, as suggested by cutaneous manifestations [38, 39], acute gastro-intestinal [40] and neurological symptoms, and cardiovascular complications in recently infected COVID-19 patients [41, 42]. Furthermore, many recovered patients continue to manifest non-respiratory symptoms and neurological morbidities which indicate the virus may have also attacked other organs such as the brain, and not just the lungs [15, 41, 43]. Further research is needed about management at home, including protection of other family members, rehabilitation, diet and the organisation of care.

Early in the epidemic, many patients were ventilated due to acute and severe respiratory failure, and many of them did not survive. The wide use of ventilation revealed a global shortage of ventilators and oxygen supply. With the shortage of medical supplies, healthcare providers started to implement other treatment

TABLE 2 Proposed actions at the healthcare provider level

1) Innovation, digital technology and e-communications
- Support and participate in new and ongoing development of COVID-19 mHealth and app technologies designed for early screening and daily management of infected patients
- Deploy mHealth and disease self-management programmes/tools, which are especially relevant when patients and families are in self-isolation
- Support and strengthen official online platforms for regional and global networks of healthcare providers sharing practical experience in dealing with COVID-19
- Support and promote a concerted effort that may lead to a shared approach in making decisions in self-management programmes targeting high-risk populations

2) Diagnosis, treatment and equipment
- Follow evidence-based scientific reports and WHO recommendations on effective and efficacious diagnostic tests and treatments for COVID-19
- Increase the production and provision of personal protective equipment to all healthcare workers in all settings in all countries
- Increase the manufacture and supply of sufficient respiratory ventilators to meet the global needs for COVID-19, across all continents and healthcare settings: acute, primary/paediatrics, community or long-term care
- Ensure coordination between primary and secondary care in terms of adequate and well-defined integrated care pathways for CRD patients, in the context of COVID-19 and other future epidemics/pandemics, with clear guidelines for referral
- Support the logistics of facility cleaning and clinical waste disposal for community services
- Establish a compensation process for those who have been infected at work by COVID-19 (work-related disease)

3) Training and research
- Promote and ensure validated and adequate training on various aspects of COVID-19 and other emergent infections and their effects on CRDs to healthcare staff, at different levels of care and locations
- Promote and support innovative, high-quality, clinical and translational research focusing on optimisation of prevention, diagnosis and treatment of COVID-19 pandemic as well as its effects on CRD patients
- Promote large collaborative, multinational epidemiological studies as well as randomised controlled trials to assess the relevance of factors such as BCG vaccination in protection against COVID-19, namely in patients with CRD
- Support creation of international networks and registries of clinical research on COVID-19 and CRDs

COVID-19: coronavirus disease 2019; WHO: World Health Organization; CRD: chronic respiratory disease.

options and some of them may not have proven useful. The use of applications such as WhatsApp, Skype, Facebook Messenger and WeChat has allowed frontline healthcare providers to communicate with each other and share their patient experiences and consult each other in real time [44]. This collegial support has shortened the distance between people and broken communication barriers. However, information overload is a risk for busy clinicians; therefore, there is a need for a strong direction from public health authorities.

During these difficult times of fighting COVID-19, healthcare professionals must be highly valued; this includes appropriate remuneration, rigorous protection and explicit reassurance that any health consequences of incidental COVID-19 will be compensated. Their confidence is built upon the support

TABLE 3 Proposed actions at the local and community level

1) Country support and preparedness

- Comply with WHO recommendations on prevention and containment of new severe epidemics
- Align all action with the motto expressed in the Helsinki statement "Health in all policies: framework for country action"
- Focus on the effective implementation of guidelines, regulations and instructions with relevant authorities
- Ensure full regional ownership of nationally coordinated actions
- Ensure adequate national coordination and integration of activities with clear overall objectives, focused goals and measures, in a prioritised way
- Ensure an updated, practical and real notion of each country's critical preparedness and readiness for preventive and response actions to COVID-19 and other, future severe pandemics, not only in terms of healthcare infrastructures, institutional capacity and skills, but also regarding other institutions and the community at large
- Adequately identify strengths and weaknesses in countries' global strategy, as well as in healthcare and community settings regarding CRDs in the context of severe pandemics, as well as limited resources that may hinder adequate approaches
- Strive to develop community capacity regarding CRDs and severe epidemics, integrated into a national strategy and policy
- Ensure adequate planning of risk communication regarding pandemics and CRDs, as well as community engagement in actions that may be both global but also tailored to the specific level of health literacy and cultural context of each population, aiming at reducing health inequalities
- Ensure all actions are inclusive of vulnerable population groups, and their needs are prioritised when appropriate
- Ensure that there is adequate accessibility to healthcare and medication for patients with CRD, during the pandemic
- Endeavour to have adequate monitoring of all actions integrated into countries' policies and strategies regarding CRD management in the context of severe pandemics
- Endeavour to have actions guided by the "One Front, Many Actions" approach, with integrated, articulated, complementary, necessarily supervised and multiple-level organised actions impacting upon management of CRDs in the context of COVID-19 and other future pandemics, not only within each country but also in collaborative efforts among different countries, as has already been initiated by CPLP (Portuguese-speaking countries), in terms of a common webpage hyperlink to country-level dedicated epidemiological statistics and other relevant information on COVID-19 (http://gard-cplp.ihmt.unl.pt/index.html)

2) Surveillance, research, environmental health and CRDs

- Follow-up (short and longer-term, clinical as well as functional) of infected patients regardless of age (infants, children, adolescents, adults and elderly) is important to monitor disease and symptom severity and treat accordingly, as well as identifying possible long-term consequences
- Use objective measures for monitoring including pulse oximetry, and where possible, spirometry, carbon monoxide diffusing capacity, impulse oscillometry, and lung clearance index
- Support surveillance (testing, screening, diagnosing, contact tracing, treating, and following-up) and reporting of COVID-19 disease burden and epidemiology by countries/regions which will help understand the differential impact attributable to geographic variations
- Access reliable dashboards (*e.g.* WHO, www.who.int/emergencies/diseases/novel-coronavirus-2019, European Center for Disease Prevention and Control www.ecdc.europa.eu, Johns Hopkins https://coronavirus.jhu.edu/map.html, GARD https://gard-breathefreely.org/covid19/) on pandemic surveillance and statistics
- Keep abreast of the pandemic locally and worldwide in order to act accordingly
- Ensure COVID-19 surveillance of vulnerable populations in low and middle income countries, particularly in areas of high prevalence of HIV, malaria and tuberculosis
- Ensure that public health surveillance is not just diverted towards COVID-19 but is also kept, together with accessibility to adequate treatments, in other infectious diseases (namely tuberculosis, HIV and malaria) and chronic respiratory diseases, particularly in low and middle income countries
- Partner with respective government agencies to enforce the ongoing fight against air pollution and climate change
- Include in pre-graduation curriculum (medical, nursing and allied health sciences): catastrophe healthcare management, as well as preparedness, with an emphasis on epidemics, pandemics and global security
- Support and provide resources for efficient and effective local surveillance systems
- Use/support continuing medical education programmes to update knowledge on new infectious disease
- Support investment in training healthcare professionals and the public in understanding risk, how tests are used, and in risk communication to avoid unnecessary alarm and/or complacency in uncertain times

WHO: World Health Organization; COVID-19: coronavirus disease 2019; CRD: chronic respiratory disease.

and crisis preparedness of their healthcare system. However, the latter varies throughout the world and warrants a higher level of collaboration in order to reduce inequalities. Proposed actions are outlined in table 2.

Community level (including environmental impact, air pollution)

Air pollution has been termed the "silent killer" by the World Health Organization as it poses a great environmental risk to health and yet often is unnoticed. Furthermore, air pollution abatement has faced multiple challenges and, with population growth and expansion of industries, many questioned whether air pollution could be ameliorated.

In February and March 2020, many cities across the world launched social distancing strategies attempting to curtail the spread of COVID-19. Cities all over the world are now observing record low levels of air pollution. For example, ambient levels of nitrogen dioxide (NO_2), one of the main traffic-related pollutants, have declined by 70% to 80% in Barcelona, 40% in London, and 50% in New York [45] and has decreased in many cities across the world [46–48]. This "short-term" reduction in air pollution is a positive aspect of the pandemic; however, if this short-term "improvement" will be associated with any significant health benefits, remains to be seen. Nonetheless, it demonstrated that abating air pollution is achievable. Communities that are educated and engaged more easily adhere to and are involved in epidemic prevention and treatment measures [49], although this also depends on infrastructures, institutions and resources [17].

It is possible that during these unusual times of less air pollution and extreme measures to avoid transmission of respiratory viruses, there is a decline in morbidity and mortality due to respiratory diseases unrelated to COVID-19, particularly those due to acute respiratory infections and/or exacerbations of CRDs. It is fundamental to reinforce surveillance and research to demonstrate how populations could benefit from more rigorous control of air pollution and transmission of respiratory viruses in general. Proposed actions are outlined in table 3.

Conclusion

Worldwide, COVID-19 has infected over five million people, killed hundreds of thousands and has forever changed our daily life and the way we interact with each other. At the same time, globally 1000 people die from asthma every day and many of these deaths are premature and preventable with proper and timely management (www.globalasthmareport.org/burden/mortality.php). Therefore, it is paramount to minimise the potential "collateral damage" to patients from suboptimal management of CRDs during the pandemic.

To combat the unprecedented global atrocity of COVID-19, we observe that healthcare professionals are united to face this deadly and fast-spreading virus, finding strength, compassion, courage and solidarity among peers who are committed to prevent, manage and rehabilitate patients with this life-threatening ailment, at all levels. Now, more than ever, there is an urgent need to bridge individual and population needs, and this can only be done with engagement and interaction among public health, primary and secondary care.

The COVID-19 pandemic, while devastating, has created a remarkable worldwide opportunity for individuals, organisations and countries to excel in solidarity, collaboration and partnership, sharing resources and experiences which are essential to control the pandemic, reduce the death toll and attenuate the socio-economic and psychological consequences from isolation, unemployment and poverty.

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