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Title: Editorial: Coronavirus disease 2019 (COVID-19) - advances in epidemiology, diagnostics, treatments, host-directed therapies, pathogenesis, vaccines, and ongoing challenges

Authors:

Alimuddin Zumla ^{a,b} and David S Hui ^c

Institutional affiliations:

^a Division of Infection and Immunity, University College London, London, UK

^b NIHR Biomedical Research Centre, UCL Hospitals NHS Foundation Trust, London, UK

^c Department of Medicine & Therapeutics and Stanley Ho Centre for Emerging Infectious Diseases, The Chinese University of Hong Kong, Hong Kong Special Administrative Region, China.

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Correspondence to: Professor David S Hui MD.FRCP
Department of Medicine & Therapeutics & Stanley Ho Center for Emerging Infectious Diseases,
The Chinese University of Hong Kong,
Prince of Wales Hospital,
Shatin, New Territories,
Hong Kong.
Email: dschui@cuhk.edu.hk

Introduction

Two and a half years into the unprecedented pandemic outbreak of novel Coronavirus disease 2019 (COVID-19), health services worldwide remain on alert despite rapid development, evaluation and rollout of diagnostics, treatments and vaccines. COVID-19 remains the top cause of death from a single infectious disease globally, and has added substantially to the huge toll of respiratory tract infections globally. The COVID-19 pandemic has illustrated that rankings of countries based on their Global Health security Indices and their national pandemic preparedness plans did not materialize in the actual relative performance of countries in their public health responses. There is a plethora of information and updates on real-time COVID-19 data dashboards, and on various epidemiological, clinical and public health aspects of COVID-19. Such is the world of fast-paced information and data-sharing. It is clear that the COVID-19 pandemic has disrupted health services worldwide and resources moved to the COVID-19 response have undermined health services for other infectious and non-communicable diseases.

In this issue of Current Opinions of pulmonary Medicine, apart from COVID-19, we also cover developments in other causes of respiratory tract infections.

CORONAVIRUS DISEASE 2019

The epidemiology of SARS-CoV-2 is continually changing and is characterized by the rapid global spread of the Omicron variant. We provide summary updates of the epidemiology, clinical presentations, diagnostics, management and prevention of COVID-19 (**Hui and Zumla (COPM 2022 Ref)**). The current global epidemiology of SARS-CoV-2 is characterized by the continued rapid global spread of the Omicron variant. As the pandemic unfolds, so has the increasing numbers of patients with Long-COVID syndrome which can be debilitating for many months after first infection. **Luke Daines and colleagues (COPM Ref)**, focus on the epidemiology, clinical features, and research priorities for long-COVID focusing on the respiratory system. There are no specific interventions to treat long-COVID, and further research is needed to understand the natural history

of long-COVID, identify factors associated with its persistence, and interventions to prevent and treat long-COVID.

A major success of the global efforts to control COVID-19 was unprecedented speed at which several effective vaccines were developed. However the emergence of specific SARS-CoV-2 Variant of Interest (VOI) and Variant of Concern (VOC) have focused attention on the effects of these on the protection offered by vaccine. **Igor Rudan and colleagues (COPM,2022)** discuss the mRNA vaccines, adenoviral vector vaccines and recombinant nanoparticles and their effectiveness and impact in light of the emergence of SARS-CoV-2 variant.

OTHER VIRAL CAUSES OF RESPIRATORY TRACT INFECTIONS

Mass gathering sporting and religious events are known for frequent close contact between attendees and local host country public. They also provide optimal conditions for transmission and globalization of respiratory tract infections. **Jaffer Al-Tawfiq and colleagues (2022)** review literature on COVID-19 and other RTIs at mass gathering events. Global rates of influenza have declined globally since the 2020-2021 season and waning immunity due to less exposure due to COVID-related infection control measures over the past 2 and a half years. **Sharon Sukhdeo and Nelson Lee (COPM 2022)** provide an update on clinical aspects and recent advances in point-of-care molecular diagnostics and co-detection of influenza and coronaviruses, and the development of new treatments and development of newer class of antivirals including polymerase inhibitors in adults, children, and high-risk individuals.

As COVID-19 mitigation strategies and infection control measures are eased, a lighten, a resurgence of respiratory viruses globally is anticipated. **Michael Ison (COPM,2022)** highlights that the expansion of the availability and increased utilization of multiplex molecular assays during the COVID-19 era has allowed the recognition of the scope of respiratory virus infections in the transplant populations, and summarizes current options for the management in transplant recipients. New antivirals for influenza, respiratory syncytial virus (RSV), parainfluenza virus (PIV) and adenovirus show promise to improve outcomes of these important infections.

RESPIRATORY TRACT INFECTIONS DUE TO DRUG RESISTANT BACTERIAL PATHOGENS

Tuberculosis remains a global emergency. The global focus on COVID-19 has shifted scarce resources from all other health services, and have severely affected TB program services, and patient access to TB medicines, counselling and followup. According to the 2021 WHO Global TB Report, in 2020, TB deaths increased for the first time in over a decade, going up to 1.5 million, an upward trend that is expected to worsen for the next few years. The numbers of cases of drug-resistant TB (DR-TB) are increasing and there is an urgent need to diagnose and treat everyone with active TB. Recent notable progress in improved diagnosis and treatment of drug-resistant TB is reviewed by **Gunar Günther and colleagues (COPM, 2022)**. They also remind us that due to resource issues and the COVID-19 pandemic the majority of TB patients worldwide are not having access to these advances.

There have been increasing numbers of case and cohort on invasive fungal infections in COVID-19 patients. The early and accurate diagnosis of these are being hindered by the absence of optimal diagnostic algorithms for fungal point-of-care testing. **Ignacio Martin-Loeches and colleagues (COPM, 2022)** discuss the most recent findings in the area of diagnosis, treatment and prevention of fungal infections of the respiratory tract, especially in the critically ill.

Antimicrobial resistance (AMR) is a growing global health threat and multidrug-resistant (MDR) bacterial pathogens are of serious public health concern worldwide. As with MDR-TB, global focus on AMR due to other bacterial pathogens has been distracted and there is an increasing number of patients with *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Klebsiella pneumoniae*, *Burkholderia cepacia* complex and *Escherichia coli* infections are being detected. Treatment options remain limited and alternatives to antibiotics are required. Personalized treatment with bacteriophages is a new concept in Europe and the USA, despite extensive experience in Eastern countries. **Giovanni Satta and colleagues (COPM 2022)** review the evidence base and recent advances in the use of bacteriophages to treat pulmonary infections caused by gram-negative drug-resistant bacteria.

Conclusions

Respiratory tract infections are important causes of death worldwide. The COVID-19 pandemic continues to be a major threat to public health security, so do other respiratory infections, such as TB, influenza, fungal and antimicrobial resistant. Whilst COVID-19 still dominates the global public health agenda, the world needs to refocus attention on all Respiratory tract infections which have been neglected ever since the emergence of COVID-19 pandemic. New ways of working through alignment of health services and utilizing the latest in diagnostics screening simultaneously for COVID-19, tuberculosis, and other bacterial and viral causes of Respiratory tract Infections to screen, confirm, and initiate patients on specific treatment is required.

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Conflicts of interest

Prof David S Hui and Sir Prof Alimuddin Zumla and both have a specialist interest in respiratory tract infections and are editors of this volume of COPM. They declare no other conflicts of interest

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