



COMMENTARY ARTICLE

Coping with the Ongoing SARS-CoV-2 Pandemic and Seasonal Influenza

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Abstract

The ongoing SARS-COV-2 pandemic has brought about unprecedented challenges to individuals, communities, and healthcare systems worldwide. As the world braces for a potential second wave of COVID-19 infections, the seasonal influenza season is also looming. This article explores the coping strategies that individuals and healthcare systems can adopt to manage both the SARS-COV-2 pandemic and seasonal influenza. The article highlights the importance of vaccination, social distancing measures, and personal protective equipment in preventing the spread of both viruses. Additionally, it discusses the need for mental health support for individuals who are struggling to cope with the stressors brought about by these pandemics. The article concludes by emphasizing that a coordinated effort between individuals, communities, and healthcare systems is crucial in mitigating the impact of these pandemics on public health.

Keywords

SARS-COV-2, Seasonal flu, Pandemic, Public health, Vaccine

Introduction

The year 2020 has been marked by the emergence of a new respiratory virus, SARS-CoV-2, which has caused a global pandemic [1]. As if that wasn't enough, we are now entering the flu season, which means that we will be dealing with two different respiratory diseases at the same time. This is an unprecedented situation that requires us to adapt and cope in new ways [2].

The coping of SARS-CoV-2 and influenza is a challenge for public health systems around the world [3]. Both

viruses are highly contagious and can cause severe illness, especially in vulnerable populations such as the elderly and those with underlying health conditions. The symptoms of both diseases are similar, including fever, cough, and shortness of breath. This makes it difficult to distinguish between them without testing [4].

One of the biggest concerns is that hospitals and healthcare systems will become overwhelmed with patients suffering from both diseases [5]. This could lead to shortages of hospital beds, ventilators, and other essential medical equipment. It is also possible that people who contract both viruses at the same time may experience more severe symptoms than those who only have one [6].

To prevent this scenario from happening, it is crucial that we take steps to reduce the spread of both viruses. This includes practicing good hygiene such as washing hands frequently, wearing masks in public places, avoiding large gatherings, and staying home when sick. It also means getting vaccinated against influenza as soon as possible [6].

The good news is that many of the measures we have already put in place to control the spread of SARS-CoV-2 can also help prevent influenza transmission. For example, social distancing measures can reduce contact between people and limit the spread of both viruses. Wearing masks can also help prevent transmission by reducing droplet spread [7].

In addition to these measures, it is important for healthcare systems to prepare for an influx of patients



Citation: Mustafa MI, Mohammed A (2023) Coping with the Ongoing SARS-CoV-2 Pandemic and Seasonal Influenza. J Infect Dis Epidemiol 9:304. doi.org/10.23937/2474-3658/1510304

Accepted: May 29, 2023; **Published:** May 31, 2023

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with respiratory illnesses. This includes increasing capacity for testing and treatment, ensuring an adequate supply of personal protective equipment for healthcare workers, and developing protocols for managing patients with both SARS-CoV-2 and influenza A.

Host Immune Response of SARS-CoV-2 and Influenza a Virus

The innate immune response

As the world continues to grapple with the COVID-19 pandemic, it is important to understand how our immune system responds to the virus. The innate immune response is the first line of defense against viral infections, including SARS-CoV-2 and Influenza A virus [8].

The innate immune response is a rapid and non-specific response that occurs within hours of infection. It involves a variety of cells and molecules that work together to detect and eliminate pathogens. One key component of the innate immune response is the production of type I interferons (IFNs), which are cytokines that help to limit viral replication and spread [8].

Studies have shown that SARS-CoV-2 can suppress the production of type I IFNs in infected cells, which may contribute to its ability to evade host immunity and cause severe disease [8]. In contrast, Influenza A virus induces a robust type I IFN response in infected cells, which helps to control viral replication and limit disease severity [9].

Another important aspect of the innate immune response is the activation of pattern recognition receptors (PRRs), which are proteins that recognize specific molecular patterns on pathogens. SARS-CoV-2 is recognized by several PRRs, including Toll-like receptor 7 (TLR7) and retinoic acid-inducible gene I (RIG-I), which trigger downstream signaling pathways that lead to the production of pro-inflammatory cytokines [8].

In contrast, Influenza A virus is recognized by different PRRs, including TLR3 and RIG-I, which activate different signaling pathways than those activated by SARS-CoV-2. This may explain why Influenza A virus tends to cause more severe respiratory symptoms than COVID-19 [10].

Overall, these findings suggest that differences in host innate immune responses to SARS-CoV-2 and Influenza A virus may contribute to differences in disease severity and outcomes. Understanding these differences can help to inform the development of new therapies and vaccines for COVID-19.

Adaptive immune response

The adaptive immune response is a complex system that involves the activation of T and B cells. These cells recognize specific antigens on the surface of pathogens

and mount an immune response against them. In the case of SARS-CoV-2 and Influenza A virus, the adaptive immune response is critical in controlling the infection and preventing severe disease [11].

Studies have shown that individuals who have recovered from COVID-19 develop robust T cell responses against SARS-CoV-2 [12]. These T cells are capable of recognizing multiple viral proteins and can provide long-term immunity against the virus. Similarly, individuals who have been vaccinated against Influenza A virus develop strong antibody responses that can protect them from future infections [2].

However, there are also some similarities between the two viruses that can affect the host adaptive immune response. Both SARS-CoV-2 and Influenza A virus can cause severe respiratory illness, leading to pneumonia and acute respiratory distress syndrome (ARDS). This can result in a dysregulated immune response known as a cytokine storm, where excessive inflammation damages healthy tissues [13].

Furthermore, both viruses can mutate rapidly, making it challenging to develop effective vaccines or treatments. The emergence of new variants of SARS-CoV-2 has raised concerns about vaccine efficacy and highlights the need for ongoing surveillance and research [6].

Available Vaccines and Their Efficacy

Several vaccines have been developed and are effective against SARS-CoV-2 by training the immune system to recognize and attack the virus. The most widely used vaccines include those developed by Pfizer-BioNTech, Moderna, Johnson & Johnson, and AstraZeneca [14]. However, there is concern that these vaccines may be less effective against new variants of the virus due to mutations in their spike proteins [15].

One of the most concerning mutations is the D614G mutation in the spike protein of SARS-CoV-2. This mutation has been found to increase the infectivity of the virus and reduce the effectiveness of some monoclonal antibodies that target the spike protein [16]. The spike protein is essential for viral entry into host cells, and antibodies that target this protein can prevent viral infection. However, some monoclonal antibodies that were effective against the original strain of SARS-CoV-2 are less effective against strains with the D614G mutation [16].

Another mutation that has been identified is E484K in the spike protein. This mutation has been found in several variants of concern, including those first identified in South Africa and Brazil [17]. The E484K mutation reduces the effectiveness of some monoclonal antibodies and convalescent plasma from individuals who have recovered from COVID-19. This mutation may also reduce vaccine efficacy by reducing neutralizing antibody responses [18].

A third mutation that has been identified is N501Y in the spike protein. This mutation is present in several variants of concern, including those first identified in the UK and South Africa. The N501Y mutation increases viral infectivity and may also reduce vaccine efficacy by reducing neutralizing antibody responses [19]. In addition to these specific mutations, there are also concerns about antigenic drift - gradual changes in viral antigens over time - which could lead to reduced effectiveness of current vaccines and therapeutic interventions [20]. Overall, these mutations highlight the need for ongoing surveillance and monitoring of SARS-CoV-2 variants, as well as continued research into new treatments and vaccines that can effectively target emerging strains.

Recent studies have shown that many of these vaccines still provide significant protection against new variants of SARS-CoV-2. For example, two doses of the Pfizer-BioNTech vaccine were 88% effective against symptomatic disease caused by the Delta variant first identified in India [14]. Two doses of the Moderna vaccine were 94% effective against symptomatic disease caused by the Beta variant first identified in South Africa. Two doses of the AstraZeneca vaccine were 60% effective against symptomatic disease caused by the Delta variant [14].

These studies provide encouraging evidence that current vaccines can still provide significant protection against new variants of SARS-CoV-2. However, ongoing surveillance and research will be needed to monitor their effectiveness as the virus continues to evolve.

Preceptive

The world is currently facing a major health crisis with the outbreak of the COVID-19 pandemic. This has led to a surge in demand for healthcare services and resources, putting immense pressure on healthcare systems worldwide. In addition, seasonal flu outbreaks continue to occur every year, further exacerbating the situation.

There is a pressing need to draw up protocols for coping with both seasonal flu and SARS-CoV-2. The protocols should be designed to help healthcare providers manage the influx of patients and ensure that they receive appropriate care in a timely manner.

One of the key aspects of these protocols should be early detection and diagnosis. This can be achieved through increased testing capacity and improved surveillance systems. Healthcare providers should also be trained on how to identify symptoms of both seasonal flu and COVID-19, as well as how to differentiate between them.

Another important aspect of these protocols is ensuring that healthcare facilities have adequate resources to cope with the increased demand. This

includes sufficient supplies of personal protective equipment (PPE), medications, and medical equipment such as ventilators.

In addition, there needs to be clear guidelines on how to manage patients with both seasonal flu and COVID-19. This includes isolation procedures, treatment options, and discharge criteria. Healthcare providers should also be trained on how to communicate effectively with patients about their diagnosis and treatment options.

Finally, there needs to be a coordinated effort between healthcare providers, public health officials, and government agencies at all levels. This will help ensure that resources are allocated appropriately and that information is shared effectively.

Conclusion

The coping of SARS-CoV-2 and influenza A is a challenge that we must face together. It requires drawing up protocols for coping with both seasonal flu and SARS-CoV-2 is essential in order to ensure that healthcare systems are prepared for future outbreaks. These protocols should focus on early detection and diagnosis, adequate resource allocation, clear guidelines for patient management, effective communication with patients, and coordinated efforts between all stakeholders involved in managing these outbreaks.

Author Contribution

MM performed overall writing of the paper including research, literature review, and analysis of data. MA Supervision and editing of the review paper. All authors read and approved the final manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest

None declared.

Acknowledgements

The authors acknowledge the Deanship of Scientific Research at University of Bahri for the supportive cooperation.

References

1. Ruiz-Medina BE, Varela-Ramirez A, Kirken RA, Robles-Escajeda E (2022) The SARS-CoV-2 origin dilemma: Zoonotic transfer or laboratory leak? *Bio Essays* 44: e2100189.
2. Dabaja-Younis H, Fuchs E, Shorbaji N, Appel T, Carmon N, et al. (2022) SARS-CoV-2 and seasonal influenza: Similarity and disparity. *Arch Virol* 167: 2761-2765.
3. Kabantiyok D, Ninyio N, Shittu I, Meseko C, Emeto TI, et al. (2022) Human respiratory infections in Nigeria: Influenza and the emergence of SARS-CoV-2 pandemic. *Vaccines* 10: 1551.

4. Wang X, Li J, Liu H, Hu X, Lin Z, et al. (2023) SARS-CoV-2 versus Influenza A virus: Characteristics and co-treatments. *Microorganisms* 11: 580.
5. Omboni S, Padwal RS, Alessa T, Benczúr B, Green BB, et al. (2022) The worldwide impact of telemedicine during COVID-19: Current evidence and recommendations for the future. *Connected Health* 1: 7-35.
6. Muhammad FM, Ibraheem UM, Pambuk CIA (2022) SARS-CoV-2 induced COVID 19 and influenza: The dual overwhelming infection: Rising attentions for similarities. *Int J Med Sci Clin Res Studies* 2: 863-865.
7. Giraud-Gatineau A, Kaba L, Boschi C, Devaux C, Casalta JP, et al. (2022) Control of common viral epidemics but not of SARS-CoV-2 through the application of hygiene and distancing measures. *J Clin Virol* 150: 105163.
8. Diamond MS, Kanneganti TD (2022) Innate immunity: The first line of defense against SARS-CoV-2. *Nat Immunol* 23: 165-176.
9. Palermo E, Alexandridi M, Di Carlo D, Muscolini M, Hiscott J (2022) Virus-like particle-mediated delivery of the RIG-I agonist M8 induces a type I interferon response and protects cells against viral infection. *Front Cell Infect Microb* 12: 1079926.
10. Yu B, Xiaonan T (2021) Comparison of COVID-19 and influenza characteristics. *J Zhejiang Univ Sci B* 22: 87-98.
11. Azkur AK, Akdis M, Azkur D, Sokolowska M, van de Veen W, et al. (2020) Immune response to SARS-CoV-2 and mechanisms of immunopathological changes in COVID-19. *Allergy* 75: 1564-1581.
12. Peng Y, Mentzer AJ, Liu G, Yao X, Yin Z, et al. (2020) Broad and strong memory CD4+ and CD8+ T cells induced by SARS-CoV-2 in UK convalescent individuals following COVID-19. *Nat Immunol* 21: 1336-1345.
13. Budinger GS, Misharin AV, Ridge KM, Singer BD, Wunderink RG (2021) Distinctive features of severe SARS-CoV-2 pneumonia. *J Clin Invest* 131: e149412.
14. Patel R, Kaki M, Potluri VS, Kahar P, Khanna D (2022) A comprehensive review of SARS-CoV-2 vaccines: Pfizer, moderna & Johnson & Johnson. *Hum Vaccin Immunother* 18: 2002083.
15. de Souza AS, de Freitas Amorim VM, Guardia GD, Dos Santos FF, Ulrich H, et al. (2022) Severe Acute Respiratory syndrome Coronavirus 2 variants of concern: A perspective for emerging more transmissible and vaccine-resistant strains. *Viruses* 14: 827.
16. Aleem A, Akbar Samad AB, Slenker AK (2022) Emerging variants of SARS-CoV-2 and novel therapeutics against Coronavirus (COVID-19). In: StatPearls, StatPearls Publishing, Treasure Island, Finland.
17. Mistry P, Barmania F, Mellet J, Peta K, Strydom A, et al. (2021) SARS-CoV-2 variants, vaccines, and host immunity. *Front Immunol* 12: 809244.
18. Zhou H, Møhlenberg M, Thakor JC, Tuli HS, Wang P, et al. (2022) Sensitivity to vaccines, therapeutic antibodies, and viral entry inhibitors and advances to counter the SARS-CoV-2 omicron variant. *Clin Microbiol Rev* 35: e0001422.
19. Wenseleers T (2022) New confirmed SARS-CoV2 cases by variant.
20. McCrone JT, Lauring AS (2018) Genetic bottlenecks in intraspecies virus transmission. *Curr Opin Virol* 28: 20-25.