



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Correspondence

The Ukrainian refugee crisis and the COVID-19 pandemic in Europe

ARTICLE INFO

Keywords

COVID-19
 Pandemic
 SARS-CoV-2
 Ukraine
 Vaccine

Dear Editor,

1. New SARS-CoV-2 variants can threaten Europe

Since February 24, 2022, many nations have been perplexed by the Russia–Ukraine conflict and the ensuing crisis. As a result of this conflict, Ukraine’s clinical infrastructure and hospitals have been under pressure [1]. Many Ukrainian regional hospitals must now deal with high numbers of patients infected with COVID-19 and high numbers of injured soldiers or civilians, including adults and children. The injured, who can also potentially be asymptomatic carriers of SARS-CoV-2, can provide a source of infection for other hospitalized patients. From February 24 to March 17, 2022, more than 3.1 million Ukrainian residents have sought refuge in neighboring countries (<https://data2.unhcr.org/en/situations/ukraine>). The conflict has thus caused a humanitarian and public-health crisis for both the Ukrainian refugees and the neighboring European countries amidst the COVID-19 pandemic [2]. Efflux of refugees increases the risk of infection and emergence of new SARS-CoV-2 variants that can potentially become variants of concern. The virus tends naturally to mutate to attain a higher survival chance while circulating in a community [3] particularly in a population with low crowd immunity, and especially among immunocompromised patients [4].

Reportedly, epidemics commonly occur during “complex emergencies” [5], and protracted conflicts increase the risk of transmission of infectious diseases and emergence of drug-resistant bacteria among masses of displaced refugees [6]. The human immune system is known to be affected negatively by stressful conditions, anxiety, sleep deprivation, lack of exercise, malnutrition [7,8], and other unfavorable factors that coincide with intense displacement of refugees. In the context of the COVID-19 pandemic, less than 35% of the Ukrainian population have been double-vaccinated against SARS-CoV-2, with at least 20% less than the global vaccination rate. Stressful conditions of living and low rates of vaccination among the refugees predispose them to severe COVID-19 and facilitate emergence of new SARS-CoV-2 variants in the community. If the conflict continues, displacement and efflux of the Ukrainian people into the neighboring European countries will

predictably cause a new spike in the number of COVID-19 cases and potential emergence of new SARS-CoV-2 variants.

Neighboring countries, such as Hungary and Poland, have reported higher vaccination rates than Ukraine. However, health problems will aggravate when refugee masses with low vaccination rates intermingle with the populations in these countries by travelling on overcrowded trains or buses and resorting to refugee shelters. Obeying strict countermeasures including physical distancing, access to proper and sufficient facemasks, hygiene, and proper mask-wearing become relatively difficult under such conflict and humanitarian crises in occupied areas, and among displaced refugees. Therefore, emergence of any new highly transmissible and potent variant capable of immune evasion becomes a grave concern as exemplified by the emergence of the Omicron variant [9]. Thus, we predict that the present crisis in Ukraine will escalate the COVID-19 pandemic in Europe.

2. Lifting the COVID-19 restrictions in Europe

High vaccination rates among the European populations have generated national self-confidence and a sense of normalcy, security, and continuity during the pandemic; thus, Poland, Denmark, Sweden, and England have lifted the COVID-19 restrictions [10,11]. Considering the propensity of SARS-CoV-2 to evade immunity [12], the Ukrainian refugees could transmit the virus to European residents, without implementation of proper interventions. Poland’s healthcare and hygiene systems will be overstretched because many Ukrainian refugees are hosted there. However, a fourth or fifth vaccine dose can significantly reinvigorate immunity against SARS-CoV-2 among the refugees and their hosting European communities [13]. Restoring the pandemic restrictions and countermeasures also can curb a potential rise in COVID-19 cases in Europe. Finally, decision-making should be guided with unity and solidarity and by following international and independent agencies such as the World Health Organization and the United Nations High Commissioner for Refugees.

Sources of funding

This article does not require any human/animal subjects to acquire

<https://doi.org/10.1016/j.ijso.2022.106671>

Received 18 March 2022; Accepted 10 May 2022

Available online 13 May 2022

1743-9191/© 2022 IJS Publishing Group Ltd. Published by Elsevier Ltd. All rights reserved.

such approval.

Author contribution

Farid Rahimi: Conceptualization, data curation, writing – review & editing.

Amin Talebi Bezmin Abadi: Conceptualization, data curation, writing – original draft, writing – review & editing.

All authors critically reviewed and approved the final version of the manuscript before submitting.

Declaration of competing interest

None.

Trial registry number

1. Name of the registry: Not applicable.
2. Unique Identifying number or registration ID: Not applicable.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): Not applicable.

Guarantor

All of authors.

Data statement

Not applicable.

Provenance and peer review

Not commissioned, internally peer-reviewed.

References

- [1] D.A. Leon, D. Jdanov, C.J. Gerry, P. Grigoriev, D. Jasilionis, M. McKee, et al., The Russian invasion of Ukraine and its public health consequences, *Lancet Reg. Health Eur.* (2022), 100358.

- [2] C. Del Rio, S.B. Omer, P.N. Malani, Winter of Omicron – the evolving COVID-19 pandemic, *JAMA* 327 (4) (2022) 319–320.
- [3] P. Majumdar, S. Niyogi, SARS-CoV-2 mutations: the biological trackway towards viral fitness, *Epidemiol. Infect.* 149 (2021) e110.
- [4] V. Borges, J. Isidro, M. Cunha, D. Cochicho, L. Martins, L. Banha, et al., Long-term evolution of SARS-CoV-2 in an immunocompromised patient with non-Hodgkin lymphoma, *mSphere* 6 (4) (2021), e0024421.
- [5] P.B. Spiegel, P. Le, M.T. Ververs, P. Salama, Occurrence and overlap of natural disasters, complex emergencies and epidemics during the past decade (1995-2004), *Confl. Health* 1 (2007) 2.
- [6] A. Abbara, M. Almalla, I. AlMasri, H. AlKabbani, N. Karah, W. El-Amin, et al., The challenges of tuberculosis control in protracted conflict: the case of Syria, *Int. J. Infect. Dis.* 90 (2020) 53–59.
- [7] J. Lasselín, E. Alvarez-Salas, J.S. Grigoleit, Well-being and immune response: a multi-system perspective, *Curr. Opin. Pharmacol.* 29 (2016) 34–41.
- [8] S.A. Jasim, R.O. Saleh, Y.H. Ali, Psychological support and its relationship with the immune system during the pandemic, *Mater. Today Proc.* (2021). PMID: 34026570.
- [9] Y. Araf, F. Akter, Y.D. Tang, R. Fatemi, M.S.A. Parvez, C. Zheng, et al., Omicron variant of SARS-CoV-2: genomics, transmissibility, and responses to current COVID-19 vaccines, *J. Med. Virol.* 94 (2022) 1825–1832.
- [10] Euronews, COVID-19 in Europe: England ends all coronavirus restrictions: @euronews [updated 23 February 2022, accessed 17 March 2022]. Available from: <https://www.euronews.com/2022/02/23/covid-19-in-europe-italy-to-end-state-of-emergency-and-ease-restrictions-in-april>, 2022.
- [11] T. Thomas, N. McIntyre, P. Duncan, More than 900 Covid deaths recorded in England and Wales in first week of January: @guardian [updated 18 January 2022, accessed 17 March 2022]. Available from: <https://www.theguardian.com/world/2022/jan/18/more-than-900-covid-deaths-recorded-in-england-and-wales-in-first-week-of-january>, 2022.
- [12] M. McCallum, A.C. Walls, K.R. Sproule, J.E. Bowen, L.E. Rosen, H.V. Dang, et al., Molecular basis of immune evasion by the Delta and Kappa SARS-CoV-2 variants, *Science* (2021), eab18506.
- [13] X. Shen, Boosting immunity to Omicron, *Nat. Med.* 28 (2022) 445–446.

Farid Rahimi

Research School of Biology, The Australian National University, Ngunnawal and Ngambri Country, Canberra, Australia

Amin Talebi Bezmin Abadi*

Department of Bacteriology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

* Corresponding author. Room 8, First floor, Department of Bacteriology, Faculty of Medical Sciences, Tarbiat Modares University, P.O. Box 14115-111, Tehran, Iran.
E-mail address: Amin.talebi@modares.ac.ir (A. Talebi Bezmin Abadi).