



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.



ELSEVIER

Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijidINTERNATIONAL
SOCIETY
FOR INFECTIOUS
DISEASES

Editorial

Could enhanced influenza and pneumococcal vaccination programs help limit the potential damage from SARS-CoV-2 to fragile health systems of southern hemisphere countries this winter?



Low- and middle-income countries (LMICs) of the southern hemisphere are bracing themselves for the potential impact of a SARS-CoV-2 pandemic, in which Coronavirus Disease-19 (COVID-19) cases could overwhelm fragile health systems. One of the great hopes for northern hemisphere countries such as China, Italy, Iran, Japan, and South Korea, where community spread is ongoing, is that the arrival of spring and summer will reduce transmission of this respiratory virus. Intuitively, one hemisphere's fortune is likely to be the other's misfortune. As the southern hemisphere moves from summer to autumn and swiftly into winter, the transmission of all respiratory viruses will increase, including SARS-CoV-2, if introduced into there. How can LMICs mitigate the impact of such an introduction into their health systems?

The SARS-CoV-2 outbreak highlights the importance of infection prevention in controlling the spread of this and other pathogens. Despite reports of the first vaccine against SARS-CoV-2 entering phase I trials (Park, 2020), the time of roll out, should the vaccine show successful results, will not be able to mitigate the impact of a significant outbreak in the southern hemisphere this winter. However, other vaccines that could reduce primary care consultations, hospital admissions, and morbidity and mortality from respiratory infections are available to us but are historically underutilized.

Influenza epidemics are estimated to result in about three to five million cases of severe illness annually, and about 290 000 to 650 000 respiratory deaths worldwide (WHO, 2018). Influenza vaccination lessens the risk of severe disease and reduces hospitalization and admissions to intensive care units (Thompson et al., 2018; Baselga-Moreno et al., 2019). If a double-hit of influenza and SARS-CoV-2 were to occur, reducing the impact of influenza through increasing vaccination programs might be a critical factor in determining whether a country's healthcare system will cope or not. The World Health Organization recommends that nationally-determined high-risk populations should be vaccinated for influenza. Yet, reduced coverage rates and limited procurement of vaccines, due to competing funding needs, limit its potential impact on a country. In South Africa, for example, on average, 6000 – 11,000 people die each year from influenza. In 2019, just over 1 million influenza vaccine doses were procured for

the public sector (National Department of Health, personal communication). High-risk groups prioritized for vaccination include pregnant women and persons living with HIV. There are in excess of one million births each year in South Africa, which also has a population of over seven million persons living with HIV. Clearly, even if the same amount of vaccine was procured for 2020, and all one million doses were used for just these two high-risk groups alone, the entire supply would be used up, leaving the vast majority of high-risk individuals in South Africa unvaccinated.

Influenza vaccination of health care workers is also an essential strategy for reducing absenteeism, and potentially maintaining the integrity of the healthcare workforce. Influenza vaccine is effective in protecting healthcare workers (HCWs); a number of systematic reviews and meta-analyses document that vaccine efficacy in reducing symptomatic and asymptomatic infections is between 70–91% (Kuster et al., 2011; Wilde et al., 1999; Ng and Lai, 2011; Restivo et al., 2018). However, vaccine acceptance among HCWs is low, with most studies generally showing <30% (Dini et al., 2018). The determinants of whether HCWs vaccinate themselves against influenza differ depending on age, gender, and role within the healthcare workforce. For example, in one study, male HCWs and those of an older age were more likely to be vaccinated, whereas being a nurse correlated with reduced vaccine acceptance (Bish et al., 2011). The desire of HCWs to protect themselves, family, and friends rather than protect patients was a significant positive factor towards acceptance in some studies (Bish et al., 2011; Vasilevska et al., 2014). Whether an appeal to HCWs to be vaccinated against influenza to protect the integrity of the healthcare system will work amid a southern hemisphere SARS-CoV-2 pandemic is an unknown quantity. Finding the right messaging to drive high acceptance will be critical, and a case for careful study.

Streptococcus pneumoniae remains the most common global cause of community-acquired pneumonia (CAP), and peaks, like influenza, in the winter months. Vaccination with the pneumococcal conjugate vaccine (PCV), either PCV-10 or PCV-13 reduces pneumonia hospitalization of children (Alicino et al., 2017); PCV-13 has been shown to reduce bacteraemic and non-bacteraemic CAP and vaccine-type invasive pneumococcal disease (IPD) in adults ≥ 65 years of age (Bonten et al., 2015). Despite being part of

the childhood extended program of immunization in most countries, it is not utilized to maximum effect in high-risk adult populations such as those living with HIV and other causes of immunosuppression (including immune senescence in the elderly). Optimizing childhood vaccination coverage with PCV and increasing use in adults to mitigate the effects of CAP and IPD in the face of a SARS-CoV-2 epidemic, may be a second vaccination strategy available to LMICs to reduce its impact on their health systems.

How does one reconcile the cost of an expanded influenza and pneumococcal vaccination program in LMICs with current uncertainty as to how hard SARS-CoV-2 will hit these countries in the southern hemisphere this winter? Is it enough to invoke the precautionary principle and commit increased national funds to vaccination efforts? Should emergency funding be met by external agencies and channeled through Gavi, the Vaccine Alliance, or a similar body? In the face of a possible overwhelming southern hemisphere pandemic, limiting the strain placed on health systems by reducing influenza and pneumococcal infections in all countries, deserves consideration. We presently have few tools to lessen the effect of SARS-CoV-2 on health systems, and in times such as these, extraordinary measures may be needed to meet what may turn out to be equally extraordinary needs.

Funding sources

Nil.

Conflicts of interest

Nil.

References

- Alicino C, Paganino C, Orsi A, Astengo M, Trucchi C, Icardi G, et al. The impact of 10-valent and 13-valent pneumococcal conjugate vaccines on hospitalization for pneumonia in children: a systematic review and meta-analysis. *Vaccine* 2017;35(October (43)):5776–85, doi:<http://dx.doi.org/10.1016/j.vaccine.2017.09.005>.
- Baselga-Moreno V, Trushakova S, McNeil S, Somnina A, Nunes MC, Draganescu A, et al. Influenza epidemiology and influenza vaccine effectiveness during the 2016–2017 season in the Global Influenza Hospital Surveillance Network (GIHSN). *BMC Public Health* 2019;19(May (1)):487, doi:<http://dx.doi.org/10.1186/s12889-019-6713-5>.
- Bish A, Yardley L, Nicoll A, Michie S. Factors associated with uptake of vaccination against pandemic influenza: a systematic review. *Vaccine* 2011;29(38):6472–84.
- Bonten MJ, Huijts SM, Bolkenbaas M, et al. Polysaccharide conjugate vaccine against pneumococcal pneumonia in adults. *N Engl J Med* 2015;372(March (12)):1114–25.
- Dini G, Toletone A, Sticchi L, Orsi A, Bragazzi NL, Durando P. Influenza vaccination in healthcare workers: a comprehensive critical appraisal of the literature. *Hum Vaccin Immunother* 2018;14(3):772–89, doi:<http://dx.doi.org/10.1080/21645515.2017.1348442>.
- Kuster SP, Shah PS, Coleman BL, Lam PP, Tong A, Wormsbecker A, McGeer A. Incidence of influenza in healthy adults and healthcare workers: a systematic review and meta-analysis. *PLoS One* 2011;6(10):e26239, doi:<http://dx.doi.org/10.1371/journal.pone.0026239> PMID: 22028840.
- Ng AN, Lai CK. Effectiveness of seasonal influenza vaccination in healthcare workers: a systematic review. *J Hosp Infect* 2011;79(4):279–86.
- Park A. COVID-19 vaccine shipped and drug trials start Available at: <https://time.com/5790545/first-covid-19-vaccine/>. (Accessed 1 March 2020). 2020.
- Restivo V, Costantino C, Bono S, et al. Influenza vaccine effectiveness among high-risk groups: a systematic literature review and meta-analysis of case-control and cohort studies. *Hum Vaccin Immunother* 2018;14(March (3)):724–35, doi:<http://dx.doi.org/10.1080/21645515.2017.1321722> Epub 2017 Jun 16.
- Thompson MG, Piers N, Sue Huang Q, et al. Influenza vaccine effectiveness in preventing influenza-associated intensive care admissions and attenuating severe disease among adults in New Zealand 2012–2015. *Vaccine* 2018;36(September(39)):5916–25, doi:<http://dx.doi.org/10.1016/j.vaccine.2018.07.028> Epub 2018 Aug 1. PMID: 30077480.
- Vasilevska M, Ku J, Fisman DN. Factors associated with healthcare worker acceptance of vaccination: a systematic review and meta-analysis. *Infect Control Hosp Epidemiol* 2014;35(6):699–708, doi:<http://dx.doi.org/10.1086/676427>.
- Wilde JA, McMillan JA, Serwint J, Butta J, O'Riordan MA, Steinhoff MC. Effectiveness of influenza vaccine in health care professionals: a randomized trial. *JAMA* 1999;281:908–13, doi:<http://dx.doi.org/10.1001/jama.281.10.908> PMID: 10078487.
- World Health Organization. 2018 6 November 2018. Available at [https://www.who.int/news-room/fact-sheets/detail/influenza-\(seasonal\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)). (Accessed 1 March 2020).

Marc Mendelson

Division of Infectious Diseases and HIV Medicine, Department of Medicine, G16.68 New Main Building, Groote Schuur Hospital, Observatory 7925, Cape Town, South Africa E-mail address: marc.mendelson@uct.ac.za (M. Mendelson).

Received 5 March 2020