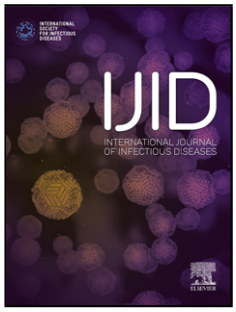

Could enhanced influenza and pneumococcal vaccination programs help limit the potential damage from SARS-CoV-2 to fragile health systems of southern hemisphere countries this winter?

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PII: S1201-9712(20)30149-1

DOI: https://doi.org/10.1016/j.ijid.2020.03.030

Reference: IJID 4036

To appear in: *International Journal of Infectious Diseases*

Received Date: 5 March 2020

Please cite this article as: Mendelson M, 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?, *International Journal of Infectious Diseases* (2020), doi: https://doi.org/10.1016/j.ijid.2020.03.030

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?

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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 that country. How can LMICs mitigate the impact of such an introduction into their health systems?

The SARS-CoV-2 outbreak is highlighting 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 to rollout, should the vaccine show successful results, will not be able to mitigate the impact of a major 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 under-utilized.

Influenza epidemics are estimated to result in about 3 to 5 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 hospitalisation and admissions to intensive care units (Thompson 2018, Baselga-Moreno 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. World Health Organization- and nationally-determined high risk populations should be vaccinated for influenza, yet poor coverage rates and limited procurement of vaccine due to competing funding needs limit its potential impact to 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 ~~have been~~ 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 1 million births each year in South Africa, which also has a population of over 7 million persons living with HIV. Clearly, even if ~~all 100,000 vaccines~~ the same amount of vaccine was procured for 2020, and all 1 million were used for just these two high risk groups alone, the entire supply would be used up, leaving the vast majority ~~in each group (and all other high-risk individuals)~~ of high-risk individuals in South Africa, unvaccinated.

Influenza vaccination of health care workers is also an important strategy for reducing absenteeism and presentism, and potentially maintaining the integrity of the healthcare workforce. Influenza vaccine is effective in protecting healthcare workers (HCWs), with a number of systematic reviews and meta-analyses documenting vaccine efficacy in reducing symptomatic and asymptomatic infections between 70-91% (Kuster 2011, Wilde 1999, Ng and Lai 2011, Restivo 2018). However, vaccine uptake among HCWs is low, with most studies generally being <30% (Dini 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 older age were more likely to be vaccinated, whereas being a nurse correlated with reduced vaccine uptake (Bish 2011). The desire of HCWs to protect themselves, family and friends rather than protect patients was an important positive factor towards uptake in some studies (Bish

2011, Vasilevska 2014). Whether an appeal to HCWs to be vaccinated against influenza to protect the integrity of the healthcare system will work in the midst of a southern hemisphere SARS-CoV-2 pandemic is an unknown quantity. Finding the right messaging to drive high uptake will be critical, and a case for careful study.

Streptococcus pneumoniae remains the commonest global cause of community acquired pneumonia (CAP), and peaks, like influenza, in the winter months. Vaccination with pneumococcal conjugate vaccine (PCV), either PCV-10 or PCV-13 reduces pneumonia hospitalisation of children (~~Izu~~ Alicino, 2017), and 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 2015). Despite being part of the childhood extended programme 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 of PCV~~-13~~ 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 mitigate its effects 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 principal and commit increased national funds to vaccination efforts? Should emergency funding be met by external agencies and channelled 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 in all countries, deserves consideration. We 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

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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