Flu shots and measles vaccines could also help 'flatten the curve' for COVID-19

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While the world has celebrated the arrival of highly effective vaccines against COVID-19, new work by researchers at Weill Cornell Medicine and the University of Oxford shows that even unrelated vaccines could

help reduce the burden of the pandemic. The study, published Jan. 10 in the *Proceedings of the National Academy of Sciences*, crystallizes decades of evidence suggesting that the generalized immune-boosting properties of many vaccines can cross-protect patients against multiple pathogens.

Before COVID-19-specific vaccines became available, many public health experts and immunologists suggested immunizing vulnerable populations with other vaccines to provide some degree of protection.

"We know that unrelated vaccines have these heterologous effects, and a reasonable person could tell you that if you used them during a pandemic, it would benefit," said Dr. Nathaniel Hupert, an associate professor of population health sciences at Weill Cornell Medicine and lead author on the new paper. However, it wasn't clear how much such an intervention would help, which populations would be best to target or how much of the population would have to get the unrelated vaccines to have a meaningful effect.

To address those questions, Dr. Hupert and senior author Dr. Douglas Nixon, a professor of immunology in medicine in the Division of Infectious Diseases at Weill Cornell Medicine, and their colleagues from Weill Cornell Medicine and the University of Oxford used the COVID-19 International Modeling Consortium (CoMo) system, a sophisticated computer modeling platform they'd built in response to the pandemic. "If you have a model that can be customized to a particular place and time in the context of an outbreak, you can start to experiment with different conditions of population immunity and see how things might have played out," Dr. Hupert said.

Using the winter 2020-21 COVID-19 wave that struck the United States after holiday season reopenings, the investigators modeled the likely effects of a non-COVID-19 vaccine intervention at different times and

targeting different populations. While they did not specify particular vaccines, the researchers chose values for cross-protection consistent with data from earlier studies on measles, influenza, tuberculosis and other immunizations. They found that an unrelated vaccine that provided just 5 percent protection against serious COVID-19, and was delivered to only a small portion of the population, would have caused a substantial reduction in caseloads and hospital usage.

"Surprisingly, we found a couple of really interesting emergent results from what we put in the mix," Dr. Hupert said. While COVID-19 severity correlates tightly with age, an experimental scenario that modeled vaccinating everyone over the age of 20 was more effective than strategies targeting only the elderly. That could be because younger people tend to have more social contacts across age groups, making them more likely to spread the virus to more vulnerable populations. The timing of the vaccinations also mattered, with delivery during the rising phase of the wave of infections having the biggest impact.

"This modeling study shows the potential power of all vaccines in keeping the immunological system primed and healthy," Dr. Nixon said, "and reinforces the need for everyone to keep their vaccination history up to date, particularly during a pandemic."

Dr. Hupert sees the new findings as a "double win," suggesting that even nations with difficulty distributing enough COVID-19-specific vaccines can intervene with routine immunizations against other pathogens and, in combination with non-pharmaceutical interventions such as face masks, could potentially blunt ongoing COVID-19 waves while also preventing other diseases.

And as vaccine-escaping variants of the SARS-CoV-2 virus like Omicron sweep the globe, he notes that "each and every additional protective measure that we can muster across populations at risk—even

small ones like those we modeled—will lead to fewer infections, which means fewer new variants, which may mean a quicker end to the pandemic."

More information: Nathaniel Hupert et al, Heterologous vaccination interventions to reduce pandemic morbidity and mortality: Modeling the US winter 2020 COVID-19 wave, *Proceedings of the National Academy of Sciences* (2022). DOI: 10.1073/pnas.2025448119

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