

Childhood vaccination: The benefits spread beyond children

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An Australian and Canadian study has found while childhood COVID vaccination leads to high relative reductions in child disease and mortality, it is more beneficial to adults, particularly the unvaccinated.

Accepted into mBio, but available currently on MedRxiv, the research uses a mathematical epidemiological model to forecast the effect of childhood vaccination on the number of COVID-19 cases, hospitalizations, deaths, complications, and [vaccine](#) adverse effects in both [children](#) and in adults.

"Our model showed that childhood vaccination carries minimal risk, yet can result in large relative reductions in the disease" said Professor Michael Good from the Institute for Glycomics, Griffith University.

"For children between five to 11 years of age while we will see a high percent reduction in hospitalizations and deaths, there will not be a huge reduction in the actual number of children being hospitalized or dying because these events were so rare in the first place, even in unvaccinated children."

The study showed that the biggest benefit of childhood vaccination will, perhaps surprisingly, be seen in adult populations.

"A [critical point](#) is that for children aged five to 11, cases of vaccine-associated myocarditis and anaphylaxis are predicted to be very rare, so childhood vaccination can be used altruistically to work for the greater population," said Professor Michael Hawkes, School of Public Health, University of Alberta.

"Our results indicate that childhood vaccination generates an "altruistic" reduction in the number of adult cases, hospitalizations, and mortality particularly among the unvaccinated, who have a high risk of adverse outcomes.

"The observed effects on herd immunity were significant however, with a reduction in hospitalizations and deaths of 8 to 13%."

The implication for immunization programs of this effect on adult populations is that childhood vaccination has the greatest potential for population-wide impact when coupled with other [public health measures](#) such as social distancing, masking, improved hand hygiene and adult vaccination to maximize the reduction in cases.

"The success of childhood vaccinations on the broader community is highly dependent on the intensity of the epidemic and the rate of transmission," Professor Good said.

"Under less intense epidemic conditions, when the effective reproduction rate is slightly greater than 1, the type of modest reductions seen in adult populations due to childhood vaccination can lead to large reductions in the disease."

The authors also acknowledge that vaccinating children to benefit adults must be considered from an ethical as well as a public health perspective.

The researchers point out that in the first 19 months of the SARS-CoV-2 pandemic in the U.S. there were 349 deaths of children due to COVID-19 while the annual death rate of children due to influenza was 116.

"Currently, many children in Australia and Canada don't receive vaccination for seasonal influenza, suggesting that a substantial fraction of parents would be similarly reluctant to vaccinate their children against COVID-19, despite the fact that by vaccinating children, they are benefiting the rest of the community," Professor Good said.

"These ethical considerations can become blurred, however, because the people [childhood](#) vaccination will be protecting are often older individuals who refuse to be vaccinated in the first place, or the small

percentage of vaccinated people for whom the vaccine is ineffective.

"From a global health perspective, an additional ethical consideration is the justice of giving priority to children in high-income countries who have low risk of severe disease, while vaccines have not been made available to vulnerable adult populations in low-income countries. Doing the latter will have the added benefit reducing the likelihood of new variants of the disease emerging."

Modeling for this study was generated using publicly available data for the Delta strain of SARS-CoV-2. The researchers acknowledge that case numbers will be higher for the Omicron strain but it is predicted that the relative impacts of Omicron on children and adults as a result of vaccination of children will be similar.

More information: Michael T. Hawkes et al, Vaccinating children against COVID-19: commentary and mathematical modelling, (2022). [DOI: 10.1101/2022.01.05.22268820](https://doi.org/10.1101/2022.01.05.22268820)

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