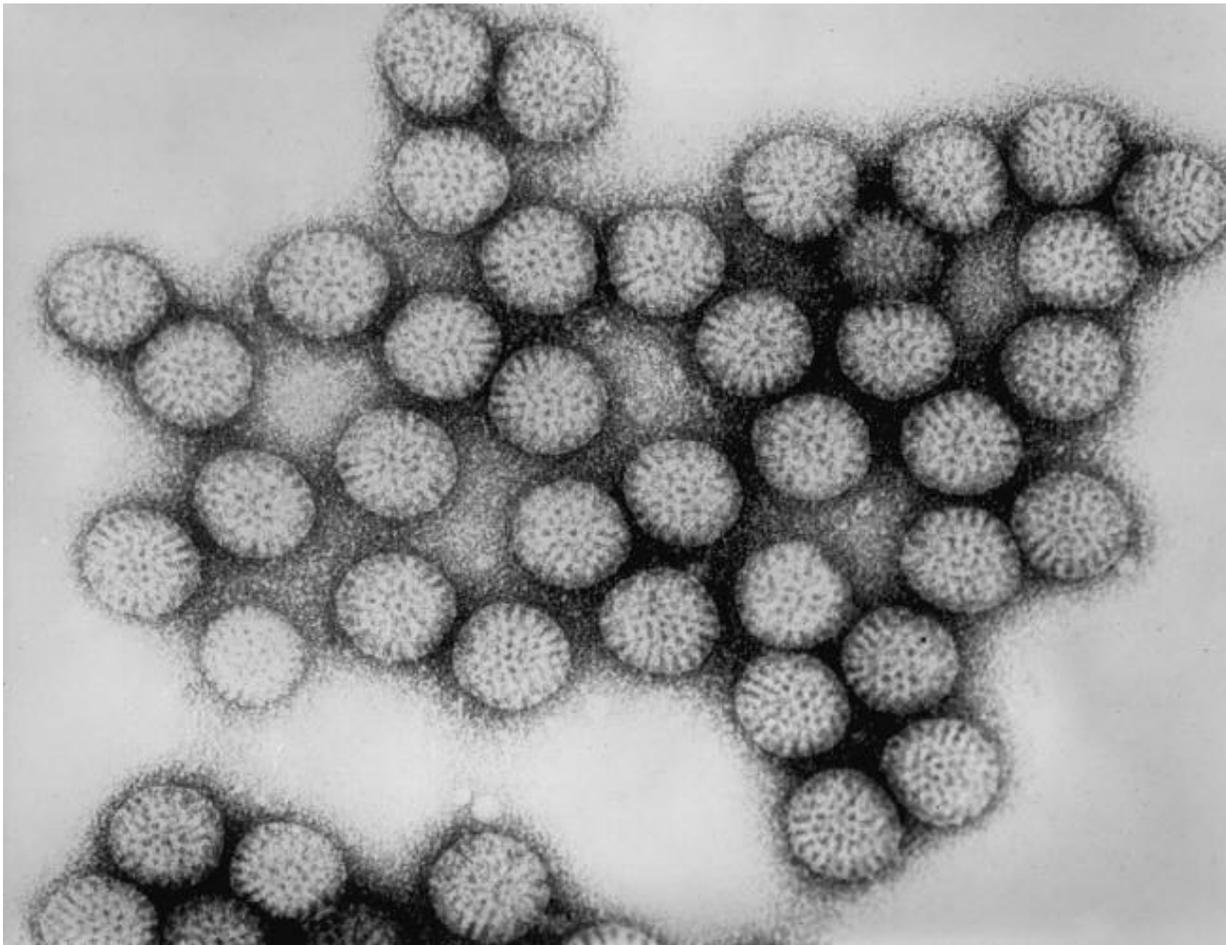


Study predicts modest impact from additional dose of rotavirus vaccine

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Transmission electron micrograph of intact rotavirus particles, double-shelled.
Transmission electron micrograph of intact rotavirus particles, double-shelled.
Credit: CDC

Giving children an additional dose of rotavirus vaccine when they are nine months old would provide only a modest improvement in the vaccine's effectiveness in low-income countries concerned about waning protection against the highly contagious disease, according to a new study led by the Yale School of Public Health and the Institute of Infection and Global Health at the University of Liverpool.

Rotavirus is the leading cause of morbidity and death from severe diarrhea in children worldwide. Rotavirus vaccines have had a substantial impact on reducing incidence of rotavirus-associated gastroenteritis or RVGE in high- and [middle-income countries](#). The vaccines' impact in [low-income countries](#) has been less defined. The vast majority of rotavirus deaths occur in Asia and Africa.

Clinical trials have reported 85-99% [vaccine efficacy](#) in high-income countries compared to only 39-67% efficacy in low-income countries.

In response to concerns about the vaccines' effectiveness in low-income countries, a team of researchers led by Associate Professor Virginia Pitzer of the Yale School of Public Health and Professor Nigel Cunliffe of the University of Liverpool conducted a detailed mathematical analysis of rotavirus vaccinations and diarrhea cases reported at the main hospital in Blantyre, Malawi, a low-income country in southeastern Africa that introduced rotavirus vaccine in 2012.

Global health experts are concerned about reports of lower vaccine effectiveness in the second year of life and have proposed administering an additional vaccine dose to children at nine months of age. Children in Malawi are currently given rotavirus vaccine at 6 and 10 weeks.

With access to 12 years of pre-vaccination and 5 years of post-vaccination data acquired through the Malawi-Liverpool-Wellcome Trust Clinical Research Programme in Blantyre, Malawi, the researchers

investigated the magnitude and duration of current vaccine protection and the potential waning of vaccine-induced immunity that was being reported. They also ran computer modeling simulations to evaluate strategies for improving vaccine effectiveness.

The analysis predicted that an additional dose of rotavirus vaccine at nine months of age would provide only a modest 5-16% reduction in overall RVGE incidence over the first three years. The findings also identified other possible reasons for why the vaccine reportedly wasn't working so well in low-income countries, besides the vaccine itself.

"Our analysis revealed that lower vaccine effectiveness during the second year of life is not necessarily indicative of waning [rotavirus vaccine](#) protection," said Pitzer, the study's lead author and an expert in the epidemiology of microbial diseases in the Yale School of Public Health's public health modeling unit.

The study documented a high rate of rotavirus transmission in Malawi; as a result, vaccination provides only partial protection and tends to delay cases among vaccinated infants to the second year of life, according to the study. A poor immune response to oral vaccination due to other causes of inflammation in the gut and interference from other vaccines, such as those for polio, may also impact vaccine effectiveness.

"Strategies to enhance the immune response to initial vaccination, including the use of next-generation vaccines that are currently in development, may lead to enhanced and more durable [vaccine](#) impact" said Cunliffe, an expert in gastrointestinal infections at the University of Liverpool's Centre for Global Vaccine Research.

The study findings can be found online today, Aug. 14, in the journal *Science Translational Medicine*.

More information: V.E. Pitzer at Yale University in New Haven, CT et al., "Evaluating strategies to improve rotavirus vaccine impact during the second year of life in Malawi," *Science Translational Medicine* (2019). stm.sciencemag.org/lookup/doi/10.1126/scitranslmed.aav6419

Provided by Yale University

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