

Mortality reduction benefits and intussusception risks of rotavirus vaccination in 135 low- and middle-income countries: evaluation of current and alternative schedules

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Background

Infant rotavirus vaccines have led to substantial reductions in hospital admissions and deaths due to gastroenteritis, but some studies have reported an elevated risk of intussusception, a rare bowel disorder.

Method

Mortality reduction benefits and intussusception risks of rotavirus vaccination were modelled for 135 low- and middle-income countries (LMICs). Numbers of rotavirus gastroenteritis (RVGE) deaths and intussusception deaths in each week of age were calculated for all infants born in the year 2015 between birth and age 5.0 years, with and without restrictions on age at administration. Benefit-risk ratios and other indicators were calculated for two current vaccination schedules and 16 alternatives.

Results

A current three-dose schedule without age restrictions could lead to ~74,000 (2.5th and 97.5th percentiles, 59,000 – 100,000) RVGE deaths averted (38% reduction) and 139 (45 – 420) intussusception deaths caused (1% increase) compared to no vaccination; a benefit-risk ratio of 532:1 (208:1 - 1665:1). For infants vaccinated outside the recommended ages, the benefit-risk ratio was 224:1 (90:1 – 656:1). Schedules with the highest predicted impact in each country (including birth and/or booster doses) could prevent ~81,000 RVGE deaths (42% reduction) and lead to 106 intussusception deaths caused (0.7% increase) compared to no vaccination; a benefit-risk ratio of 768:1.

Conclusion

Rotavirus vaccines have a favourable benefit-risk profile in LMICs. Alternative schedules have the potential to further increase benefits and reduce risks, but more efficacious rotavirus vaccines would be needed to achieve more substantial improvements in impact.