Broadening the value of viral vaccines: Contribution of varicella and rotavirus vaccinations to reduce antibiotic prescriptions

Digital poster

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Background

- Antimicrobial resistance (AMR) is considered a silent pandemic[1]
- According to the World Health Organization (WHO), vaccines play a strategic role in tackling AMR by reducing infection rates and limiting the use of antibiotics[2]
- The aim of the present work was to explore whether varicella and rotavirus vaccinations, may help reduce antibiotic prescriptions

Methods

A non-systematic literature search was carried out in the PubMed, EMBASE, SCOPUS, and Google Scholar databases. The search strategy was based on predefined keywords concerning vaccination and antibiotic use and covered the period from January 1, 2015, to December 31, 2025.

Conclusions

Although specific data generation is needed, the potential impact of varicella and rotavirus vaccinations on reducing antibiotic prescriptions may be warranted. The evaluation of the value and impact of varicella or rotavirus vaccination should encompass their potential contribution to tackling AMR and be recognized by relevant stakeholders, as recommended by the WHO.[2]

Results

Nine studies[3-11] coming from the United States of America (USA), Europe, Southeast Asia, and Latin-America were identified documenting consistent antibiotic use in the clinical management of varicella; none directly measured reductions in antibiotic use following varicella vaccination.[3-11] Five studies[12-16] from the USA, the Middle East, and India, including a systematic review, supported the evidence that rotavirus vaccination can reduce the need for antibiotic prescriptions. In a USA-based study, it was estimated that 67,045[13] initial antibiotic prescriptions among the pediatric population were prevented following the introduction of rotavirus vaccination.

Figure 1. **Goals and Objectives Identified by the WHO to Maximize the Impact of Vaccines Against Antimicrobial Resistance**[17]

Goal 1. Expand the use of licensed vaccines to maximize impact on AMR

Objective 1. Increase coverage of vaccines with impact on AMR

Objective 2. Update recommendations and normative guidance in both the vaccine and AMR sectors to include the role of vaccines to control AMR

Objective 3. Improve awareness and understanding of the role of vaccines in limiting AMR through effective communication, education, and training

Goal 2. Develop new vaccines that contribute to prevention and control of AMR

Objective 4. Bridge the funding gap for R&D of new vaccines with potential for global AMR impact

Objective 5. Develop regulatory and policy mechanisms to accelerate the approval and use of new vaccines that can reduce AMR

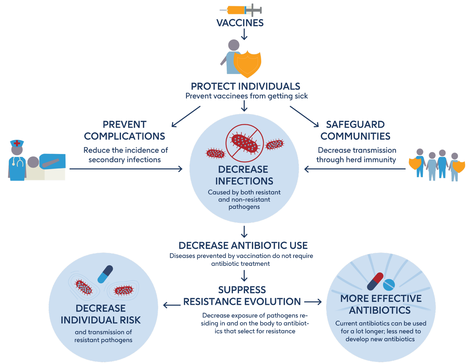
Goal 3. Expand and share knowledge of vaccine impact on AMR

Objective 6. Improve methodologies and increase collection and analysis of data to assess vaccine impact on AMR, including antimicrobial use

Objective 7. Develop estimates of vaccine value to avert the full public health and socioeconomic burden of AMR

AMR, antimicrobial resistance; R&D, research and development; WHO, World Health Organization

Figure 2. **Impact of Vaccines on AMR: A Schematic Pathway**[18]



Source: World Health Organization. Leveraging vaccines to reduce antibiotic use and prevent antimicrobial resistance: An action framework. 2020.[18] AMR, antimicrobial resistance

Table 1. **Antibiotic Prescriptions for Varicella Clinical Management Across Countries**

Region	Rate (%) of Antibiotic Prescriptions in Hospitalized Pediatric Patients	Rate (%) of Antibiotic Prescriptions in Non-Hospitalized Pediatric Patients	Prescription Rates in Complicated Cases (%)	Prescription Rates in Non-Complicated Cases (%)
Argentina[11]	73.1	—	—	—
Italy[6]	42.6	—	—	—
Belgium[9]*	—	27.3	63.5	—
England[3]	—	25.9	64.3	22.7
France[4]	—	25.1	68.1	17.3
Thailand[5]*	—	26.7†	—	—
Thailand[5]	—	19.0†	—	—
USA[7]	—	7.9‡	41.5	5.0
USA[8§]	—	17.0‡	41.5	5.0

*Data obtained from adults. †Data are primarily for outpatients; 14 hospitalized patients included; no hospitalization-specific rates reported. ‡Data are not restricted to hospitalized patients or non-hospitalized patients. §Data were generated by a vignette survey and not retrieved from clinical records. — Indicates data not specifically reported or differentiated in the study. USA, United States of America

Table 2. **Effect of Rotavirus Immunization on Antibiotic Prescriptions and Mortality-Related Outcomes in Children in India, the United States, and Israel**

Region	Type of Study	Sample Size (Children)	Rotavirus Vaccination Coverage	Reduction in Antibiotic Prescriptions	Rotavirus-Related Deaths Averted by Vaccination	Factors Related to Inappropriate Use
India[16]	Dynamic agent-based simulation	100,000 (simulated starting population)	17.8%	21.8%	38.3%	Lack of diagnostic tests and overlapping of non-specific symptoms with bacterial infections
United States[13]	Retrospective cohort	2,136,136	69.9%	20.7%	Not explicitly quantified for the US sample, but associated with a drastic reduction in hospitalisations	Etiology often unknown at the time of medical examination, prescription for viral gastroenteritis
Israel[15]	Single-center retrospective study	2,240	79.0% (cohorts born from 2011 to 2015)	47.0% (Odds Ratio 0.53, i.e. 47% reduction in odds)	Inferred through reduction of disease severity and secondary bacterial complications	Elevated levels of C-reactive protein and leukocytes, abnormal chest x-ray findings, or positive blood cultures

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Conflicts of interest

GCM declares that she has received payments/honoraria from Gilead and ViiV and has participated on Data Safety Monitoring Boards or advisory boards for Gilead and ViiV. **VB** has received payment/honoraria and support for meeting attendance from Pfizer, AstraZeneca, GSK, Moderna, Seqirus, and MSD. **FM** declares that he is an employee of GSK and holds GSK stock as part of his employment. He has participated on Data Safety Monitoring Boards or advisory boards for Sanofi, GSK, Pfizer, Seqirus, and MSD. **GG** has received consulting fees and honoraria from GSK, Sanofi Pasteur, MSD, Pfizer, Viatris, AstraZeneca, Moderna, Bavarian Nordic, and Seqirus. He serves on the Board of the Italian Vaccinal Calendar for Life, is a member of the Working Group "Vaccines and Immunization Policies" of the Italian Society of Hygiene, Preventive Medicine and Public Health (SItI), and is an advisor to the Adult Immunization Board (AIB). **PC, MF,** and **AL** declare no conflicts of interest.

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