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Poster title

Immune Training With Bacterial Lysates and Reduced Antibiotic Use in Children With Recurrent Respiratory Tract Infections: A Systematic Review, Meta-analysis, and Projection Model

Poster abstract

Background
Excessive antibiotic prescribing for recurrent respiratory tract infections (RTIs) in children is a major contributor to antimicrobial resistance (AMR). Preventive strategies for common infections are key to decrease the burden of AMR. However, interventions that demonstrably reduce antibiotic exposure are scarce. Bacterial lysates induce immune training through repeated immunomodulatory stimulation of mucosal immunity and may reduce infection burden and subsequent antibiotic use. We evaluated their effectiveness as an antibiotic-sparing strategy in pediatric recurrent RTIs.

Methods
We conducted a systematic review and meta-analysis of randomized and quasi-randomized trials assessing oral bacterial lysates in children (<18 years) with recurrent RTIs. PubMed, Embase, Web of Science, and the Cochrane Library were searched from inception to March 3, 2024. Eligible studies required ≥3 months of follow-up and reported antibiotic use or RTI outcomes. Risk of bias was assessed

using RoB 2 and ROBINS-I. Random-effects meta-analyses were performed. A population-level projection model estimated potential reductions in antibiotic courses among children with recurrent RTIs in the European Union. The protocol was registered in PROSPERO (CRD42024497733).

Results
Fifty-eight studies (5,879 children; 54 randomized trials) were included, with 48 contributing to meta-analyses. Bacterial lysates significantly reduced antibiotic courses (mean difference [MD] −1.90 courses/child-year; 95% CI −2.68 to −1.12) and antibiotic treatment duration (MD −3.95 days; 95% CI −4.45 to −3.45). Significant reductions were also observed in RTI frequency (MD −2.66 episodes, 95% CI −3.12 to −2.20), wheezing episodes, wheezing duration, and asthma exacerbations. Between-study heterogeneity was substantial. Projection modelling suggested that full uptake among EU children with recurrent RTIs could avert approximately 15.2 million antibiotic courses annually, corresponding to a 41.4% reduction, predominantly in β-lactam and macrolide use.

Conclusions
Bacterial lysates are associated with meaningful reductions in antibiotic consumption and respiratory morbidity in children with recurrent RTIs. These findings support their potential role as a complementary, non-antibiotic intervention within antimicrobial-stewardship strategies, while highlighting the need for higher-quality trials with harmonized outcome reporting.

Research topic

Epidemiology