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Review Article

Comparative outcomes of respiratory syncytial virus-related bronchiolitis with and without vaccination in children: a review of evidence

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ABSTRACT

Respiratory syncytial virus (RSV) is a leading cause of severe bronchiolitis in infants, accounting for significant morbidity, mortality, and healthcare costs globally. It is the most common pathogen identified in infant and young children with lower respiratory tract infection. Vaccination against RSV has emerged as a groundbreaking intervention, offering substantial protection against severe disease. This article examines the outcomes of RSV infections with and without vaccination, providing an evidence-based comparison from recent clinical trials and observational studies. Recent advancement in RSV vaccine development have shown remarkable efficacy in reducing severe disease particularly bronchiolitis. This article also reviews the latest evidence on the effectiveness of maternal RSV vaccination and monoclonal antibodies, highlighting their potential to transform paediatric respiratory care. Despite the efficacy of the vaccination and monoclonal antibodies in reducing morbidity and mortality, both are costly which will be a barrier especially in communities where the virus burden is highest. Global efforts are needed to make the vaccine equitable to all.

Keywords: Bronchiolitis, Recurrent wheezing, Respiratory syncytial virus, RSV-related bronchiolitis, Monoclonal antibodies, Abrysvo vaccine, Nirsevimab, Maternal immunisation

INTRODUCTION

RSV infection is a primary driver of hospitalization in children under five, with the highest burden observed in infants below six months. Severe RSV bronchiolitis does not only necessitate oxygen supplementation and intensive care but also may predispose survivors to long-term complications such as recurrent wheezing and asthma.[1,2] Until recently, preventive options were limited to monoclonal antibodies like palivizumab, which had restricted applicability due to high costs and logistical challenges. The introduction of RSV vaccines and advanced monoclonal antibodies, such as Abrysvo and Nirsevimab, offers a new pathway for reducing severe outcomes.

BURDEN OF DISEASE WITHOUT VACCINATION

In the absence of vaccination, RSV remains a significant health threat. According to a meta-analysis, approximately 33 million episodes of RSV-related acute lower respiratory infections (ALRIs) occur annually in children under five, leading to 3.6 million hospitalizations and 100,000 deaths.[3] A study by Shi et al at Lancet found that nearly 45% of hospitalizations and in-hospital fatalities related to RSV-ALRI accounts with for 28 % of

all ALRI and 13-22% of all ALRI mortality especially with infants less than 6 months old being highest risk.[4]

Unvaccinated infants, particularly those born prematurely or with underlying health conditions, face a disproportionately higher risk of severe outcomes. The RSV monoclonal antibody reduced RSV-related hospitalizations and the need for mechanical ventilation in healthy preterm and full-term infants.[5]

IMPACT OF RSV VACCINATION ON OUTCOMES

Maternal vaccination

Maternal RSV vaccination gestation has been shown to significantly reduce the burden of RSV in neonates. A pivotal phase III trial on women with low-risk pregnancies at 24-36 weeks gestation had demonstrated that the Abrysvo vaccine reduced incidence of medically-attended RSV respiratory tract infections by 81.8% during 1st 90 days of life and protection rate for severe disease exceeded 69% within first 6 months of life.[6]

A separate study in the New England journal of medicine 2020 found that maternal vaccination decreased RSV-related hospitalizations with a reduction in lower respiratory tract infections with severe hypoxemia.[7] Vaccinated neonates were also less likely to require prolonged hospital stays, with an average length of stay reduced by 2.5 days compared to their unvaccinated counterparts.

Monoclonal antibodies

Nirsevimab, a long-acting monoclonal antibody given before RSV season, has demonstrated efficacy in preventing medically-attended RSV infections in healthy late pre-term and term infants with no safety concerns. Clinical trials reported an efficacy of 74.5% with 95% confidence interval.[8] Unlike palivizumab, which requires monthly dosing, Nirsevimab provides season-long protection with a single dose, making it a cost-effective alternative for broader populations.

COMPARISON OF VACCINATED VERSUS UNVACCINATED OUTCOMES

Hospitalization rates

Vaccinated infants have significantly lower hospitalization rates. For example, a study comparing outcomes between vaccinated and unvaccinated infants showed that RSV-related hospitalizations were reduced by 90% with vaccination.[9]

Oxygen requirement

Among hospitalized infants, those vaccinated required supplemental oxygen less frequently than unvaccinated infants more so in infant with chronic lung disease.[10]

Intensive care admission

The risk of admission to the intensive care unit (ICU) was reduced in vaccinated infants compared to unvaccinated peers.[6,8]

Mortality rates

While RSV-related mortality is rare in high-income countries, studies from low- and middle-income countries indicate that vaccination could prevent between 55-63% of RSV-related in hospital deaths in infant less than 6 months old.[11]

CHALLENGES AND CONSIDERATIONS

Cost and accessibility

Despite their proven efficacy, RSV vaccines and monoclonal antibodies remain costly. The global health community must address these economic barriers to ensure equitable access, particularly in low-income countries where the RSV burden is highest[6.]

Durability of immunity

Current maternal vaccines provide protection primarily during the early months of life. Booster doses or alternative strategies may be required to extend protection, particularly for older infants. Long-term data on Nirsevimab and its efficacy over multiple seasons are also needed.

Public health implementation

Widespread implementation of RSV vaccination programs requires careful coordination. Maternal vaccination campaigns must align with antenatal care schedules, while targeted programs for high-risk infants will require effective outreach and education to improve uptake.

CONCLUSION

RSV vaccination represents a critical advancement in the prevention of severe bronchiolitis, offering substantial reductions in hospitalization, intensive care admission, and mortality. The comparative evidence highlights the profound benefits of vaccination over non-intervention, underscoring the urgency of integrating these tools into routine paediatric and maternal healthcare.

Future efforts should focus on improving access, addressing cost barriers, and expanding research into long-term outcomes to maximize the public health impact of these interventions.

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REFERENCES

1. Shi T, McAllister DA, O'Brien KL, Simoes EA, Madhi SA, Gessner BD, et al. Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: a systematic review and modelling study. The Lancet. 2017;390(10098):946-58.
2. Zhou Y, Tong L, Li M, Wang Y, Li L, Yang D, et al. Recurrent wheezing and asthma after respiratory syncytial virus bronchiolitis. Front Pediatr. 2021;9:649003.
3. Nair H, Nokes DJ, Gessner BD, Dherani M, Madhi SA, Singleton RJ, et al. Global burden of acute lower respiratory infections due to respiratory syncytial virus in young children: a systematic review and meta-analysis. The Lancet. 2010;375(9725):1545-55.
4. Shi T, McAllister DA, O'Brien KL, Simoes EA, Madhi SA, Gessner BD, et al. Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: a systematic review and modelling study. The Lancet. 2017;390(10098):946-58.
5. Hammitt LL, Dagan R, Yuan Y, Baca Cots M, Bosheva M, Madhi SA, et al. Nirsevimab for prevention of RSV in healthy late-preterm and term infants. N Eng J Med. 2022;386(9):837-46.
6. Papazisis G, Topalidou X. Maternal Vaccination for the Prevention of Infantile RSV Disease: An Overview of the Authorized, In-Progress, and Rejected Vaccine Candidates. Vaccines. 2024;12(9):980.
7. Madhi SA, Polack FP, Piedra PA, Munoz FM, Trenholme AA, Simões EA, et al. Respiratory syncytial virus vaccination during pregnancy and effects in infants. N Eng J Med. 2020;383(5):426-39.
8. Hammitt LL, Dagan R, Yuan Y, Baca Cots M, Bosheva M, Madhi SA, et al. Nirsevimab for prevention of RSV in healthy late-preterm and term infants. N Eng J Med. 2022;386(9):837-46.
9. Moline HL. Early Estimate of Nirsevimab Effectiveness for Prevention of Respiratory Syncytial Virus-Associated Hospitalization Among Infants Entering Their First Respiratory Syncytial Virus Season-New Vaccine Surveillance Network, October 2023-February 2024. MMWR. Morb Mortal Weekly Rep. 2024;73(9):209-214.
10. Wu P, Escobar GJ, Gebretsadik T, Carroll KN, Li SX, Walsh EM, et al. Effectiveness of respiratory syncytial virus immunoprophylaxis in reducing bronchiolitis hospitalizations among high-risk infants. Am J Epidemiol. 2018;187(7):1490-500.
11. Willemsen JE, Borghans JA, Bont LJ, Drylewicz J. Maternal vaccination against RSV can substantially reduce childhood mortality in low-income and middle-income countries: a mathematical modeling study. Vaccine: X. 2023;15:100379.

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