Maternal Views on RSV Vaccination During the First Season of Implementation in England and Scotland

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Main text

Introduction

Respiratory syncytial virus (RSV) is the leading cause of acute lower respiratory tract infections (LRTI) in infants less than 6 months old, resulting in an estimated 1.4 million hospital admissions each year worldwide[1]. A maternal bivalent RSV prefusion F protein–based (RSVpreF) vaccine was introduced to the United Kingdom routine immunization schedule in the summer of 2024. The impact of such a vaccine will depend not just on the effectiveness of the vaccine itself, but also on uptake of the vaccine by recipients. As part of the BronchStop vaccine effectiveness study[2] we conducted a survey of mothers eligible for RSV vaccination whose infants had been admitted to hospital with bronchiolitis or a LRTI. Here we present initial results from this survey to facilitate counselling of pregnant women who are offered the RSVpreF vaccination, and inform vaccine uptake strategies.

Methods

We designed a questionnaire based around the 5 Cs of vaccine hesitancy[3] (confidence, complacency, constraints, risk calculation, and collective responsibility) to understand maternal views on the new RSVpreF vaccine. Mothers were eligible to participate if they had given birth to infants born after August 12 2024 (Scotland) or September 1 2024 (England) who were admitted to hospital with a diagnosis of bronchiolitis or LRTI. The questionnaire asked whether mothers had received an RSV vaccination during pregnancy, and their views on this vaccine. The study was submitted for Integrated Research Application System (IRAS) approval with University Hospitals of Leicester NHS Trust as the Study Sponsor, IRAS ID 297802, and received a favourable opinion from

the Research Ethics Committee on August 8 2024.Responses between groups were compared using a Wilcoxon rank-sum test implemented in R[4].

Results

A total of 444 infants were recruited to the BronchStop vaccine effectiveness study from September 8 2024 to December 31 2024. Of these, 421 (94.8%) recalled whether they had received the RSV vaccination during pregnancy: 88/421 (20.9%) stated that they had received the vaccine, and 333/421 (79.1%) that they had not. RSV testing results for infants were available at time of analysis for 338/444 cases (76.1% of total).

We first compared responses from mothers whose infants were admitted with RSV positive versus RSV negative bronchiolitis/LRTI, in case knowledge about their infant's RSV status biased their views on the vaccine. We found no significant difference between the two groups for any of the responses ($p > 0.05$ for all questions). We then compared questionnaire results for mothers who had received the vaccine with those who had not (Figure 1). Mothers who had received the RSV vaccination were more likely to agree or strongly agree with the statements "I am confident that the RSV vaccine is necessary" ($p < 0.01$) and "I am confident that the RSV vaccine is safe" compared with unvaccinated mothers ($p<0.01$). However, despite differences between the vaccinated and unvaccinated groups, few mothers disagreed or strongly disagreed with the statement that the RSV vaccine was safe (7% of those vaccinated, 7% of those unvaccinated). Mothers who had not received the vaccine were more likely to disagree or strongly disagree with the statement "the RSV vaccine was easy for me to get" ($p<0.01$).

Free text responses highlighted how some pregnant women had struggled to access the RSVPreF vaccination despite a desire to receive it: one respondent stated, "I went to have the vaccine on two occasions and there were no staff members to give it" and another that they had requested the vaccine, but were informed that only 3 locations in their county were offering this, none of which were convenient for the respondent.

Discussion

In our survey we found generally positive views amongst mothers about the safety and importance of maternal RSV vaccination. An important factor for unvaccinated mothers in this context appeared not just hesitancy about the vaccine, but logistical barriers to uptake, with 35% of unvaccinated mother disagreeing or strongly disagreeing with the statement that "the RSV vaccine was easy for me to get".

This positive response from recipients to the rollout of the new vaccine is reassuring, not just for ongoing roll-out in the United Kingdom, but as the RSVPreF vaccine is introduced worldwide. Public health agencies should aim to bolster this confidence with the timely release of results of vaccine safety data at a national scale. It is also important that concerns about the safety of other RSV prevention products in older infants[5] do not affect these positive responses to maternal vaccination. In an interconnected world, information spreads widely: one of the unvaccinated respondents to the survey stated that they had seen "negative posts on social media advising against the vaccine in America".

Future efforts in the United Kingdom should focus on streamlining access to the RSVPreF vaccination for pregnant women, and raising awareness of both the vaccination and RSV disease in infants. In future qualitative work we will engage with respondents who had concerns about the safety of the RSVPreF vaccine, or remain unconcerned about the importance of RSV disease in infants, to understand reasons for this and identify ways to improve maternal vaccine uptake in future seasons.

Data from Galicia, Spain, demonstrates that uptake of the anti-RSV monoclonal antibody nirsevimab for infants can be very high (91·7%)[6], with a corresponding dramatic impact on RSV-associated hospitalisation. Moving forward, more data on maternal RSV vaccine uptake, effectiveness, and impact will be needed to allow countries to make informed choices about which infant RSV preventative is most likely to be appropriate for their local context.

References

1 Li Y, Wang X, Blau DM, *et al*. Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in children younger than 5 years in 2019: a systematic analysis. *Lancet* 2022; **399**: 2047–64.

2 Williams TC, Cunningham S, Drysdale SB, *et al*. Update to: Study Pre-protocol for 'BronchStart - The Impact of the COVID-19 Pandemic on the Timing, Age and Severity of Respiratory Syncytial Virus (RSV) Emergency Presentations; a Multi-Centre Prospective Observational Cohort Study'. *Wellcome open Res* 2024; **6**: 120.

3 Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS One* 2018; **13**. DOI:10.1371/JOURNAL.PONE.0208601.

4 R Core Team, Team RDC, R Core Team. R: A Language and Environment for Statistical Computing. Vienna, Austria, Austria: R Foundation for Statistical Computing, 2023.

5 U.S. Food & Drug Administration. Vaccines and Related Biological Products Advisory Committee Meeting December 12, 2024. 2024. https://www.fda.gov/media/184301/download.

6 Ares-Gómez S, Mallah N, Santiago-Pérez M-I, *et al*. Effectiveness and impact of universal prophylaxis with nirsevimab in infants against hospitalisation for respiratory syncytial virus in Galicia, Spain: initial results of a population-based longitudinal study. *Lancet Infect Dis* 2024; **0**. DOI:10.1016/S1473-3099(24)00215-9.

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analysis and interpretation of the data. SC, SBD, DR and TCW drafted the manuscript. All the authors revised the manuscript critically for important intellectual content and all authors approved the final manuscript prior to submission.

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Supporting data: The data used to make the calculations in this study, and associated R code, is available on GitLab ( ).