Clinical Infectious Diseases

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Safety and Immunogenicity of Bivalent RSVpreF Vaccine Coadministered With Seasonal Inactivated Influenza Vaccine in Older Adults

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Background. Respiratory syncytial virus (RSV) and influenza are both typically seasonal diseases, with winter peaks in temperate climates. Coadministration of an RSV vaccine and influenza vaccine could be a benefit, requiring 1 rather than 2 visits to a healthcare provider for individuals receiving both vaccines.

Methods. The primary immunogenicity objective of this phase 3, 1:1 randomized, double-blind, placebo-controlled study in healthy adults aged ≥65 years in Australia was to demonstrate noninferiority of immune responses with coadministration of the stabilized RSV prefusion F protein–based vaccine (RSVpreF) and seasonal inactivated influenza vaccine (SIIV) versus SIIV or RSVpreF administered alone, using a 1.5-fold noninferiority margin (lower bound 95% confidence interval >.667). Safety and tolerability were evaluated by collecting reactogenicity and adverse event data.

Results. Of 1403 participants randomized, 1399 received vaccinations (median age, 70; range, 65–91 years). Local reactions and systemic events were mostly mild or moderate when RSVpreF was coadministered with SIIV or administered alone. No vaccine-related serious adverse events were reported. Geometric mean ratios were 0.86 for RSV-A and 0.85 for RSV-B neutralizing titers at 1 month after RSVpreF administration and 0.77 to 0.90 for strain-specific hemagglutination inhibition assay titers at 1 month after SIIV. All comparisons achieved the prespecified 1.5-fold noninferiority margin.

Conclusions. The primary study objectives were met, demonstrating noninferiority of RSVpreF and SIIV immune responses when RSVpreF was coadministered with SIIV and that RSVpreF had an acceptable safety and tolerability profile when coadministered with SIIV. The results of this study support coadministration of RSVpreF and SIIV in an older-adult population.

Clinical Trials Registration. https://clinicaltrials.gov/study/NCT05301322.

Keywords. respiratory syncytial virus; influenza; RSVpreF; seasonal inactivated influenza vaccine; coadministration.

Respiratory syncytial virus (RSV) is a major cause of lower respiratory illness in people of all ages and can cause severe illness in infants and older adults [1]. In temperate climates, RSV infection typically follows a seasonal pattern, resulting in annual wintertime epidemics [2], although, during the coronavirus disease 2019 (COVID-19) pandemic, the RSV season was disrupted with interseasonal epidemics observed [3, 4].

Adults aged 65 years and older and those who have chronic heart or lung conditions or are immunocompromised have an increased risk of serious RSV infection [5]. The estimated disease burden among adults aged 60 years and older in high-income countries and regions (ie, the United States, Canada, Europe, Japan, and South Korea) in 2019 was more than 5 million cases of acute respiratory illness, almost half a million RSV-associated hospitalizations, and more than 33 000 in-hospital deaths [6]. Although available studies suggest that RSV morbidity and mortality may be comparable to influenza in older adults [7], the burden of adult RSV disease is underestimated [6, 8].

Like RSV illness, influenza is typically seasonal, with winter peaks in temperate climates. Older adults, particularly those with medical comorbidities, are at increased risk of influenza morbidity and mortality [9], and annual seasonal influenza vaccination is recommended in this population to prevent illness or reduce illness severity [10]. In some countries, high-dose or adjuvanted influenza vaccines are preferentially recommended for adults aged 65 years and older [11–13].

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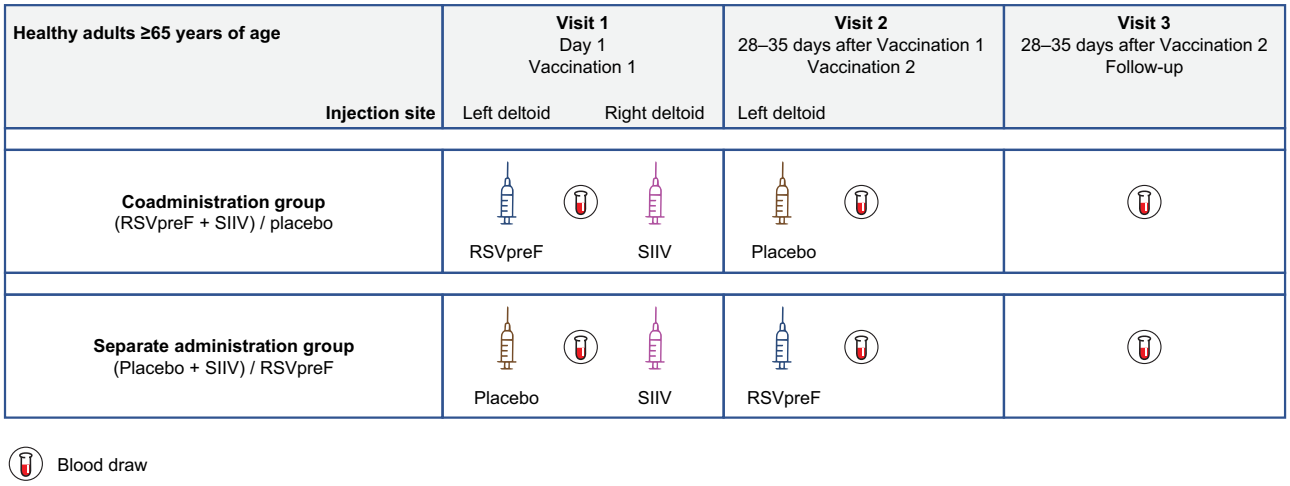

Figure 1. Study design. Abbreviations: RSVpreF, respiratory syncytial virus prefusion F protein–based vaccine; SIIV, seasonal inactivated influenza vaccine.

The RSV prefusion F protein–based (RSVpreF) vaccine is a bivalent vaccine containing stabilized prefusion F glycoproteins (preF) from the 2 major co-circulating antigenic subgroups (RSV-A and RSV-B) [14, 15]. In an ongoing global, pivotal phase 3 trial, vaccination with RSVpreF in adults aged 60 years and older was 89% effective in preventing RSV-associated lower respiratory tract illness with 3 or more signs or symptoms at the end of the first full RSV season [16, 17]. Based on the results of this trial, RSVpreF (ABRYSVO; Pfizer, Inc) was recently licensed by the US Food and Drug Administration for the prevention of lower respiratory tract disease caused by RSV in individuals aged 60 years and older [18]. RSVpreF vaccine is also licensed for the prevention of lower respiratory tract disease and severe lower respiratory tract disease caused by RSV in infants from birth through 6 months of age, based on efficacy and safety data from a study in pregnant individuals [18].

With the typical seasonality of both RSV and influenza, it is possible that RSVpreF vaccine may be given at the same time as seasonal influenza vaccine. Coadministration of these 2 seasonal vaccines would eliminate the need for an additional visit to a healthcare provider for individuals receiving both vaccines; this would likely be convenient for patients and healthcare providers and, in turn, potentially increase vaccination rates. It is important to understand whether the 2 vaccines can be safely coadministered and whether coadministration affects immune responses. Therefore, the aim of this study was to assess the safety and immunogenicity of RSVpreF when coadministered with seasonal inactivated influenza vaccine (SIIV) compared with administration of either vaccine alone.

METHODS

Study Design and Participants

This phase 3, parallel-group, placebo-controlled, randomized, double-blind study was conducted at 31 sites (clinics) in Australia (NCT05301322). Participants were enrolled by the site staff and randomized 1:1 using interactive response technology to either the coadministration group (RSVpreF + SIIV [Fluad Quad; Seqirus, Inc] administered at visit 1 and placebo administered at visit 2 [1 month later]) or the individual vaccines alone in the sequential administration group (placebo + SIIV administered at visit 1 and RSVpreF administered at visit 2 (Figure 1).

The study included healthy men and women who were 65 years and older. Those with preexisting stable disease (ie, not requiring a significant change in therapy or hospitalization and without worsening of disease during the 6 weeks before enrollment) could participate. Participants were excluded if they had a serious chronic disorder, such as metastatic malignancy, end-stage renal disease, or clinically unstable cardiac disease; had a history of Guillain-Barré syndrome; had a history of severe allergic reaction with any vaccine; allergy to egg proteins or products; had received RSV vaccine any time before enrollment or influenza vaccine within 6 months before study vaccination; or were immunocompromised, with suspected immunodeficiency, or were receiving immunosuppressive therapies. Additional exclusion criteria and methods for randomization and blinding are outlined in the Supplementary Appendix.

The study was conducted in accordance with the consensus ethical principles derived from international guidelines, including the Declaration of Helsinki and the Council for International Organizations of Medical Sciences International Ethical Guidelines, applicable International Council for Harmonisation Good Clinical Practice guidelines, and applicable laws and regulations, including privacy laws. All participants provided written informed consent.

Immunogenicity Objectives and Assessments

Blood was collected before each vaccination and 1 month after the second vaccination, and serum was prepared for

immunogenicity assessments. The primary RSV immunogenicity objective was to demonstrate that the immune responses, measured by RSV-A and RSV-B neutralizing titers, elicited by RSVpreF vaccine when coadministered with SIIV were noninferior to those elicited by RSVpreF vaccine alone. The primary SIIV immunogenicity objective was to demonstrate that the immune responses, measured by strain-specific hemagglutination inhibition (HAI) titers, elicited by SIIV when coadministered with RSVpreF were noninferior to those elicited by SIIV alone.

The secondary immunogenicity objectives were to describe the immune responses elicited by RSVpreF and SIIV when coadministered or when administered alone. Exploratory objectives included descriptions of seroprotection and seroconversion rates after SIIV when coadministered with RSVpreF or when administered alone.

Safety Objectives and Assessments

The primary safety objective was to evaluate the safety profiles of RSVpreF when coadministered with SIIV or when administered alone 1 month after SIIV. Local reactions at the RSVpreF or placebo injection site (left deltoid) and systemic events (including fever) occurring within 7 days after each vaccination were recorded by participants in an electronic diary (e-diary) device or smartphone app; SIIV injection-site reactions were not collected via the e-diary but reported as adverse events (AEs). Severity scales for local reactions and systemic events are shown in Supplementary Table 1. Adverse events and serious AEs (SAEs) occurring within 1 month after each vaccination were collected, and investigators assessed causality of AEs relative to the blinded study vaccine (RSVpreF/placebo). The AEs were categorized according to Medical Dictionary for Regulatory Activities v25.1 terms [19].

Statistical Analysis

Sample-size considerations are summarized in the Supplementary Appendix. Statistical analyses were conducted with SAS software (SAS Institute, Cary, NC).

The geometric mean ratios (GMRs) of RSV neutralizing titers in the coadministration group to the sequential administration group for RSV-A and RSV-B at 1 month after RSVpreF vaccination were determined along with associated 2-sided 95% confidence intervals (CIs). The GMRs of strain-specific HAI titers in the coadministration group to the sequential administration group at 1 month after receipt of SIIV were determined along with the associated 2-sided 95% CIs. Using a 1.5-fold margin, noninferiority was declared if the lower bound of the 2-sided 95% CI for each GMR was greater than 0.667 for all 4 SIIV strains (H1N1 A/Victoria, H3N2 A/Darwin, B/Austria, and B/Phuket) and for both RSV-A and RSV-B. The 1.5-fold noninferiority margin and lower-bound 2-sided 95% CI cutoff are consistent with the noninferiority criteria used in other vaccine trials [20] and based on precedent established in discussion with regulatory agencies. An exploratory subgroup analysis of the primary immunogenicity endpoints stratified by age (65–74 years and ≥75 years) was also conducted.

Geometric means (at each applicable visit) and geometric mean fold-rises (GMFRs; from before to each applicable time point after RSVpreF vaccination) of the RSV neutralizing titers and the associated 2-sided 95% CIs were determined for each vaccine group (coadministration group vs sequential administration group) for RSV-A and RSV-B. Geometric means (at baseline and 1 month after SIIV) and GMFRs (from before vaccination to 1 month after vaccination with SIIV) of strain-specific HAI titers and the associated 2-sided 95% CIs were summarized similarly.

Empirical reverse cumulative distribution curves plotted the proportions of participants with values equal to or exceeding a specified assay value versus the indicated assay value for all observed assay values. Seroprotection (defined as strain-specific HAI titers ≥1:40 before vaccination and 1 month after vaccination with SIIV) rates were determined along with the associated Clopper-Pearson 95% CIs. Seroconversion was defined as an HAI titer less than 1:10 before vaccination with SIIV and with an HAI titer of 1:40 or greater 1 month after vaccination with SIIV, or an HAI titer 1:10 or greater before vaccination and with a 4-fold or more increase in HAI titer 1 month after vaccination with SIIV. For each influenza strain, counts and percentages of participants with strain-specific HAI titer seroconversion 1 month after vaccination with SIIV were determined along with the associated Clopper-Pearson 95% CIs.

The primary safety objective was evaluated by descriptive summary statistics for local reactions, systemic events, AEs, and SAEs after each vaccination for each vaccine group along with 95% CIs computed using the Clopper-Pearson method.

RESULTS

Participants

The study was conducted from 13 April to 12 October 2022 in Australia to coincide with the typical Southern Hemisphere RSV and influenza seasons. In total, 1403 participants were randomized (coadministration group, n = 705; sequential administration group, n = 698) (Figure 2). Overall, 98.2% (1378/1403) of participants completed the study (coadministration group, 97.3% [686/705]; sequential administration group, 99.1% [692/698]). Baseline demographic characteristics were well balanced between study groups (Table 1). The median (range) age was 70 (65–91) years; 55% (770/1399) of participants were female, 95% (1334/1399) were White, and 45% (630/1399) reported current or former tobacco use. The majority of participants (~95%) reported a history of medical conditions expected in older adults, including respiratory and

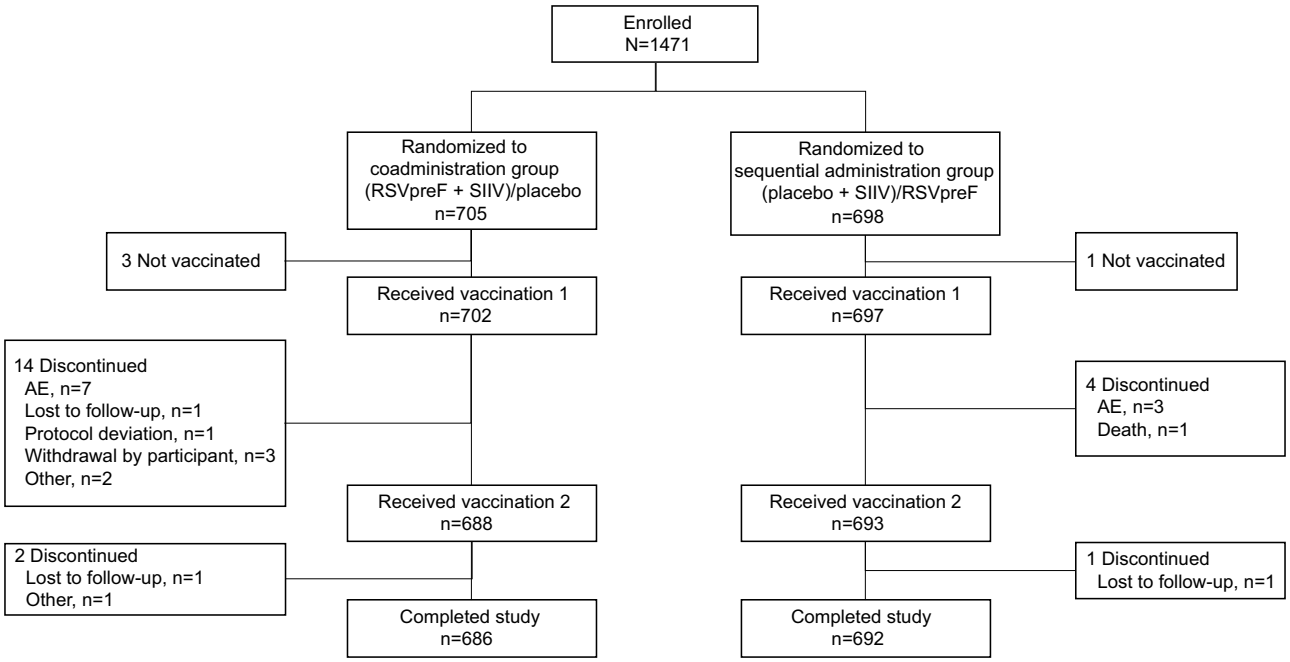

Figure 2. Participant disposition. "Enrolled" refers to participants who were recruited by study site staff and gave written informed consent, regardless of whether they were randomized. Abbreviations: AE, adverse event; RSVpreF, respiratory syncytial virus prefusion F protein–based vaccine; SIIV, seasonal inactivated influenza vaccine.

cardiac conditions (~22% and 17% in each group, respectively). The clinically significant medical history of the participants is summarized in Supplementary Table 2.

Immunogenicity

For the primary immunogenicity evaluation, 1352 (96%) participants were included in the evaluable RSV immunogenicity population and 1367 (97%) were included in the evaluable SIIV immunogenicity population.

The GMRs for coadministration to sequential administration were 0.86 for RSV-A and 0.85 for RSV-B neutralizing titers at 1 month after RSVpreF vaccination and 0.77 to 0.90 for strain-specific HAI titers at 1 month after vaccination with SIIV (Figure 3), with each of the 6 assay strains/subgroups achieving the 1.5-fold prespecified noninferiority margin (lower bound 95% CI >0.667). The primary immunogenicity objectives of the study were therefore achieved. In the subgroup analysis, immune responses in participants aged 75 years and older were consistent with the overall population (Supplementary Figure 1).

The GMFRs of RSV 50% neutralizing titers from baseline (before vaccination) to 1 month after vaccination showed robust immune responses when RSVpreF was coadministered with SIIV (10.0 and 10.1 for RSV-A and RSV-B, respectively) or administered alone (11.4 and 12.0, respectively) (Supplementary Figure 2*A*). The GMFRs of the HAI assay 1 month after receiving SIIV alone ranged from 2.3 to 5.4 across the 4 influenza strains, and GMFRs 1 month after receiving SIIV coadministered with RSVpreF ranged from 2.1 to 4.1 (Supplementary Figure 2*B*).

Reverse cumulative distribution curves of RSV-A and RSV-B 50% neutralizing titers 1 month after RSVpreF was coadministered with SIIV or administered alone and of HAI titers 1 month after SIIV was coadministered with RSVpreF or administered alone are shown in Supplementary Figure 3. Rates of seroprotection and seroconversion were generally similar across the 4 influenza strains (Supplementary Table 3).

Safety

Local reactions and systemic events were mostly mild or moderate when RSVpreF was coadministered with SIIV. Local reaction rates were assessed only at the RSVpreF or placebo injection site and were higher after vaccination with RSVpreF (either with SIIV coadministered in the contralateral arm or given alone) compared with placebo (13.7–14.0% vs 7.6–9.1%) (Figure 4*A*). The most common local reaction was injection-site pain (reported in 11.4–12.4% of participants after receiving RSVpreF). Systemic events reported after receiving RSVpreF plus SIIV concomitantly (44.7%) were slightly higher than for those receiving placebo and SIIV (41.4%), followed by RSVpreF alone (34.4%) and placebo alone (31.6%) (Figure 4*B*). The most commonly reported systemic events were fatigue (30.0% of participants receiving RSVpreF plus SIIV concomitantly, 27.1% receiving placebo and SIIV, 19.1% receiving RSVpreF alone, and 17.6% receiving placebo alone) and headache (19.7% after receiving RSVpreF plus SIIV

Table 1. Demographic Characteristics

	Coadministration Group (RSVpreF + SIIV)/placebo (n[a] = 703)	Sequential Administration Group (Placebo + SIIV)/RSVpreF (n[a] = 696)
Age at vaccination, median (range), y	70 (65–91)	70 (65–88)
Age group at vaccination 1, n (%)		
65–74 y	567 (80.7)	559 (80.3)
≥75 y	136 (19.3)	137 (19.7)
Sex, n (%)		
Male	305 (43.4)	324 (46.6)
Female	398 (56.6)	372 (53.4)
Race, n (%)		
White	669 (95.2)	665 (95.5)
Asian	22 (3.1)	21 (3.0)
American Indian or Alaska Native	0	1 (0.1)
Native Hawaiian or Other Pacific Islander	4 (0.6)	3 (0.4)
Not reported	2 (0.3)	1 (0.1)
Unknown	2 (0.3)	4 (0.6)
Multiracial	4 (0.6)	1 (0.1)
Racial designation, n (%)		
Indigenous Australian[b]	3 (0.4)	6 (0.9)
Other[c]	302 (43.0)	281 (40.4)
Missing	398 (56.6)	409 (58.8)
Ethnicity, n (%)		
Non-Hispanic/non-Latino	652 (92.7)	647 (93.0)
Hispanic/Latino	5 (0.7)	8 (1.1)
Not reported	46 (6.5)	41 (5.9)
Tobacco use, n (%)		
Current	30 (4.3)	36 (5.2)
Former	294 (41.8)	270 (38.8)
Never	379 (53.9)	390 (56.0)

Data are for the safety population.

Abbreviations: RSVpreF, respiratory syncytial virus prefusion F protein-based vaccine; SIIV, seasonal inactivated influenza vaccine.

[a]Number of participants in the specified vaccine group; these values were used as the denominators for the percentage calculations.

[b]Defined as a racial designation being Australian Aboriginal or Torres Strait Islander.

[c]Defined as a non-missing racial designation other than Australian Aboriginal or Torres Strait Islander and includes Indian Subcontinent Asian, Southeast Asian, Japanese, Chinese, Filipino, and other.

concomitantly, 20.9% after placebo and SIIV, 16.2% after RSVpreF alone, and 15.1% after placebo). Most systemic events were mild or moderate; the percentage of participants reporting any severe systemic event after vaccination was 0.1% to 1.7% across groups. The occurrence of fever after vaccination was low (1.9% after receiving RSVpreF plus SIIV concomitantly, 1.4% after placebo and SIIV, 1.2% after RSVpreF alone, and 0.9% after placebo); no fevers higher than 40.0°C were reported during the study. The median onset of local reactions after receiving RSVpreF plus SIIV concomitantly or RSVpreF alone was 1 to 2 days after vaccination and resolved after a median duration of 1 to 2 days. The median onset of systemic events after receiving RSVpreF plus SIIV concomitantly or RSVpreF alone was 1 to 3 days and 1 to 3.5 days after vaccination, respectively. The median duration of systemic events after receiving RSVpreF plus SIIV concomitantly or RSVpreF alone was 1 to 2 days.

For AEs reported within 1 month after each vaccination, 21.9% of participants reported AEs after receiving RSVpreF plus SIIV concomitantly, 19.3% after placebo and SIIV, 16.6% after RSVpreF alone, and 17.0% after placebo alone (Figure 5). The most commonly reported AEs within 1 month after each vaccination were in the infections and infestations system organ class (8.8–12.2%), with COVID-19 being the most frequent AE (2.9–5.1%) (Supplementary Table 4). Atrial fibrillation was reported by 3 participants, all considered by the investigator to be unrelated to study vaccination: 1 participant on day 31 after receiving RSVpreF plus SIIV (nonserious AE, related to coronary artery bypass graft surgery), 1 participant on day 22 after receiving RSVpreF alone (SAE, related to aortic valve replacement procedure), and 1 participant on day 26 after receiving RSVpreF alone (nonserious AE, not related to study vaccination). The only AE reported in more than 1 participant that was considered to be related to study vaccination (either RSVpreF or placebo) by the investigator was lymphadenopathy, which occurred in 2 (0.3%) participants after coadministration of RSVpreF and SIIV (1 participant reported submandibular lymphadenopathy on day 2 after vaccination lasting 3 days; the other reported enlarged neck lymph node on day 2 after vaccination lasting 1 day).

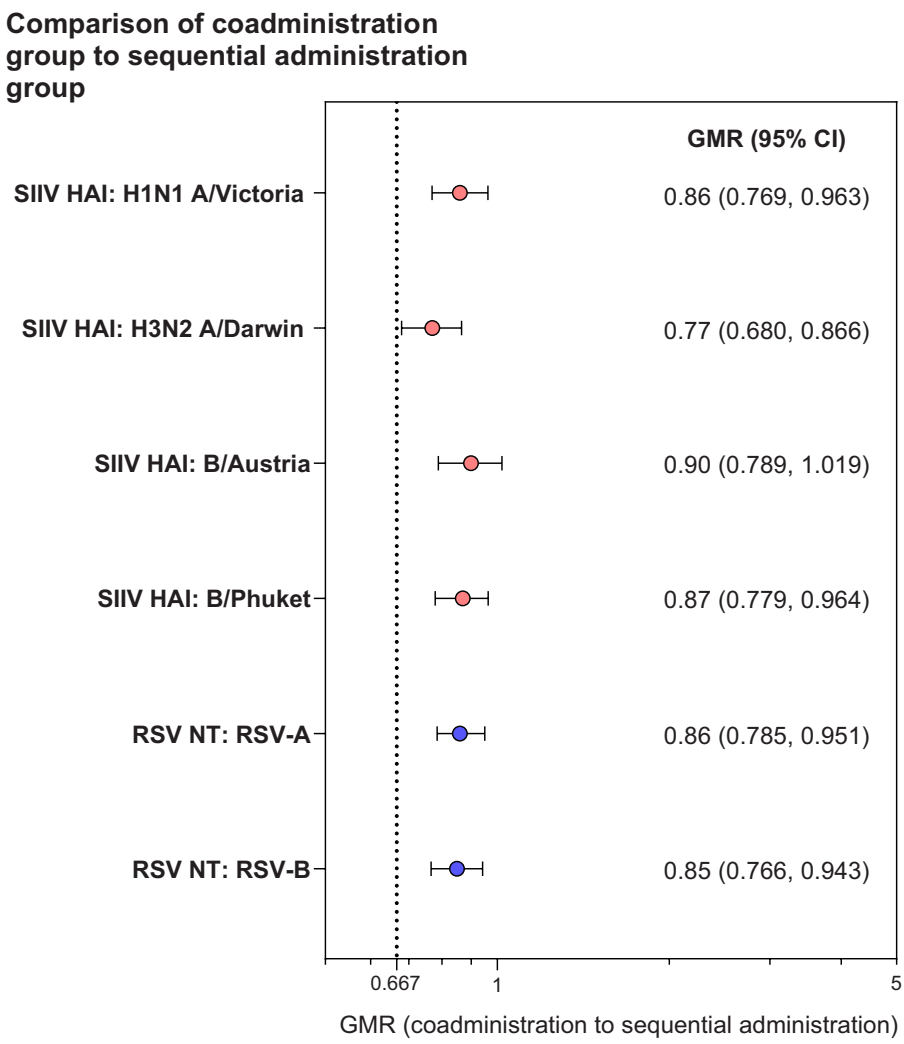

Figure 3. Geometric mean ratios (95% CIs) for influenza strain HAI titers and RSV neutralizing titers at 1 month after vaccination. Data are for the evaluable SIIV immunogenicity population and evaluable RSV immunogenicity population. Two-sided 95% CIs were based on the Student's *t* distribution. The dotted line represents the prespecified noninferiority margin. The number of participants with valid and determinate assay results for the specified assay in the respective evaluable immunogenicity population was 674–681. Abbreviations: CI, confidence interval; GMR, geometric mean ratio; HAI, hemagglutination inhibition; NT, 50% neutralizing titer; RSV, respiratory syncytial virus; RSVpreF, respiratory syncytial virus prefusion F protein–based vaccine; SIIV, seasonal inactivated influenza vaccine.

One month after vaccination, SAEs were reported in 1.1% of participants who received RSVpreF plus SIIV concomitantly and in 0.9% of those receiving placebo and SIIV; no SAEs were considered to be study vaccine–related. No participants reported Guillain-Barré syndrome or other immune-mediated demyelinating conditions. One participant with a history of hypertension, dyslipidemia, mitral valve incompetence, and aortic stenosis died of cardiac failure 28 days after receipt of placebo and SIIV; the death was not considered vaccine-related by the investigator.

DISCUSSION

We found that the bivalent RSVpreF vaccine and SIIV can be safely coadministered to individuals aged 65 years and older, with immune responses meeting the prespecified immunogenicity endpoint for noninferiority for both vaccines. Robust immune responses were observed when RSVpreF was coadministered with SIIV or given alone. When RSVpreF was administered alone, RSV neutralizing titer GMFRs were similar to previous studies in this age group [21, 22]. Immune responses were similar among study groups, with comparable HAI titer seroprotection and seroconversion rates. A subgroup analysis showed that results in participants aged 75 years and older were consistent with the overall population, albeit with wider CIs due to lower numbers relative to 65- to 74-year-olds. The HAI titers for H3N2 trended lower than the other influenza strains tested, but met noninferiority criteria. Collectively, these results support coadministration of RSVpreF and SIIV as an appropriate option, as evidenced by noninferior immune

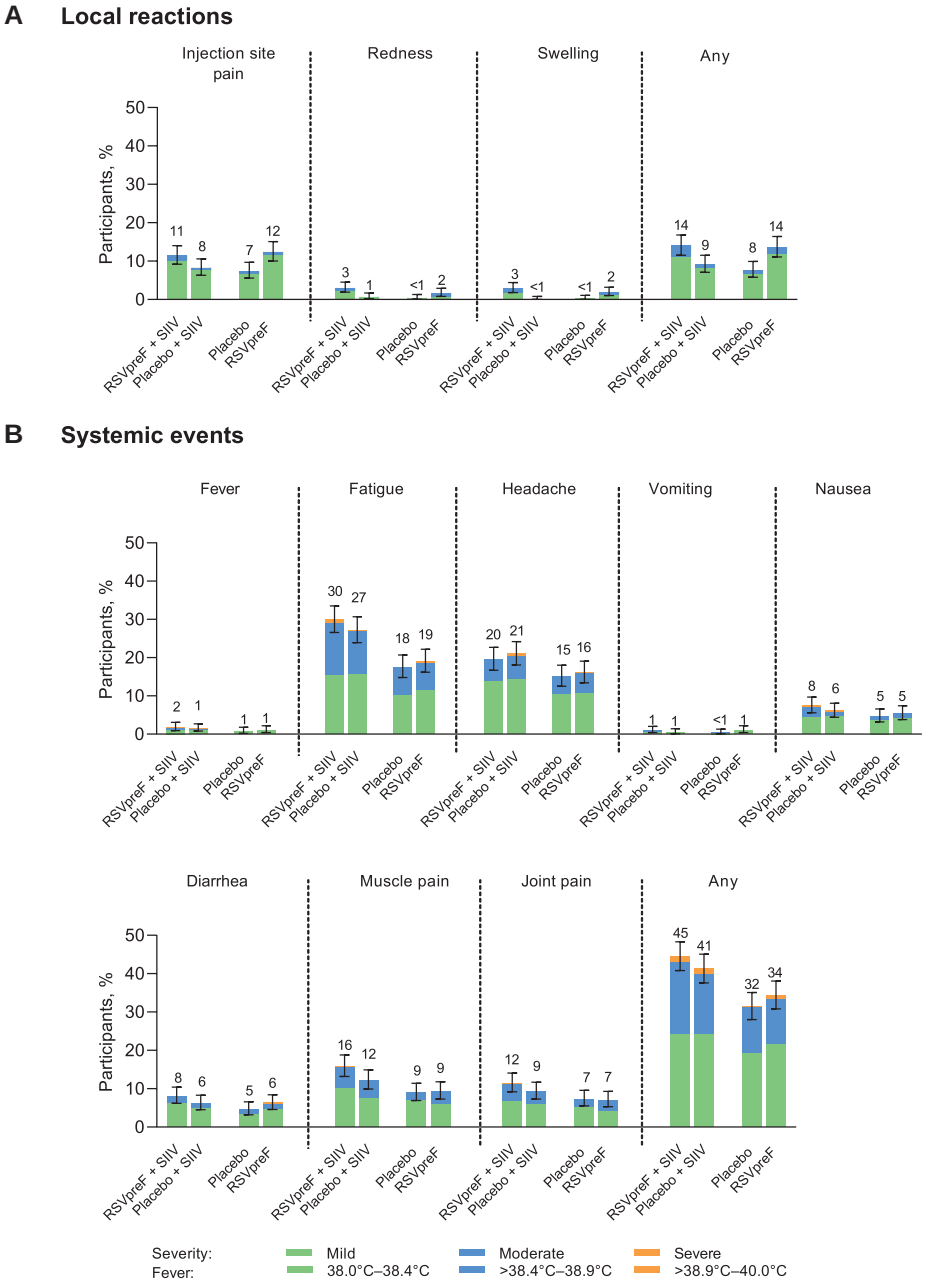

Figure 4. Local reactions (*A*) and systemic events (*B*) reported within 7 days of vaccination. Data are for the safety population. Severity grading of the specific local reactions and systemic events is provided in Supplementary Table 1. Error bars represent 95% CIs computed using the Clopper-Pearson method and numbers above the bars indicate the percentage of participants in each group reporting the specified event (rounded to whole numbers). Local reactions were reported by participants at the RSVpreF or placebo injection site only. RSVpreF + SIIV (n = 701); placebo (n = 681); placebo + SIIV (n = 693); RSVpreF alone (n = 686). Abbreviations: CI, confidence interval; RSVpreF, respiratory syncytial virus prefusion F protein–based vaccine; SIIV, seasonal inactivated influenza vaccine.

responses and lack of clinically significant tolerability or safety issues. No neuroinflammatory or demyelinating conditions were reported in the study.

By eliminating the need for an additional vaccination visit, coadministration of RSVpreF vaccine and influenza vaccine in individuals who are recommended to receive both vaccines may offer convenience to patients and healthcare providers. At the end of the 2022–2023 winter, influenza vaccine uptake in the United States was 71% in adults aged 65 years and older, which was higher than the previous year [23]. If this encouraging uptake could be sustained and influenza vaccine coadministered with RSVpreF, this would help protect a substantial proportion of older adults against these important respiratory pathogens. This is especially important given the

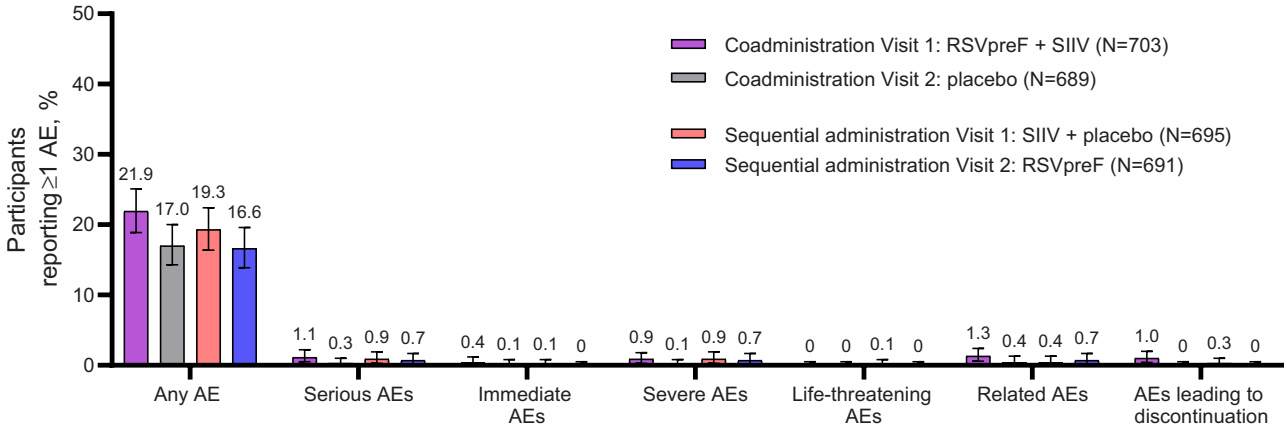

Figure 5. Adverse event summary within 1 month of each vaccination. Data are for the safety population. The numbers above the bars show the percentage of participants who experienced 1 or more of the specified type of event within 1 month after the respective vaccination. Error bars represent exact 2-sided 95% CIs calculated using the Clopper-Pearson method. An immediate AE was defined as any AE that occurred within the first 30 minutes after administration of study vaccine (RSVpreF or placebo). Related AEs were determined by the investigator. Abbreviations: AE, adverse event; CI, confidence interval; RSVpreF, respiratory syncytial virus prefusion F protein–based vaccine; SIIV, seasonal inactivated influenza vaccine.

surge in RSV cases in the Northern Hemisphere in the fall of 2022 [24, 25]. Coadministration of influenza vaccines with other respiratory vaccines, for example those targeting COVID-19 and pneumococcal disease, has also been shown to be safe and immunogenic [26–28].

Although this study was conducted in older adults, we expect that the favorable safety profile and robust immunogenicity observed with coadministration would support broader application.

Strengths of this study include the randomized, double-blind design, which enabled comparison of RSVpreF and SIIV coadministration to sequential administration while providing all participants with both vaccines. The study was conducted in adults 65 years and older, a population well recognized for being substantially at risk of severe complications of both RSV illness and influenza infection [5, 9]. Study limitations include that the only participants evaluated were those aged 65 years and older from Australia, with demographic characteristics that differ from other countries. Another study limitation is that immunocompromised individuals were excluded.

Conclusions

The study met the primary endpoint, demonstrating that immune responses to RSVpreF and SIIV were noninferior when the vaccines were coadministered. The results also support the safety and tolerability of RSVpreF when coadministered with SIIV. Collectively, these results support coadministration of RSVpreF and SIIV in adults aged 65 years and older to help protect against these 2 important respiratory pathogens in this vulnerable population.

Supplementary Data

Supplementary materials are available at *Clinical Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Author Contributions. E. A. and R. J. S. were involved in data collection and analysis and interpretation of results. J. B., K. Q., A. J., Q. J., D. C., A. S. A., K. A. S., W. C. G., A. G., and B. S.-T. were involved in study concept and design, and analysis and interpretation of results. W. L. was involved in analysis and interpretation of results. M. W. C. was involved in data collection. E. V. K. was involved in the study concept and design and data collection. All authors drafted the manuscript and/or reviewed and approved the final manuscript.

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Data availability. Upon request, and subject to review, Pfizer will provide the data that support the findings of this study. Subject to certain criteria, conditions, and exceptions, Pfizer may also provide access to the related individual de-identified participant data. See https://www.pfizer.com/science/clinical-trials/trial-data-and-results for more information.

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Potential conflicts of interest. E. A. reports receiving consulting fees from Moderna for vaccine advisory meeting. R. J. S. reports being an investigator for Pfizer (consultant doctor/medical investigator for the University of the Sunshine Coast Clinical Trials team; received consulting fees to work as a medical investigator; and was involved with the conduct of the clinical trial for Pfizer RSVpreF vaccine at the clinical trial site in Queensland, Australia). A. G. reports patents planned, issued, or pending: WO2017/1096729. All authors (except E. A. and R. J. S.) are employees of Pfizer, Inc, and may hold stock or stock options.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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