Table 2. Efficacy against first or only HZ episode from 30 days post-dose 2 to study end (post-hoc analysis, mTVC)

RZV Adjuvanted recombinant zoster vaccine group N=259			PL Placebo group N=256			Vaccine efficacy % (95% CI)
No. of confirmed HZ cases	Cumulative follow-up (person-years)	Rate of HZ (cases/1000 person-years)	No. of confirmed HZ cases	Cumulative follow-up (person-years)	Rate of HZ (cases/1000 person-years)	
2	236.1	8.5	14	211.6	66.2	87.20 (44.25-98.59) p = 0.0021

HZ, herpes zoster; **N,** number of participants in the modified total vaccinated cohort (**mTVC**), which included all participants from the TVC except those who did not receive the second dose or who developed a confirmed HZ case prior to 30 days post-dose two; **CI**, confidence interval.

Table 3. Reactogenicity and safety (total vaccinated cohort)

Specification	RZV Adjuvanted recombinant zoster vaccine group		PL Placebo group	
	n	% (95% CI)	n	% (95% CI)
Within 7 days after each vaccination (overall/subject)	N=278		N=274	
Any solicited local symptom	233	83.8 (78.9–87.9)	48	17.5 (13.2–22.5)
Grade 3 solicited local symptom	37	13.3 (9.5–17.9)	0	0.0 (0.0–1.3)
Any solicited general symptom	206	74.1 (68.5–79.1)	134	48.9 (42.8–55.0)
Grade 3 solicited general symptom	43	15.5 (11.4–20.3)	17	6.2 (3.7–9.7)
Within 30 days after each vaccination (overall/subject)	N'=283		N'=279	
Any unsolicited adverse event	134	47.3 (41.4–53.3)	128	45.9 (39.9–51.9)
Considered related by investigator	19	6.7 (4.1–10.3)	5	1.8 (0.6–4.1)
Grade 3 unsolicited adverse event	25	8.8 (5.8–12.8)	28	10.0 (6.8–14.2)
Considered related by investigator	5	1.8 (0.6–4.1)	0	0.0 (0.0–1.3)
From first vaccination up to 1 year post-last dose	N'=283		N'=279	
Any serious adverse event	66	23.3 (18.5–28.7)	82	29.4 (24.1–35.1)
Considered related by investigator	1	0.4 (0.0–2.0)	1	0.4 (0.0–2.0)
Potential immune-mediated disease	3	1.1 (0.2–3.1)	2	0.7 (0.1–2.6)
Fatal adverse events	29	10.2	37	13.3
Considered related by investigator*	1	0.4	0	0.0

N, number of participants with at least one solicited local or general symptom documented as either present or absent; **N'**, number of participants with at least one administered dose; **n (%)**, number (percentage) of participants reporting an event; **CI**, confidence interval. The total vaccinated cohort included participants who received at least 1 vaccine/placebo dose.

***Note:** One of the fatal serious adverse events in the RZV group was a case of "death neonatal" (preferred term) which was an event in the offspring of a subject which was vaccinated before estimated pregnancy onset and was assessed by the investigator as causally related to vaccination. During the entire study period, there were two pregnancy outcomes in 1 subject who was negative for pregnancy tests at both vaccination Visits 1 and 2 and exposed to the second dose of RZV prior to estimated pregnancy onset. Both pregnancies resulted in live infants with no congenital anomalies.

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150. Relative Effectiveness of High-Dose and Standard-Dose Influenza Vaccine Against Influenza-Related Hospitalization Among Older Adults—United States, 2015–2017

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Background. Seasonal influenza causes substantial morbidity and mortality, and older adults are disproportionately affected. Newer vaccines have been developed for use in people 65 years and older, including a trivalent inactivated vaccine with a 4-fold higher dose of antigen (IIV-HD). In recent years, the use of IIV-HD has increased sufficiently to evaluate its effectiveness compared with standard-dose inactivated influenza vaccines (IIV-SD).

Methods. Hospitalized patients with acute respiratory illness were enrolled in an observational vaccine effectiveness study at 8 hospitals in 4 states participating in the United States Hospitalized Adult Influenza Vaccine Effectiveness Network during the 2015–2016 and 2016–2017 influenza seasons. Predominant influenza A virus subtypes were H1N1 and H3N2, respectively, during these seasons. All enrolled patients were tested for influenza virus with polymerase chain reaction. Receipt and type of influenza vaccine was determined from electronic records and chart review. Odds of laboratory-confirmed influenza were compared among vaccinated and unvaccinated patients. Relative odds of laboratory-confirmed influenza were determined for patients who received IIV-HD or IIV-SD, and adjusted for potential confounding variables via logistic regression.

Results. Among 1,744 enrolled patients aged ≥ 65 years, 1,105 (63%) were vaccinated; among those vaccinated, 621 (56%) received IIV-HD and 484 (44%) received IIV-SD. Overall, 315 (18%) tested positive for influenza, including 97 (6%) who received IIV-HD, 86 (5%) who received IIV-SD, and 132 (8%) who were unvaccinated. Controlling for age, race, sex, enrollment site, date of illness, index of comorbidity, and influenza season, the adjusted odds of influenza among patients vaccinated with IIV-HD vs. IIV-SD were 0.72 (P = 0.06, 95% CI: 0.52 to 1.01).

Conclusion. Comparison of high-dose vs. standard-dose vaccine effectiveness during 2 recent influenza seasons (1 H1N1 and 1 H3N2-predominant) suggested relative benefit (nonsignificant) of high-dose influenza vaccine in protecting against influenza-associated hospitalization among persons aged 65 years and older; additional years of data are needed to confirm this finding.

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151. Evaluation of Pneumococcal Vaccine Effectiveness Against Invasive Pneumococcal Disease Among US Medicare Beneficiaries ≥65 Years Old

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Background. Pneumococcal conjugate vaccine (PCV13) was recommended in series with PPSV23 for all US adults ≥65 years in late 2014. We evaluated effectiveness of PCV13 against invasive pneumococcal disease (IPD) among Medicare beneficiaries ≥65 years old to assess this new policy.

Methods. We linked records for IPD cases (pneumococcus isolated from sterile sites) in persons ≥65 years old identified through Active Bacterial Core surveillance with those of Medicare beneficiaries. Isolates were serotyped and classified as PCV13 (with or without cross-reacting type 6C), and nonvaccine types. We selected Medicare beneficiaries with no record of IPD or pneumonia as controls, and matched to cases on age, residence census tract, and length of Medicare enrollment; we included all eligible controls. Vaccination and medical histories were obtained through Medicare. We estimated vaccine effectiveness (VE) as 1 minus the IPD odds ratio for vaccinated (PCV13) vs. unvaccinated (no PCV13 or PPSV23) persons using conditional logistic regression, adjusted for sex and underlying conditions.

Results. From 2,246 IPD cases identified in 2015–2016, 1,017 (45%) were matched to Medicare beneficiaries. After excluding cases in persons residing in long-term care facilities or with <1 year of Medicare enrollment, we included 699 eligible cases and 10,152 controls in our analysis. PCV13-types (+6C) accounted for 164 (23%) cases, and serotype 3 was the most common PCV13-type. Case patients were more likely than controls to have one or more chronic (88% vs. 58%) or immunocompromising (54% vs. 32%) conditions present. Fourteen percent, 22%, and 8% of case patients, and 18%, 21%, and 8% of controls received PCV13 only, PPSV23 only, or both vaccines, respectively. PCV13-only VE against PCV13-types was 36% (95% CI −18, 65%). When we included type 6C with PCV13-types, VE was 67% (95% CI 11, 88%). PCV13 showed similar effectiveness against PCV13 type (+6C) IPD among adults >75 years

of age (VE 61%, 95% CI 14, 82). VE was 26% (95% CI −58, 65%) against serotype 3 and 67% (95% CI 11, 88%) against other PCV13-types (+6C). PCV13 was not effective against nonvaccine types.

Conclusion. PCV13 was effective in preventing IPD caused by PCV13 types when excluding type 3; no effectiveness was demonstrated against serotype 3.

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152. Protective Antibody Levels 7.5 Years After Primary Vaccination in Adolescence With a Recombinant, 4-Component, Meningococcal Serogroup B Vaccine (4CMenB) and Response to a Booster Dose in Adolescents and Young Adults: Phase IIIb Clinical Findings

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Background. 4CMenB has been shown to be immunogenic with an acceptable safety profile in infants and young adolescents. However, no data on long-term persistence after primary vaccination in adolescents are available. This is the first study to assess antibody persistence, booster response, and safety of 4CMenB in adolescents and young adults up to 7.5 years following the primary vaccination in adolescence.

Methods. This phase 3b, open-label, extension study (NCT02446743) assessed the antibody persistence and booster response at 4 years (Canada and Australia, NCT01423084) or 7.5 years (Chile, NCT00661713) after primary vaccination with 4CMenB (following 0 + 1-, 0 + 2-, or 0 + 6-month schedules), compared with vaccine-naïve (VN), healthy controls. Chilean follow-on (FO) and VN participants aged 18–24 years received either a booster dose of 4CMenB 7.5 years postprimary series (Group FO, N = 131) or 2 primary doses, 1 month apart (Group VN, N = 150). Immunogenicity was measured using human serum bactericidal antibody assay (hSBA) against antigen-specific strains. Immune response was evaluated 1 month post-booster vaccination and compared with VN controls at 1 month post-first dose. Kinetics of antibody responses were measured at 3, 7, and 30 days post-vaccination. Safety was assessed.

Results. Antibody levels waned at 7.5 years postprimary vaccination in Group FO, but were higher than in Group VN at baseline, for all antigens except NHBA (table). At 1 month post-booster/post-first dose, 93–100% (Group FO) and 62–93% (Group VN) of participants had hSBA titres ≥4; GMTs ranged between 41 and 1,951 (Group FO) and 9.43–46 (Group VN) (table). The percentages of FO participants with hSBA titres ≥4 remained similar to prebooster for all 4 antigens at 3 days, increased at 7 days, and remained unchanged or increased further 30 days post-booster. The reactogenicity of 4CMenB was consistent with previous observations in this age group; no safety concerns were identified during the study.

Table. Antibody persistence and response to a booster (Group FO) or first dose (Group VN)

Antigen	Day	Group FO			Group VN		
		N	hSBA titres ≥4 % (95% CI)	GMT value (95% CI)	N	hSBA titres ≥4 % (95% CI)	GMT value (95% CI)
fHbp	1	131	44 (35.6; 53.2)	4.51 (3.57; 5.69)	150	13 (7.8; 19.1)	1.52 (1.23; 1.90)
	31	127	100 (97.1; 100)	269 (206; 351)	149	81 (73.3; 86.6)	24 (19; 31)
NadA	1	120	84 (76.4; 90.2)	31 (23; 42)	139	24 (16.9; 31.7)	2.30 (1.75; 3.04)
	31	102	100 (96.4; 100)	1951 (1425; 2671)	137	84 (76.7; 89.7)	31 (24; 41)
PorA	1	129	29 (21.1; 37.3)	2.56 (2.07; 3.17)	148	14 (9.0; 20.9)	1.50 (1.23; 1.84)
	31	120	93 (87.3; 97.1)	41 (30; 56)	148	62 (53.8; 70.0)	9.43 (7.15; 12)
NHBA	1	131	81 (73.1; 87.3)	22 (16; 29)	150	79 (72.0; 85.5)	18 (14; 24)
	31	127	99 (95.7; 99.98)	113 (90; 142)	149	93 (87.2; 96.3)	46 (37; 57)

Group FO, follow-on participants; **Group VN**, vaccine-naïve participants; **N (%)**, number (percentage) of participants with hSBA titres ≥4; **hSBA**, human serum bactericidal assay; **GMT**, geometric mean titre; **CI**, confidence interval; **Day 1**, pre-booster timepoint for Group FO and pre-vaccination for Group VN; **Day 31**, 1 month post-booster for Group FO and 1 month post-first dose for Group VN; **fHbp**, factor H binding protein; **NadA**, *Neisseria* adhesin A; **PorA**, Porin A; **NHBA**, neisserial heparin binding antigen.

Conclusion. Antibody levels in adolescents and young adults declined at 7.5 years after a 2-dose primary series of 4CMenB, but were higher than baseline levels in VN controls. An additional dose of 4CMenB elicited strong anamnestic responses—substantially higher than 1 dose in VN controls.

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153. The Effect of Timing of Tetanus–Diphtheria and Pertussis Vaccine Administration in Pregnancy on The Avidity of Pertussis Antibodies

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Background. Tetanus–diphtheria–pertussis (Tdap) vaccination in pregnancy is currently recommended in many countries. The optimal timing of pertussis immunization in pregnancy is not well established, leading to different recommendations. We aimed to determine the effect of timing of vaccination with Tdap in pregnancy on the umbilical cord avidity of antipertussis toxin (PT) immunoglobulin G (IgG).

Methods. Avidity of anti-PTIgG was assessed using ammonium thiocyanate (NH_4SCN) at concentrations between 0.25 M (to measure low avidity antibodies) and 3 M (to measure high avidity antibodies). Anti-PT IgG levels achieved at each NH_4SCN concentration were calculated. *T*-tests were used to compare anti-PT IgG levels between newborns of women vaccinated in early (28–32 weeks gestation) and late (33–36 weeks gestation) third trimester. Pearson correlation assessed the relationship between the timing of vaccination and anti-PT IgG levels.

Results. Newborns of women vaccinated with Tdap in early third trimester (n = 43) had higher anti-PT IgG levels at 1 M and 2 M NH_4SCN concentrations compared with newborns of women vaccinated in late third trimester (n = 47), 2.4 international units (IU)/mL vs. 1.9 IU/mL (P = 0.0073) and 2.3 IU/mL vs. 1.7 IU/mL (P = 0.0354), respectively, after adjustment for gestational age at birth. There was a negative association between later timing of vaccination in third trimester and anti-PT IgG levels achieved at 0.5 M, 1 M, 1.5 M, and 2 M NH_4SCN (all $P \leq 0.02$). There was a positive association between increasing time between vaccination and delivery and anti-PT IgG levels achieved at 0.5 M, 1 M, 1.5 M, and 2 M NH_4SCN (all $P \leq 0.02$).

Conclusion. Vaccination against pertussis during early third trimester results in higher levels of high avidity antibodies compared with vaccination in late third trimester. High avidity antibodies may confer greater protection to the neonate supporting recommendations for vaccination at 28–32 WG vs. 33–36 WG.

Disclosures. **All authors:** No reported disclosures.

154. Diagnosis and Genotyping of *Coxiella burnetii* Causing Endocarditis in a Patient With Prosthetic Pulmonary Valve Replacement (PVR) Using Next-Generation Sequencing (NGS) of Plasma

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Session: 45. Cool Findings in Bacteremia and Endocarditis
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Background. Identification of *Coxiella burnetii*, the etiologic agent of Q Fever, in culture-negative endocarditis (CNE) remains challenging, and strain-level information is typically unavailable through conventional testing. We used a novel next-generation sequencing (NGS) assay on plasma cell-free DNA to facilitate rapid diagnosis and genotyping in a patient with *C. burnetii* CNE.

Methods. NGS was performed on plasma by Karius, Inc. (Redwood City, California). Human reads were removed and remaining sequences were aligned to a curated database of over 1,000 pathogens. Organisms present above a predefined significance threshold were reported. For *C. burnetti* strain-typing, alignments to different *Coxiella* strains in the pathogen database were compared by BLAST bit-score to determine the most closely related strain to the infecting organism. *C. burnetii* genotype group was also determined by *in silico* analysis of polymorphic ORF deletion markers known to distinguish groups I–VI.

Results. Twenty-nine-year-old male with history of Tetralogy of Fallot, multiple pulmonary valve replacement (PVR), and 18 months of intermittent fever and night sweats were admitted. Relevant history included travel in South and South East Asia, the use of a LivaNova 3T Heater-Cooler device during surgery (i.e., at risk for *Mycobacterium chimaera*), and drinking unpasteurized milk. Cardiac CT showed 2 pulmonary opacities concerning for septic emboli and echocardiography showed echodensity on pulmonic valve. Blood cultures were negative. NGS detected *C. burnetii*