Methods: This study analyzed data from the Center for Disease Control and Prevention's (CDC) Behavioral Risk Factors Surveillance System (BRFSS) survey. Persons ages 18 to 36 years of age, who lived in 17 states that included the supplementary "Adult Human Papillomavirus (HPV)" module questionnaire in 2016, 2017 or 2018, were included. We compared self-reported receipt of HPV vaccination among persons living in Republican versus Democratic states, based on state electoral college votes in the 2016 US presidential election. Mantel-Haenszel stratified analysis was used to estimate prevalence ratios and to assess for effect modification and control for confounding.

Results: Overall, 36,334 survey respondents were included in the analysis, 22.7% of whom reported prior receipt of the HPV vaccine, 28.1% in Democratic states and 20.4% in Republican states. When adjusted for race, living in a Democratic state was associated with a higher prevalence of prior receipt of the HPV vaccine in comparison to living in a Republican state. This association was strongest for men less than 26 years of age (PR 1.77, 95% CI: 1.58, 1.98) but remained significant for men ages 26 – 36 years (PR 1.51, 95% CI: 1.24, 1.85), women less than 26 years of age (PR 1.20, 95% CI: 1.13, 1.27), and women ages 26 – 36 years (PR 1.69, 95% CI: 1.57, 1.83).

Conclusion: Overall HPV vaccine coverage was low in adults 18–36 years of age. The strong association between state-level voting patterns and prior receipt of the HPV vaccine suggests that HPV vaccine coverage is lower in Republican states when compared to Democratic states. Further public health efforts are needed to promote HPV vaccine uptake among young men and women, particularly in Republican voting states.

Disclosures: **All Authors**: No reported disclosures

19. Completion of Two-Dose Recombinant Zoster Vaccine Series in Adults 50 Years and Older

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Session: P-2. Adult Vaccines

Background: In 2017, the Advisory Committee on Immunization Practices preferentially recommended adjuvanted recombinant zoster vaccine (RZV) for adults ≥ 50 years as a two-dose series 2–6 months apart.[1] We evaluated two-dose RZV completion and factors associated with completion.

Methods: The study included Kaiser Permanente Southern California members ≥ 50 years who received an RZV dose during April-November 2018 and had continuous membership 12 months before to 9 months after the 1st RZV dose (RZV1). Completion was defined as receipt of the 2nd dose ≥4 weeks to 9 months after RZV1 (allowing a 3-month grace period). Characteristics including age at RZV1, sex, race/ethnicity, Medicaid status, neighborhood level income and education, distance from home to medical office, comorbidities, history of herpes zoster, health care utilization before and after RZV1, receipt of influenza vaccine, vaccination month (supply shortage proxy), concomitant vaccine, department administering RZV1, medical center, and medically attended local or systemic reaction, pain, or gout after RZV1 were compared between completers and non-completers. Adjusted odds ratios (aOR) and 95% confidence intervals (CI) for factors associated with completion were estimated by multivariable logistic regression.

Results: Among 31,120 RZV1 recipients, 67.2% completed the series within 9 months. In adjusted analyses, higher completion was associated with White compared with Black or Hispanic race/ethnicity, higher neighborhood income and education, no chronic pulmonary disease, diabetes, or dementia, more outpatient visits and fewer emergency department visits before or after RZV1, no hospitalizations after RZV1, receipt of influenza vaccine, receipt of RZV1 in June-November rather than April-May 2018, no concomitant vaccine with RZV1, and receipt of RZV1 in Family Practice rather than Internal Medicine. Systemic reactions or pain after RZV1 was not associated with completion.

Table 2. RZV Series Completion by Selected Characteristics During Follow-up of Members Aged ≥50 Years Who Received at Least One Dose of RZV at Kaiser Permanente Southern California in April-November 2018

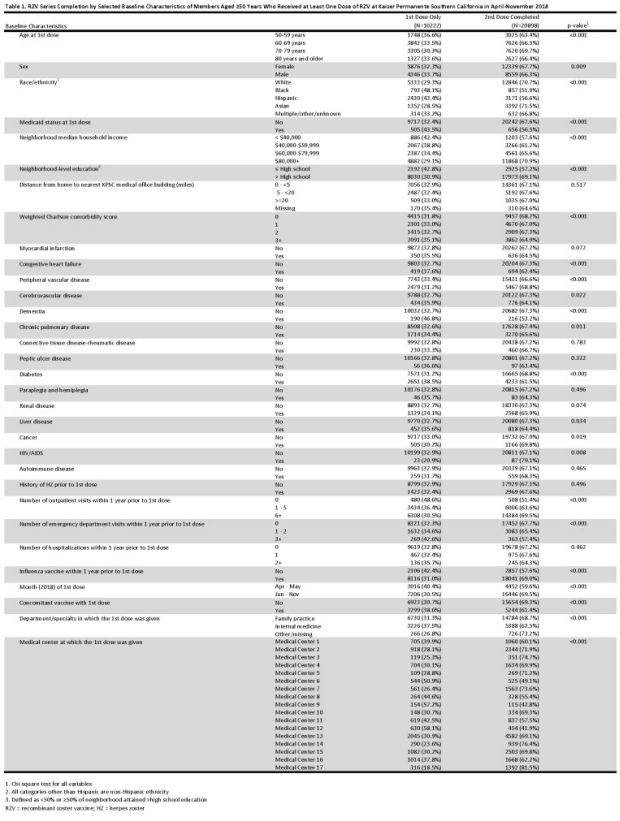


Table 1. RZV Series Completion by Selected Baseline Characteristics of Members Aged 50 Years Who Received at Least One Dose of RZV at Kaiser Permanente Southern California in April-November 2018

Baseline Characteristics		1st Dose Only (N=10222)	2nd Dose Completed (N=20898)	p-value[1]
Age at 1st dose	50-59 years	1748 (36.6%)	3025 (63.4%)	<0.001
	60-69 years	3842 (33.5%)	7626 (66.5%)	
	70-79 years	3305 (30.3%)	7620 (69.7%)	
	80 years and older	1327 (33.6%)	2627 (66.4%)	
Sex	Female	5676 (32.3%)	12139 (67.7%)	0.009
	Male	4346 (33.7%)	8559 (66.3%)	
Race/ethnicity[2]	White	5333 (29.7%)	12846 (70.7%)	<0.001
	Black	793 (48.1%)	857 (51.9%)	
	Hispanic	2439 (43.4%)	3175 (56.6%)	
	Asian	1352 (28.5%)	3392 (71.5%)	
	Multiple/other/unknown	314 (33.7%)	617 (66.4%)	
Medicaid status at 1st dose	No	9732 (32.4%)	20242 (67.6%)	<0.001
	Yes	505 (43.5%)	656 (56.5%)	
Neighborhood median household income	< $40,000	886 (42.4%)	1203 (57.6%)	<0.001
	$40,000-59,999	2067 (38.8%)	3266 (61.2%)	
	$60,000-79,999	2387 (34.4%)	4541 (65.6%)	
	$80,000+	4882 (29.1%)	11864 (70.9%)	
Neighborhood-level education[3]	< High school	2192 (42.4%)	2925 (57.2%)	<0.001
	> High school	8030 (30.9%)	17972 (69.1%)	
Distance from home to nearest KPSC medical office building (miles)	0 - <5	7056 (32.9%)	14361 (67.1%)	0.517
	5 - <20	2487 (32.4%)	5192 (67.6%)	
	>=20	509 (33.0%)	1035 (67.0%)	
	Missing	170 (35.4%)	310 (64.6%)	
Weighted Charlson comorbidity score	0	4415 (31.8%)	9457 (68.2%)	<0.001
	1	2201 (33.0%)	4470 (67.0%)	
	2	1415 (32.7%)	2909 (67.3%)	
	3+	2091 (35.1%)	3862 (64.9%)	
Myocardial infarction	No	9872 (32.8%)	20262 (67.2%)	0.072
	Yes	350 (35.5%)	636 (64.5%)	
Congestive heart failure	No	9803 (32.7%)	20269 (67.3%)	<0.001
	Yes	419 (37.6%)	694 (62.4%)	
Peripheral vascular disease	No	7743 (33.4%)	15431 (66.6%)	<0.001
	Yes	2479 (31.2%)	5467 (68.8%)	
Cerebrovascular disease	No	9788 (32.7%)	20137 (67.3%)	0.022
	Yes	434 (35.9%)	776 (64.1%)	
Dementia	No	10032 (32.7%)	20682 (67.3%)	<0.001
	Yes	190 (46.6%)	216 (53.2%)	
Chronic pulmonary disease	No	8508 (32.6%)	17628 (67.4%)	0.011
	Yes	1714 (34.4%)	3270 (65.6%)	
Connective tissue disease-rheumatic disease	No	9992 (32.8%)	20418 (67.2%)	0.783
	Yes	230 (33.3%)	460 (66.7%)	
Peptic ulcer disease	No	10166 (32.8%)	20801 (67.2%)	0.322
	Yes	56 (36.6%)	97 (63.4%)	
Diabetes	No	7571 (31.2%)	16665 (68.8%)	<0.001
	Yes	2651 (38.5%)	4233 (61.5%)	
Paraplegia and hemiplegia	No	10176 (32.8%)	20815 (67.2%)	0.496
	Yes	46 (35.7%)	83 (64.3%)	
Renal disease	No	8893 (32.7%)	18310 (67.3%)	0.074
	Yes	1329 (34.1%)	2588 (65.9%)	
Liver disease	No	9779 (32.7%)	20080 (67.3%)	0.034
	Yes	452 (35.6%)	818 (64.4%)	
Cancer	No	9717 (33.0%)	19732 (67.0%)	0.019
	Yes	505 (30.2%)	1166 (69.8%)	
HIV/AIDS	No	10199 (32.9%)	20811 (67.1%)	0.008
	Yes	23 (20.9%)	87 (79.1%)	
Autoimmune disease	No	9963 (32.9%)	20319 (67.1%)	0.465
	Yes	259 (31.7%)	559 (68.3%)	
History of HZ prior to 1st dose	No	8799 (32.9%)	17929 (67.1%)	0.496
	Yes	1423 (32.4%)	2969 (67.6%)	
Number of outpatient visits within 1 year prior to 1st dose	0	480 (48.6%)	508 (51.4%)	<0.001
	1 - 5	3434 (36.4%)	6006 (63.6%)	
	6+	6308 (30.5%)	14384 (69.5%)	
Number of emergency department visits within 1 year prior to 1st dose	0	8221 (32.3%)	17452 (67.7%)	<0.001
	1 - 2	1632 (34.6%)	3083 (65.4%)	
	3+	369 (42.6%)	363 (57.4%)	
Number of hospitalizations within 1 year prior to 1st dose	0	9619 (32.8%)	19678 (67.2%)	0.462
	1	467 (32.4%)	975 (67.6%)	
	2+	136 (35.7%)	245 (64.3%)	
Influenza vaccine within 1 year prior to 1st dose	No	2106 (42.4%)	2857 (57.6%)	<0.001
	Yes	8116 (31.0%)	18041 (69.0%)	
Month (2018) of 1st dose	Apr - May	3016 (40.4%)	4452 (59.6%)	<0.001
	Jun - Nov	7206 (30.5%)	16446 (69.5%)	
Concomitant vaccine with 1st dose	No	4923 (30.7%)	11654 (69.3%)	<0.001
	Yes	5299 (38.6%)	9244 (61.4%)	
Department/specialty in which the 1st dose was given	Family practice	6739 (31.1%)	14784 (68.7%)	<0.001
	Internal medicine	3226 (37.5%)	5398 (62.5%)	
	Other/missing	266 (26.8%)	726 (73.2%)	
Medical center at which the 1st dose was given	Medical Center 1	705 (39.9%)	1060 (60.1%)	<0.001
	Medical Center 2	918 (28.1%)	2344 (71.9%)	
	Medical Center 3	119 (25.3%)	351 (74.7%)	
	Medical Center 4	704 (30.1%)	1634 (69.9%)	
	Medical Center 5	109 (28.8%)	269 (71.2%)	
	Medical Center 6	548 (50.9%)	525 (49.1%)	
	Medical Center 7	561 (26.4%)	1563 (73.6%)	
	Medical Center 8	264 (44.6%)	328 (55.4%)	
	Medical Center 9	158 (57.2%)	115 (42.8%)	
	Medical Center 10	148 (30.7%)	334 (69.3%)	
	Medical Center 11	619 (42.5%)	837 (57.5%)	
	Medical Center 12	639 (58.1%)	454 (41.9%)	
	Medical Center 13	2045 (30.9%)	4582 (69.1%)	
	Medical Center 14	290 (23.6%)	939 (76.4%)	
	Medical Center 15	1082 (30.2%)	2503 (69.8%)	
	Medical Center 16	1014 (37.8%)	1668 (62.2%)	
	Medical Center 17	316 (18.0%)	1392 (81.5%)	

1. Chi-square test for all variables
2. All categories other than Hispanic are non-Hispanic ethnicity
3. Defined as <50% or ≥50% of neighborhood attained >High school education
RZV = recombinant zoster vaccine; HZ = herpes zoster

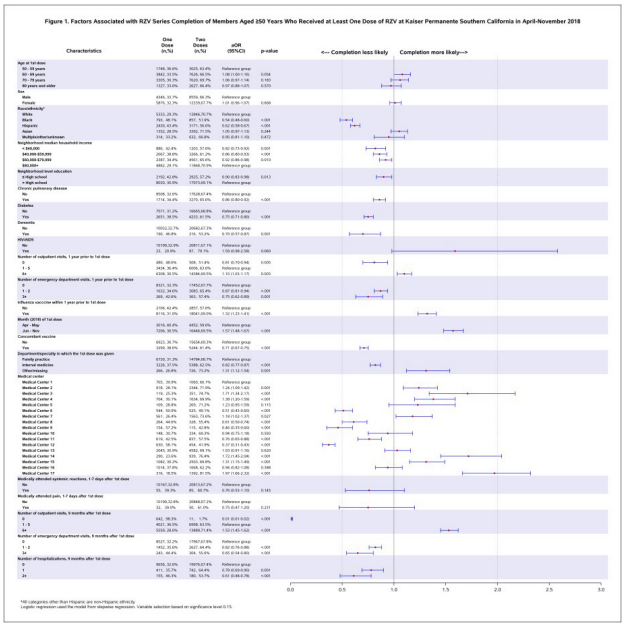
Table 2. RZV Series Completion by Selected Characteristics During Follow-up of Members Aged ≥ 50 Years Who Received at Least One Dose of RZV at KPSC in April-November 2018

Table 2. RZV Series Completion by Selected Characteristics During Follow-up of Members Aged ≥50 Years Who Received at Least One Dose of RZV at Kaiser Permanente Southern California in April-November 2018

Follow-up Characteristics		1st Dose Only (N=10222)	2nd Dose Completed (N=20898)	p-value[1]
Medically attended local reactions, 1-7 days after 1st dose	No	10201 (32.8%)	20866 (67.2%)	0.293
	Yes	21 (39.6%)	32 (60.4%)	
Medically attended systemic reactions, 1-7 days after 1st dose	No	10167 (32.8%)	20813 (67.2%)	0.104
	Yes	55 (39.3%)	85 (60.7%)	
Medically attended pain, 1-7 days after 1st dose	No	10190 (32.8%)	20848 (67.2%)	0.233
	Yes	32 (39%)	50 (61%)	
Medically attended gout, 1-30 days after 1st dose	No	10170 (32.8%)	20799 (67.2%)	0.677
	Yes	52 (34.4%)	99 (65.6%)	
Number of emergency department visits within 9 months after 1st dose	0	8527 (32.2%)	17967 (67.8%)	<0.001
	1-2	1452 (35.6%)	2627 (64.4%)	
	3+	243 (44.4%)	304 (55.6%)	
Number of outpatient visits within 9 months after 1st dose	0	642 (98.3%)	11 (1.7%)	<0.001
	1-5	4021 (36.5%)	6998 (63.5%)	
	6+	5559 (28.6%)	13889 (71.4%)	
Number of hospitalizations within 9 months after 1st dose	0	9656 (32.6%)	19976 (67.4%)	<0.001
	1	411 (35.6%)	742 (64.4%)	
	2+	155 (46.3%)	180 (53.7%)	

1. Chi-square test for all variables
RZV = recombinant zoster vaccine

Figure 1. Factors Associated with RZV Series Completion of Members Aged ≥ 50 Years Who Received at Least One Dose of RZV at KPSC in April-November 2018



Conclusion: Completion of RZV series appears moderate in the early phase of implementation. Despite similar accessibility in a health care system, completion varied by race/ethnicity, socioeconomic status, health status, and care seeking behavior, suggesting areas to target for improvement.

Disclosures: Hung-Fu Tseng, MPH, PhD, GlaxoSmithKlein (Research Grant or Support) Lei Qian, PhD, GlaxoSmithKlein (Research Grant or Support) Jun Wu, MD, MS, GlaxoSmithKlein (Research Grant or Support) Yi Luo, PhD, GlaxoSmithKlein (Research Grant or Support) Lina S. Sy, MPH, GlaxoSmithKlein (Research Grant or Support) Katia Bruxvoort, PhD, MPH, GlaxoSmithKlein (Research Grant or Support) Bradley Ackerson, MD, GlasoSmithKlein (Research Grant or Support)

20. Cost-Effectiveness of Implementing 13-Valent Pneumococcal Conjugate Vaccine (Pcv13) for Adults Aged ≥19 Years with Underlying Conditions

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Session: P-2. Adult Vaccines

Background: In June 2019, the U.S. Advisory Committee on Immunization Practices changed the recommendation for routine PCV13 use in immunocompetent adults aged ≥65, including those with certain chronic medical conditions (CMC); PCV13 is now recommended based on shared clinical decision-making. Adults with CMC continue to be at increased risk for pneumococcal disease. We assessed the cost-effectiveness of adding PCV13 to the recommended PPSV23 dose for adults aged ≥19 years with CMC.

Methods: We used a probabilistic model following a cohort of 19-year-old U.S. adults. We used Monte Carlo simulation to estimate the impact on program, medical, and non-medical costs (in 2017 U.S. dollars [$] using the societal perspective), and pneumococcal disease burden when administering PCV13 in series with PPSV23. Table 1 shows vaccine effectiveness (VE) assumptions for the base case. We performed one-way sensitivity analyses assuming higher PCV13 VE against serotype 3 disease.

Vaccine effectiveness assumptions by age group used for the base case

Table 1. Vaccine effectiveness assumptions by age group used for the base case

Vaccine effectiveness		Age groups			
		19–64 years		≥65 years	
Vaccine type	Outcome	Value	Range	Value	Range
PCV13	PCV13-type IPD (-ST3, +ST6C)[i]	75	(41.4, 90.8)	67	(11, 88)
PCV13	ST3 IPD[ii]	0	(0, 45)	0	(0, 26)
PCV13	PCV13-type NBPP (-ST3), CMC[iii]	45	(14.2, 65.3)	32.5	(3.9, 53)
PCV13	ST3 NBPP[iv]	0	(0, 45)	0	(0, 45)
PPSV23	PPSV23-type IPD[v]	73	(56.0, 84.0)	67	(37, 73)
PPSV23	PPSV23-type NBPP[vi]	0	(0, 50)	0	(0, 50)

CMC: chronic medical condition, IPD: invasive pneumococcal disease, NBPP: non-bacteremic pneumococcal pneumonia, PCV13: 13-valent pneumococcal conjugate vaccine, PPSV23: 23-valent pneumococcal polysaccharide vaccine, ST3: serotype 3, ST6C: serotype 6C

[i] Source: Bonten et al. 2015 for 19–64 year old. Pilishvili et al.2018 for age ≥65 years
[ii] Source for adults aged ≥65 years from Pilishvili et al. 2018. For adults aged 19–64 year olds, we assumed that the upper range will be as high as what we estimated for ST3 NBPP.
[iii] Source: Bonten et al. 2015 for age 19–64 years Suaya et al. 2018.
[iv] We assume PCV13 ineffective against ST3 pneumonia based on results from serotype 3 IPD For the upper bound of effectiveness, we use the effectiveness of PCV13 against all vaccine-type pneumonia from Bonten et al. 2015.
[v] Source: Falkenhorst et al. 2017. For 19–64 year olds, pooled estimate from case-control studies was used. For ≥65 years old, we asumed the point estimate to be the same as PCV13.
[vi] Source: Schiffner-Rohe et al. 2016, Falkenhorst et al. 2017, Tin Tin Htar et al. 2017.

Results: In the base-case scenario, adding a dose of PCV13 upon CMC diagnosis cost $689,299 per QALY. Results of one-way sensitivity analyses are presented in Table 2.

Base case and one-way sensitivity analyses of adding PCV13 at diagnosis of CMC

Table 2: Base case and one-way sensitivity analyses of adding PCV13 at diagnosis of CMC

	Base case	PCV13 VE against ST3 IPD Equal to Other PCV13-type IPD*	PCV13 VE against ST3 NBPP Equal to Other PCV13-type NBPP*	PCV13 VE against ST3 IPD and NBPP Equal to Other PCV13-type NBPP and IPD*
Health Outcomes				
IPD Cases	-54	-141	-54	-141
Hospitalized NBPP Cases	-319	-319	-2,244	-2,244
Non-hospitalized NBPP Cases	-565	-565	-3,427	-3,427
Deaths due to IPD	-4	-12	-4	-12
Deaths due to NBPP	-10	-10	-77	-77
Discounted QALYs gained	174	269	809	904
Discounted life-years gained	255	393	1,243	1,382
Costs (million $)				
Total Cost	120	116	75	72
Medical Costs	-11	-15	-55	-59
Vaccine Costs	131	131	131	131
Cost Ratios ($)				
Cost/QALY	689,299	431,419	93,184	79,416
Cost/Life-year	468,449	294,922	60,616	51,981

IPD: invasive pneumococcal disease, NBPP: non-bacteremic pneumococcal pneumonia, QALY: quality-adjusted life year, ST3: serotype 3, VE: vaccine effectiveness
*When PCV is assigned equal protection against serotype 3 as against other serotypes it is assigned 75% vs IPD and 45% vs NBPP for the 19-64 age group and 67% vs IPD and 32.5% vs NBPP for the 65+ age group

Conclusion: Adding PCV13 in series with PPSV23 for adults 19 years or older with CMC was not cost-saving. Results were sensitive to assumptions on PCV13 VE against serotype 3 disease.

Disclosures: **All Authors**: No reported disclosures

21. Current and Nadir CD4+ Counts Are Associated with Heplisav-B Seroprotection Rates in People with HIV

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Session: P-2. Adult Vaccines

Background: A two-dose hepatitis B (HBV) vaccine with an immunostimulatory adjuvant (HBV-ISS, Heplisav-B), was FDA approved in 2017 for adults 18 years and older. In randomized controlled trials (RCTs), HBV-ISS demonstrated a seroprotection rate (SPR) of 90–95% versus 65–80% for Engerix-B (HBV-Eng). No RCTs, however, included people with HIV (PWH), and the SPR and its predictors in this population are unknown.

Methods: This retrospective cohort study enrolled PWH ages 18 years and older without current HBV seroprotection at an HIV clinic at a tertiary care center. HBV