Title

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

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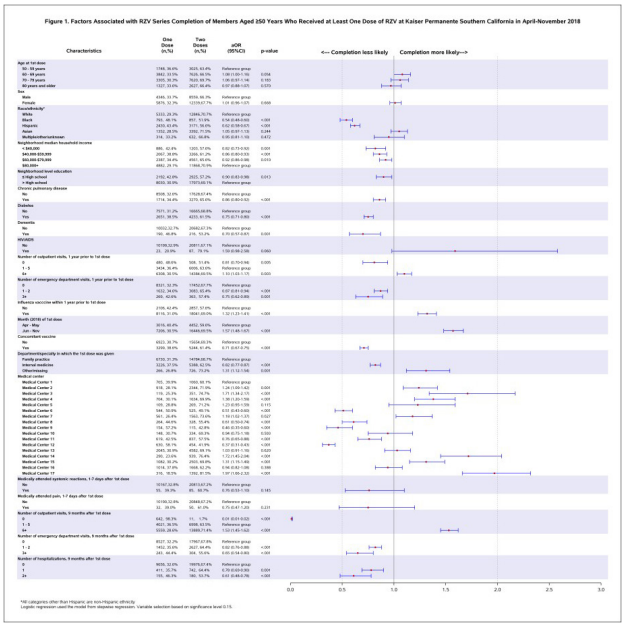
Figure 1. Factors Associated with RZV Series Completion of Members Aged ≥ 50 Years Who Received at Least One Dose of RZV at KPSC in April-November 2018



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

seroprotection was defined as an anti-HBV surface antibody level >= 10 mIU/mL. Patients without follow-up titers after immunization were excluded. The primary outcome was the SPR, the proportion of patients with HBV seroprotection at any point following the first HBV-ISS vaccination.

Results: Among the 51 PWH included, 50 received 2 doses of HBV-ISS (1 patient who received 1 dose developed seroprotection) (Table 1). Median time to antibody titer measurement was 11 weeks (IQR 7–19 weeks). Median age was 59 years, 90% were men, and 96% had VL < 200. There were no pregnant or breastfeeding patients. The SPR was 82% (42/51) in the cohort, and 86% (38/44) when patients with significant non-HIV immunosuppression (decompensated cirrhosis, solid organ transplantation, active chemotherapy) were excluded. There were no significant differences in SPR based on age, sex, BMI, diabetes mellitus, chronic kidney disease, history of remote anti-HBV surface or core antibody positivity, or prior HBV vaccination (Table 2). Lower current and nadir CD4+ counts were associated with progressively lower SPRs (P for trend < 0.0001 for both) (Figure 1).

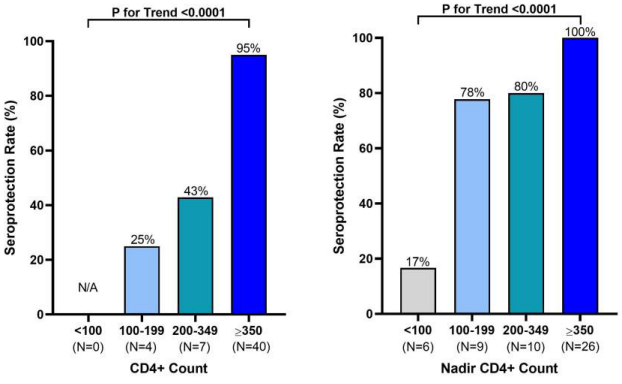
Table 1. Baseline Demographics and Characteristics

Characteristic	Total (N = 51)
Age, median [IQR], y	59 [48-66]
Male (%)	46 (90)
Race/Ethnicity (%)	
White / Non-Hispanic	20 (39)
White / Hispanic	11 (22)
African-American	7 (14)
Asian	6 (12)
Pacific Islander	4 (8)
Other	3 (6)
BMI, median [IQR]	26 [24-30]
CKD III-V (%)	3 (6)
Diabetes Mellitus (%)	10 (20)
Current Smoking (%)	7 (14)
Non-HIV Immunosuppression (%)	7 (14)
Liver transplant	3 (6)
Active chemotherapy)	2 (4)
Cirrhosis	1 (2)
Asplenia	1 (2)
Any prior HBV vaccine (%)	33 (65)
Prior HBV vaccine series (%)	25 (49)
Anti-HBV Surface Ab ever +	5 (10)
Anti-HBV Core Ab ever +	16 (31)
HIV Viral Load (%)	
VL <40	46 (90)
VL 40-199	3 (6)
VL ≥200	2 (4)
CD4, median [IQR]	533 [374-1,012]
Nadir CD4, median [IQR]	378 [144 – 587]

Table 2. Seroprotection Rate (SPR) by Variables of Interest

Variable	SPR (%)	P Value
Age		
Age <65	30/36 (83%)	1.00
Age ≥65	12/15 (80%)	
Gender		
Female	3/5 (60%)	0.21
Male	39/46 (85%)	
Race / Ethnicity		
White / Non-Hispanic	15/20 (75%)	0.81
White / Hispanic	10/11 (91%)	
African-American	6/7 (86%)	
Other	11/13 (85%)	
BMI		
BMI <25	12/18 (67%)	0.14
BMI 25-29.9	19/20 (95%)	
BMI ≥30	11/13 (85%)	
CKD III-V		
No	39/48 (81%)	1.00
Yes	3/3 (100%)	
Diabetes Mellitus		
No	34/41 (83%)	1.00
Yes	8/10 (80%)	
Current Smoking		
No	37/44 (84%)	0.59
Yes	5/7 (71%)	
Non-HIV Immunosuppression		
No	38/44 (86%)	0.09
Yes	4/7 (57%)	
Prior HBV Vaccination Series		
No	21/26 (81%)	1.00
Yes	21/25 (84%)	
Anti-HBV Surface Ab ever +		
No	39/46 (85%)	0.21
Yes	3/5 (60%)	
Anti-HBV Core Ab ever +		
No	28/35 (80%)	0.70
Yes	14/16 (88%)	
HIV Viral Load		
VL <40	37/46 (80%)	0.57
VL ≥40	5/5 (100%)	

Figure 1. Seroprotection Rate (SPR) by Current and Nadir CD4+ Count



Conclusion: The SPR from HBV-ISS in PWH appears comparable to the immunocompetent patients included in RCTs, especially when patients with significant non-HIV immunosuppression are excluded. The SPR demonstrated in this single-arm, retrospective study was higher than that of HBV-Eng in immunocompetent patients, and consideration should be given to establishing HBV-ISS as first-line HBV vaccination in PWH. Finally, SPR is significantly reduced in those with lower current and nadir CD4+ counts. Further research on the effectiveness of a repeat vaccination series or higher dosing in these subgroups is needed.

Disclosures: Jennifer Cocohoba, PharmD, AAHIVP, BCPS, Viiv (Grant/Research Support)

22. Description of Hospitalized Patients with Influenza Vaccine Failure

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Session: P-2. Adult Vaccines

Background: Despite influenza vaccination, some patients develop illness and require hospitalization. Many factors contribute to vaccine failure, including mismatch of the vaccine and circulating strains, waning immunity, timing of influenza season, age and patient comorbidities such as immune function. This study compared vaccinated, hospitalized patients with and without influenza.

Methods: This study used 2015–2019 Tennessee data from the US Hospitalized Adult Influenza Vaccine Effectiveness Network database. Enrolled patients were ≥ 18 years vaccinated for the current influenza season and admitted with an acute respiratory illness. Patient or surrogate interviews and medical chart abstractions were performed, and influenza vaccinations were confirmed by vaccine providers. Influenza PCR testing was performed in a research lab. Statistical analyses were performed with STATA and R using Pearson's chi-squared, Kruskal-Wallis and Wilcoxon rank-sum tests and multivariate logistic regression.

Results: 1236 patients met study criteria, and 235 (19%) tested positive for influenza. Demographics, vaccines and comorbidities were similar between the two groups (Table 1) except for morbid obesity, which was more common in influenza negative patients (13% vs 8%, p = 0.04), and immunosuppression, which was more common in the influenza positive (63% vs 54%, p = 0.01). Logistic regression analysis demonstrated older patients (OR 1.47, 95% CI 1.03–2.10) and immunosuppressed patients (OR 1.56, 1.15–2.12) were at increased risk for influenza (Table 2 and Figure 1). Immunosuppression also increased the risk for influenza A/H3N2 (OR 1.86, 95% CI 1.25–2.75). A sensitivity analysis was performed on patients who self-reported influenza vaccination for the current season without vaccine verification and demonstrated increased risk of influenza in older adults (OR 1.66, 95% CI 1.16–2.39).

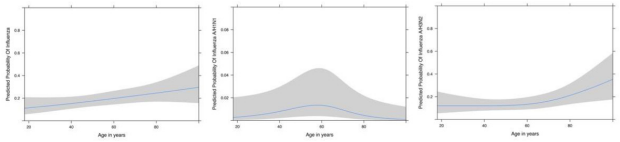
Table 1: Demographics of influenza positive versus influenza negative patients in influenza vaccinated, hospitalized patients.

N = 1236	Influenza positive (N=235)	Influenza negative (N=1001)	p-value
Median age – years (25th-75th %)	66 (57, 78)	65 (52, 74)	0.02
Gender – no. (%)			0.20
Male	98 (42%)	464 (46%)	
Female	137 (58%)	537 (54%)	
Race – no. (%)			0.43
African-American	53 (23%)	218 (22%)	
Asian	0	7 (1%)	
White	182 (77%)	767 (77%)	
Other	0	4 (0%)	
Pregnant at time of enrollment	0	9 (0.9%)	0.15
Self-reported being vaccinated for current influenza season – no. (%)	144 (61%)	576 (58%)	0.19
Vaccine type – no. (%)			0.21
Standard (trivalent, quadrivalent, recombinant, cell culture)	135 (59%)	625 (63%)	
High-dose and adjuvanted	94 (41%)	360 (37%)	
Median time between vaccine and symptom onset date – days	120 (93, 146)	114 (77, 150)	0.36
Any immunosuppression	147 (63%)	537 (54%)	0.01
Smoking (including vaping) in past 6 mo.	58 (25%)	261 (26%)	0.72
Home O2 use prior to admission	48 (44%)	201 (36%)	0.15
Cancer (Including hematologic)	33 (14%)	150 (15%)	0.65
Heart disease	133 (57%)	564 (56%)	0.94
Lung disease	121 (51%)	595 (59%)	0.07
Kidney disease (including HD)	74 (31%)	285 (28%)	0.59
Diabetes mellitus	86 (37%)	374 (37%)	0.83
Liver disease	19 (8%)	68 (7%)	0.70
Morbid obesity	17 (8%)	113 (13%)	0.04

Table 2: Logistic regression analyses of vaccinated, hospitalized influenza positive patients; vaccinated, hospitalized patients with influenza A subtypes and self-reported vaccinated, hospitalized influenza positive patients.

	All influenza positive			H1N1 positive			H3N2 positive			Self-reported vaccinated patients		
Variable	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value
Age (40-65)	1.47	1.03-2.10	0.049	1.50	0.62-3.60	0.04	1.24	0.80-1.91	0.02	1.66	1.16-2.39	0.01
Female: male	1.21	0.90-1.64	0.21	1.61	0.85-3.04	0.14	1.13	0.77-1.65	0.69	1.11	0.76-1.61	0.61
Vaccine type (high dose: standard)	0.87	0.60-1.26	0.46	1.98	0.87-4.50	0.10	0.87	0.54-1.39	0.59	0.71	0.45-1.14	0.08
Time between vaccine & symptoms	1.07	0.76-1.51	0.68	0.88	0.43-1.79	0.72	0.94	0.61-1.45	0.78	1.05	0.76-1.45	0.78
# of comorbidities	0.84	0.66-1.07	0.16	1.20	0.72-1.99	0.48	0.82	0.60-1.11	0.19	0.81	0.60-1.10	0.18
Immunosuppression	1.56	1.15-2.12	0.004	1.04	0.56-1.92	0.91	1.86	1.25-2.75	0.001	1.40	0.95-2.05	0.09
Month of Season (Nov → April)	1.31	0.79-2.19	0.30	1.04	0.36-2.97	0.95	1.24	0.66-2.32	0.51	1.23	0.69-2.18	0.49

Figure 1: Predicted Probability of Hospitalization with Influenza, Influenza A/H1N1 and Influenza A/H3N2 in Vaccinated Patients by Age.



Conclusion: Our study demonstrated an increased risk of influenza vaccine failure in older patients and immunosuppressed patients. These groups are also at increased risk for influenza complications. To improve protection of these patients against future influenza illnesses, more effective vaccines are needed, and more research on ring vaccination should be pursued.

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

23. Did You Pneu?: Impact of an Adult Pneumococcal Immunization Campaign Across Independent Community Pharmacies

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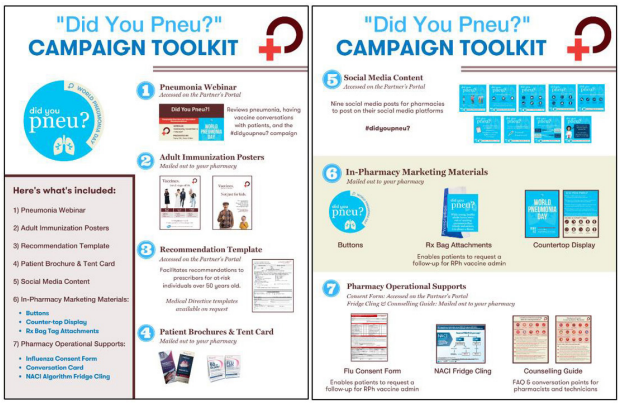
Session: P-2. Adult Vaccines

Background: Canada's pneumococcal immunization goal for adults 65 years and older aims to achieve 80% coverage, yet uptake is only 58% in this population. Barriers include lack of awareness and lack of recommendations by healthcare providers. A pneumococcal immunization campaign was designed to address barriers and increase vaccine uptake from independent community pharmacies.

Methods: A "Did You Pneu?" pneumococcal immunization campaign was developed by a pharmacist at the head office of an independent community pharmacy banner. The campaign consisted of pharmacist educational materials, in-pharmacy marketing materials, and pharmacy operational supports (Figure 1). In November 2018, a month-long in-pharmacy campaign was carried out across the banner. Feedback collected from pharmacists via telephone interviews was used to inform updates to campaign materials for the November 2019 campaign. A convenience sample of ten independent community pharmacies located across Ontario was selected for a retrospective observational analysis of pneumococcal vaccine purchases from January 2017 to December 2019.

Figure 1. "Did You Pneu?" campaign toolkit showing pharmacist educational materials, in-pharmacy marketing materials, and pharmacy operational supports developed and distributed across a banner of independent community pharmacies as part of an adult pneumococcal immunization campaign.



Results: Analysis of ten independent community pharmacies revealed an increase in the total number of pneumococcal vaccines purchased in November in years a campaign took place compared to baseline. The total number of pneumococcal vaccines purchased in November increased 23% during the first campaign and another 213% during the second campaign (13 vs. 16 vs. 50 vaccines purchased in November 2017, 2018, and 2019, respectively).

Increased vaccine uptake was also observed in months subsequent to the in-pharmacy campaign. Analysis of ten independent community pharmacies revealed a 47% increase in the mean number of pneumococcal vaccines purchased per month by the banner (8.8 mean number of pneumococcal vaccines purchased per month twelve months pre-implementation vs. 12.9 twelve months post-implementation).

Conclusion: A comprehensive pneumococcal adult immunization campaign implemented across a banner of independent community pharmacies led to immediate and sustained increases in vaccine uptake. As pharmacists have a role in promoting adult pneumococcal immunizations, advocacy efforts should be undertaken to include pharmacists in publicly funded immunization programs.

Disclosures: Tiana Tilli, PharmD, RPh, ACPR, Pfizer Canada Inc. (Grant/Research Support, Speaker's Bureau)

24. Economic Burden of Herpes Zoster Among Individuals with Chronic Obstructive Pulmonary Disease: A Retrospective Cohort Study

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