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, GlaxoSmithKlein (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

| Vaccine type | AGE group | PCV13 V% against 13-PSV3 | PCV13 V% against PPSV23-3 | PCV13 V% against PPSV23-4 | PCV13 V% against PPSV23-5 |
|--------------|-----------|--------------------------|--------------------------|--------------------------|--------------------------|
|              | 19-44 years | 95 | 86 | 85 | 83 |
|              | ≥45 years | 92 | 84 | 83 | 82 |

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.

Conclusions: 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 Hepisav-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, Hepisav-B), was FDA approved in 2017 for adults aged 18 years and older. In randomized controlled trials (RCTs), HBV-ISS demonstrated a seroprotection rate (SPR) of 90–95% versus 65–80% for Injex-B (HBV-Eng). No RCTs, however, included people with HIV (PWHR), and the SPR and its predictors in this population are unknown.

Methods: This retrospective cohort study enrolled PWHR 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 $\geq 10$ 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 $\geq$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%) |  |
| Age $\geq$65 | 12/15 (80%) | 1.00 |
| 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 $\geq$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 $\geq$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 HRV-Eng in immunocompetent patients, and consideration should be given to establishing HBV-ISS as first-line HRV 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 |
|----------|-----------------------------|-----------------------------|---------|
| Gender – no. (%) | Male 61 (26%) | 444 (44%) | 0.20 |
| Race – no. (%) | African-American 57 (24%) | 258 (26%) | 0.43 |
| | Asian 0 (0%) | 7 (0%) | |
| | White 162 (73%) | 767 (77%) | |
| | Other 4 (2%) | 0 (0%) | |
| Pregnant at time of enrollment | 0 (0%) | 9 (10.8%) | 0.15 |
| Self-reported being vaccinated and current influenza season – no. (%) | 144 (63%) | 576 (58%) | 0.19 |
| Vaccine type – no. (%) | Standard (inactivated, recombinant, cell culture) 135 (59%) | 625 (63%) | 0.21 |
| | High dose and adjuvanted 91 (41%) | 360 (36%) | |
| Median time between vaccine and symptom onset date – days | 120 (59, 146) | 114 (77, 150) | 0.36 |
| Any immunosuppression | 147 (63%) | 537 (54%) | 0.03 |
| Smoking (including vaping) in past 6 mo. | 58 (25%) | 261 (26%) | 0.72 |
| Home Oz use prior to admission | 48 (48%) | 203 (20%) | 0.15 |
| Cancer (including hematology) | 33 (14%) | 150 (15%) | 0.46 |
| Heart disease | 133 (57%) | 564 (56%) | 0.16 |
| Lung disease | 121 (51%) | 595 (59%) | 0.07 |
| Kidney disease (including HS) | 99 (41%) | 285 (28%) | 0.16 |
| Diabetes mellitus | 80 (37%) | 374 (37%) | 0.48 |
| Liver disease | 19 (8%) | 88 (9%) | 0.79 |
| Morbid obesity | 17 (8%) | 131 (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.

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

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 23% 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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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.