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).

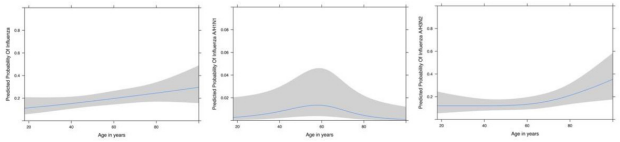
Table 1: Demographics of influenza positive versus influenza negative patients in influenza vaccinated, hospitalized patients.

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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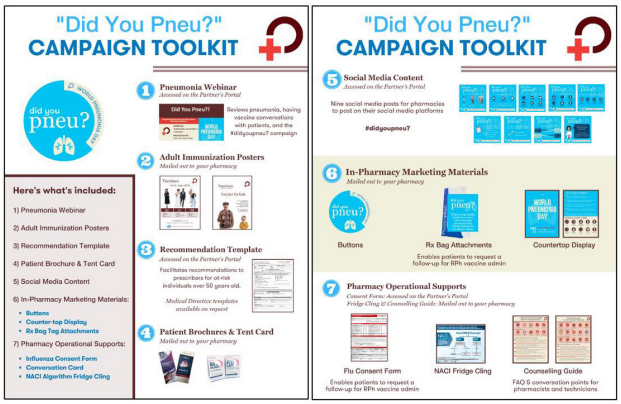
Session: P-2. Adult Vaccines

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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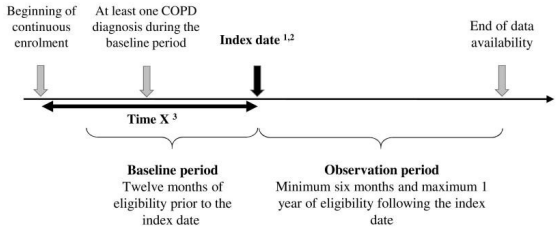
Session: P-2. Adult Vaccines

Background: Previous studies have evaluated the risk of developing herpes zoster (HZ) in patients with chronic obstructive pulmonary disease (COPD), but little is known about the impact of an acute HZ episode on healthcare resource utilization (HCRU) and costs among patients with COPD in the US.

Methods: A retrospective cohort study of individuals ≥50 years of age was conducted using administrative claims data from *Optum Clinformatics* for commercially insured and Medicare Advantage members (01/01/2013 – 12/31/2018). Two cohorts of patients with COPD, with (Cohort A) and without (Cohort B) HZ episodes, were identified (Fig.1). COPD and HZ were identified using ICD-9 and ICD-10 diagnosis codes. All-cause HCRU rates were compared between cohorts using adjusted incidence rate ratios (IRRs), calculated using generalized linear models assuming a negative binomial distribution. Differences in all-cause costs were estimated by fitting a two-part model with a logit model in the first part and a gamma distribution for the second part. Potential differences between cohorts were accounted for by propensity scores, calculated using patients' demographics and clinical characteristics at baseline and included as a covariate in multivariable regression analyses.

Figure 1: Study Design Schematic

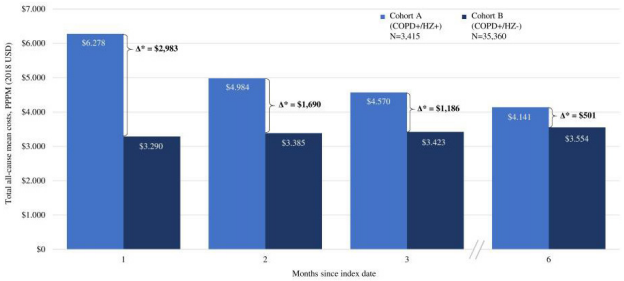


[1] Index date for the COPD cohort with HZ (Cohort A) is defined as 1st claim associated with an HZ diagnosis.
[2] Index date for the COPD cohort without HZ (Cohort B) is assigned based on the distribution of the pre-index eligibility (i.e., time between beginning of continuous enrolment and index date) in Cohort A.
[3] *Time X* is only determined for Cohort B and represents a randomly selected value such that the distribution of X's follow that of the pre-index eligibility in Cohort A.
COPD, chronic obstructive pulmonary disease; HZ, herpes zoster

Results: Among patients with COPD, 3,415 patients with HZ (mean age [standard deviation]=73.2 [9.0] years) and 35,360 without HZ (72.4 [9.4] years) were identified. Compared to patients with COPD but without HZ, patients with COPD and HZ had an increased rate of all-cause outpatient visits (adjusted IRR=1.18; 95% confidence interval [CI]=1.15–1.22; p< 0.001) and Emergency Department visits (1.28; 1.20–1.35; p< 0.001) as well as higher all-cause total costs (adjusted cost difference, per patient per month [PPPM]=$313; 95% CI=$110–536; p< 0.004), in the first year of the observation period. All-cause mean costs PPPM and differences between cohorts were higher closer to the date of HZ diagnosis (or an imputed date for Cohort B, Fig.2).

Figure 2: All-cause monthly costs

Figure 2: All-cause Monthly Costs for Patients with COPD, with HZ and without HZ, over time



COPD+/HZ+, cohort of patients with COPD and with HZ episodes; COPD+/HZ-, cohort of patients with COPD and without HZ episodes
COPD, chronic obstructive pulmonary disease; HZ, herpes zoster; PPPM, per patient per month; USD, United States Dollars; Δ* indicates adjusted cost difference

Conclusion: HCRU and cost burden is higher in patients ≥50 years old with COPD and HZ vs. without HZ. HZ vaccination may potentially reduce this burden among patients with COPD.

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Disclosures: Parinaz Ghaswalla, PhD, ORCID: 0000-0002-2883-5590, GlaxoSmithKline (Employee, Shareholder) Philippe Thompson-Leduc, MSc, ORCID: 0000-0001-9047-3941, Analysis Group, Inc. (Employee) Wendy Y. Cheng, MPH, PhD, ORCID: 0000-0002-8281-2496, GlaxoSmithKline (Other Financial or Material Support, I am an employee of Analysis Group, a consulting company that received research fund to conduct this study.) Min-Jung Wang, ScD, ORCID: 0000-0003-4432-3330, Analysis Group, Inc. (Employee, Other Financial or Material Support, Analysis Group received grant/research support from GSK) Michael Bogart, PharmD, ORCID: 0000-0002-1681-9710, GlaxoSmithKline (Employee, Shareholder) Brandon J. Patterson, PharmD, PhD, GSK (Employee, Shareholder) Mei-Sheng Duh, MPH, ScD, ORCID: 0000-0001-5035-6687, GlaxoSmithKline (Grant/Research Support) Suna Park, MS, GSK (Other Financial or Material Support, Analysis Group, Inc., where I am an employee, received funding for this study) Barbara P. Yawn, MD, Msc, ORCID: 0000-0001-7278-5810, GSK (Grant/Research Support, Scientific Research Study Investigator, Advisor or Review Panel member)

25. Effectiveness of High Dose Influenza Vaccine in HIV-positive Patients for the Winter 2017–2018 Season

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Session: P-2. Adult Vaccines

Background: Antibody response after high dose influenza vaccine (HDIV) approved for age ≥ 65 years, is superior to a standard-dose vaccine in HIV-infected persons. We report the effectiveness data of HDIV compared to the standard dose quadrivalent vaccine (SDIV) in our HIV clinic.

Methods: We conducted a retrospective cohort study at the University of Kansas Medical Center to evaluate the effectiveness of HDIV in HIV-infected patients during the 2017–2018 influenza season. A phone survey was utilized to verify vaccination status and interval development of influenza-like illness (ILI). A modified CDC definition of ILI (mCDC ILI = fever and cough, sore throat or shortness of breath (SOB)) and a broader protocol defined ILI (PD ILI = sore throat, cough or SOB with either fever, chills, headache or myalgia) were utilized. The electronic medical record was reviewed to confirm vaccine type and influenza testing when available.

Results: Of 560 HIV-infected patients in the clinic, 219 (39.1%) were available and willing to participate (197 males, 21 females, 1 transgender female). The median age was 53 years and BMI 27.2 kg/m^2. Five percent had CD4< 200 cells/uL, and 13.7% had an HIV viral load > 40 copies/mL. HDIV was given to 119 (54.3%), SDIV to 77 (35.2%) and 23 (10.5%) were not vaccinated (Table 1). A mCDC ILI occurred in 8 (10.4%) in the SDIV group compared to 6 (5.0%) in the HDIV group (p=0.16). A PD ILI was reported in 16 (20.8%) in the SDIV group compared to 12 (10.1%) in the HDIV group (p=0.04). There was no difference in confirmed influenza cases between the two groups (Table 2). On logistic regression only vaccine dose (SDIV OR 2.34 95% CI 1.04–5.37, p=0.04) and age in years (OR 0.97, 95% CI 0.94–1.0, p=0.045) were associated with PD ILI. HDIV remained protective after adjustment for age. Vaccine side effects were mild and occurred in 11/77 (14.3%) in the SDIV group compared to 13/119 (10.9%) in the HDIV group (p=0.5).

Table 1. HIV Patients characteristics and influenza vaccine status winter 2017-2018

Characteristics n=219	High-dose vaccine n=119	Standard vaccine n=77	Not vaccinated n=23
Male	106 (89.1%)	71 (92.2%)	20 (87.0%)
Female	12 (10.1%)	6 (7.9%)	3 (13.0%)
Trans female	1 (0.8%)	0 (0.0%)	0 (0.0%)
Age, mean, years	49.9	50.6	50.9
Age 18-49 years	52 (43.7%)	27 (35.1%)	9 (39.1%)
Age 50-64 years	47 (39.5%)	46 (59.7%)	12 (52.2%)
Age >=65 years	20 (16.8%)	4 (5.2%)	2 (8.7%)
BMI, mean, kg/m^2	27.4	27.7	27.3
BMI >=40 kg/m^2	2 (1.7%)	3 (3.9%)	0 (0.0%)
CD4 <200 cells/uL	4 (3.4%)	5 (6.5%)	2 (8.7%)
CD4 200-499 cells/uL	27 (22.7%)	16 (20.8%)	5 (21.7%)
CD4 >=500 cells/uL	88 (73.9%)	56 (72.7%)	16 (69.6%)
HIV Viral load >40 copies/mL	15 (12.6%)	8 (10.4%)	7 (30.4%)

BMI = body mass index