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Association between Receipt of COVID-19, Influenza, and Pneumococcal Vaccination

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Background

- COVID-19 and influenza (flu) vaccination are recommended in adults without contraindications, and pneumococcal vaccination is recommended in high-risk adults and those ≥65 years of age.
- Vaccine hesitancy threatens COVID-19 vaccine uptake.
- Limited data suggest that prior receipt of influenza and/or pneumococcal vaccine may correlate with COVID-19 vaccination uptake.[1-3]
- We evaluated correlations between receipt of COVID-19 vaccination and receipt of flu vaccination and pneumococcal vaccination in those ≥65 years of age.

Methods

- Active surveillance at two hospitals in Atlanta, GA
- Time period: May 2021 – June 2022

Eligibility Criteria:

- Adults ≥18 years of age admitted with an acute respiratory infection (ARI).
- Willing to participate in an interview regarding medical, social and vaccination history.
- Able to provide NP swabs at enrollment or from hospital testing.

Data Collection:

- Sociodemographic and clinical characteristics acquired through patient interviews and review of medical records.
- Vaccination status verified from electronic vaccine registry and medical records.

Analysis:

- If the individual received ≥ 1 dose of COVID-19 vaccine and the first vaccine dose was ≥14 days before onset of ARI symptoms, individuals were considered vaccinated.
- Same criteria were applied for flu and pneumococcal vaccination.
- Characteristics were compared with bivariate analysis (two-tailed p-value <0.05).
- A stepwise logistic regression model was created with inclusion in the model set at 0.05.
- Adjusted Odds Ratios (ORs) were determined for:
  - 1) COVID-19 vs. Influenza and 2) COVID-19 vs. Pneumococcal.
- Analysis performed using SAS v.9.4

Results

- Of the 1,365 enrolled patients, 748 (54.7%) received ≥1 COVID-19 vaccination.
- COVID-19 vaccination correlated with older age, male, white, and comorbidities (cardiac, diabetes, chronic kidney disease, and immunosuppression).
- Patients who received the influenza vaccine were 3.7 times more likely to receive COVID-19 vaccination (OR: 3.7, 95%CI: 2.9,4.7).
- Among patients who were age eligible, those who received pneumococcal vaccination within the past 5 years were 2.9 times more likely to receive COVID-19 vaccination (OR: 2.9, 95%CI: 1.8,4.7).
- **Table 1** demonstrates differences in baseline demographics and comorbidities based upon vaccination status.
- **Table 2** shows the crude and adjusted odds ratios of those who received COVID-19 vaccination and received influenza or pneumococcal vaccination.

Table 1: Baseline Demographics and Comorbidities Among those with COVID-19, Influenza, and Pneumococcal (>= 65 years of age only) Vaccination

Demographics (n= 1365)	COVID-19 Vaccination			Influenza Vax in those with COVID-19 Vaccination (n=748)			Pneumococcal Vax in those with COVID-19 Vaccination and ≥65 years of age (n=330)		
	Yes (n=748)	No (n=617)	p-value	Yes (n=519)	No (n=229)	p-value	Yes (n=273)	No (n=57)	p-value
Age, median [IQR]	63 [52, 71]	51 [37, 62]	***<.0001***	64 [54, 72]	58 [45, 67]	***<.0001***	73 [69, 78]	71 [67, 76]	0.1
Sex: Female, n(%)	379 (50.7)	361 (58.5)	***0.004***	271 (52.2)	108 (47.2)	0.2	134 (49.1)	26 (45.6)	0.6
Race: White, n (%)	231 (30.9)	109 (17.7)		188 (36.2)	43 (18.8)		116 (42.5)	16 (28.1)	
Black/African American	464 (62.0)	471 (76.3)	***<.0001***	300 (57.8)	164 (71.6)	***<.0001***	138 (50.6)	37 (64.9)	0.1
Multiracial	22 (2.9)	17 (2.8)		14 (2.7)	8 (3.5)		9 (3.3)	1 (1.8)	
Other/Unspecified	31 (4.1)	20 (3.2)		17 (3.3)	14 (6.1)		10 (3.7)	3 (5.3)	
Ethnicity: Hispanic or Latino, n (%)	24 (3.2)	30 (4.9)	0.3	16 (3.1)	8 (3.5)	0.9	6 (2.2)	1 (1.8)	1.0
Non-Hispanic nor Latino	682 (91.2)	564 (91.4)		474 (91.3)	208 (90.8)		249 (91.2)	53 (93.0)	
Not Specified/Missing Responses	42 (5.6)	23 (3.7)		29 (5.6)	13 (5.7)		18 (6.6)	3 (5.3)	
Comorbidities: Cardiac disease	541 (72.3)	330 (53.5)	***<.0001***	385 (74.2)	156 (68.1)	0.09	232 (85.0)	45 (79.0)	0.3
Respiratory disease	217 (29.0)	155 (25.1)	0.1	157 (30.3)	60 (26.2)	0.3	109 (39.9)	13 (22.8)	***0.01***
Immunocompromised	256 (34.2)	98 (15.9)	***<.0001***	197 (38.0)	59 (25.8)	***0.001***	98 (35.9)	11 (19.3)	***0.02***
Diabetes	228 (30.5)	135 (21.9)	***0.0003***	177 (34.1)	51 (22.3)	***0.001***	102 (37.4)	17 (29.8)	0.3
Chronic kidney disease	212 (28.3)	82 (13.3)	***<.0001***	155 (29.9)	57 (24.9)	0.2	93 (34.1)	15 (26.3)	0.3
Chronic lung disease	12 (1.6)	4 (0.7)	0.1	9 (1.7)	3 (1.3)	1.0	5 (1.8)	2 (3.5)	0.3

Table 2. Relationship between receipt of ≥1 COVID-19 vaccination and influenza and pneumococcal (≥65 years of age) vaccination

	≥1 COVID-19 Vx	No COVID-19 Vx	Crude OR (95%CI)	Adj OR (95%CI)
Influenza Vaccination in last year	519 (73.2)	190 (26.8)	5.1 (4.0, 6.4)	3.7 (2.9, 4.7)*
Pneumococcal Vaccination among those ≥65 years of age	273 (79.4)	71 (20.6)	3.2 (2.0, 5.1)	2.9 (1.8, 4.7)**

*Odds ratio describing odds of receiving ≥1 COVID-19 vaccination (vs not) by influenza vaccination status adjusted for age, race, and immunosuppression.
**Odds ratio describing odds of receiving ≥1 COVID-19 vaccination (vs not) by pneumococcal vaccination status adjusted for race.

Limitations

- Self selection bias due to voluntary enrollment in study.
- Incomplete access to medical records (missing cases) and potential subject recall errors.
- Data on use of high dose influenza and pneumococcal vaccination type were not analyzed.

Conclusions

- **Only 55% of those admitted with ARI had received COVID-19 vaccination.**
- **COVID-19 vaccination correlated with older age, male, white race, and comorbidities (cardiac, diabetes, chronic kidney disease, and immunosuppression).**
- **Receipt of COVID-19 vaccination strongly correlated with influenza (OR 3.7, 95% CI 2.9, 4.7) vaccination within the past year and pneumococcal (OR 2.9, 95% CI 1.8, 4.7) vaccination within the past 5 years.**

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