

2659: Substantially elevated influenza risk in vaccinated immunocompromised adults and high-risk patients relative to all vaccinated

Natalia Zemlianskaia, Amanda Zheutlin, Yoshihiko Murata, Jyotsna Battacharya, Geoffroy Coteur, Gabriela Ispas, Jorge Villacian, Jason Chien, David Hong, Jennings Xu, Breno Neri, Khaled Sarsour, Tripthi Kamath, & Xinggang Liu

All authors affiliated with Janssen Pharmaceuticals during study planning and execution

ABSTRACT

Background: Annual influenza vaccine is universally recommended for high-risk adults, but effectiveness varies between 19-60% in the general population by season and is markedly lower for specific high-risk groups, underscoring the need for novel prophylactic interventions. Despite abundant reports of vaccine effectiveness, direct evidence quantifying influenza risk in vaccinated, high-risk adults is limited.

Objective: Estimate incidence of post-vaccination medically attended influenza-like illness (ILI) and subsequent hospitalization among adults with chronic diseases and immunosuppression.

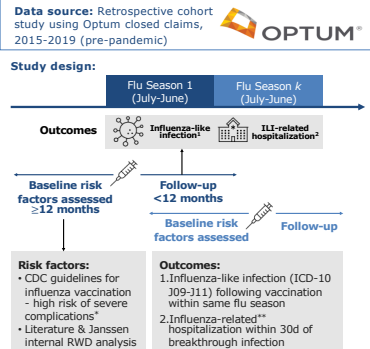
Methods: U.S. adults who received an influenza vaccine in influenza seasons 2015-2019 were identified using Optum commercial claims database (inpatient and outpatient). Known risk factors for influenza were assessed prior to vaccination, while medically attended ILI and subsequent hospitalization (within 30 days) were ascertained post-vaccination for the remainder of the flu season. Incidence rates and 95% confidence intervals (CI) were estimated for individual risk factors during the study period while maintaining sample independence across years. Incidence rate ratios (IRR) were calculated using all vaccinated with or without risk as control.

Results: Among 5,195,160 individuals (median age 65; 72% with ≥ 1 comorbid condition), annual incidence of medically attended ILI was 2.04 [95% CI 2.03-2.06] per 100 person-years and 0.25 [0.25-0.26] per 100 person-years for ILI-related hospitalization. ILI-related hospitalization risk was the highest for immunocompromised transplant patients (10.6 IRR versus all vaccinated), late-stage kidney disease (RR: 5.4-7.4), and severe chronic lung disease (RR: 4.6-5.4), with likelihood of hospitalization after ILI up to 51.3%. More than half of ILI-related hospitalizations were in individuals with chronic obstructive pulmonary disorder, heart failure, or late-stage kidney disease.

Conclusions: Immunocompromised and individuals with severe chronic cardiopulmonary or renal disease retained the highest residual risk of ILI-related hospitalization despite vaccination. Additional prophylactic intervention complementing vaccination could potentially offer enhanced protection for these patients.

METHODS

Figure 1. Data source and study design



Data and study design

- Optum Clinformatics is a US administrative claims database including inpatient, outpatient, and prescription services, as well as labs from one large national vendor, together covering >95M lives
- Adults (18-90 years) vaccinated in one or more pre-COVID-19 pandemic seasons 2015-2019 were eligible for inclusion. A random season was selected for those with >1yr of data.
- 12 months of continuous enrollment prior to vaccination was required to assess risk factors
- Time at risk following vaccination began 14 days post-vaccine and ended at the first of the following events: ILI, end of enrollment period, or June 30 of the following year.

Statistical methods

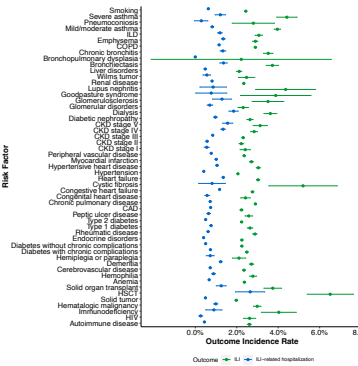
- Annual incidence rates and 95% confidence intervals (CI) were estimated for individual risk factors during the study period, maintaining sample independence across years
- Incidence rate ratios and 95% CIs were calculated for risk factors of interest using all vaccinated with and without risk as the reference group

RESULTS

Table 1. 2015-2019 vaccinated cohort demographics

	2015-2016 (N=1,320,727)	2016-2017 (N=1,404,421)	2017-2018 (N=1,307,767)	2018-2019 (N=1,192,825)	Overall (N=5,195,160)	
Age						
Mean (SD)	58.6 (18.4)	58.9 (18.5)	60.0 (18.2)	61.2 (17.8)	60.0 (18.2)	
Median (Min, Max)	62.0 (16.0, 90.0)	62.0 (16.0, 90.0)	65.0 (16.0, 90.0)	67.0 (16.0, 90.0)	65.0 (16.0, 90.0)	
Sex						
Female	580,930 (55.3%)	549,747 (56.2%)	731,919 (56.0%)	1,201,134 (56.3%)	2,913,833 (56.1%)	
Male	436,274 (44.7%)	438,974 (43.8%)	575,848 (44.0%)	867,791 (43.7%)	2,282,327 (43.9%)	
Payer						
Commercial	51,381 (56.3%)	53,107 (54.4%)	62,725 (48.1%)	82,084 (43.2%)	253,907 (48.8%)	
Medicare	388,426 (42.3%)	447,114 (46.6%)	670,762 (51.8%)	1,170,331 (50.3%)	2,686,633 (51.1%)	
Region						
Midwest	237,736 (24.2%)	233,141 (23.8%)	294,320 (22.8%)	418,866 (25.8%)	1,184,063 (22.3%)	
Northwest	123,437 (14.3%)	136,937 (14.2%)	179,400 (13.7%)	268,966 (14.1%)	710,740 (14.1%)	
Other/Unknown	14,001 (1.4%)	13,027 (1.3%)	13,627 (1.0%)	21,878 (1.1%)	62,533 (1.2%)	
South	324,944 (33.1%)	402,882 (41.0%)	561,791 (43.0%)	891,865 (46.7%)	2,281,482 (44.2%)	
West	16,272 (2.0%)	16,224 (1.6%)	25,809 (1.9%)	38,727 (19.3%)	102,195 (1.9%)	
Charlson Comorbidity Index						
Mean (SD)	0.889 (1.84)	0.894 (1.83)	0.942 (1.86)	0.984 (1.87)	0.934 (1.85)	
Median (Min, Max)	0.0, 19.0	0.0, 21.0	0.0, 21.0	0.0, 21.0	0.0, 21.0	
Influenza-like infection	50,520 (3.8%)	57,012 (4.1%)	126,226 (9.7%)	198,524 (16.6%)	572,782 (11.1%)	
ILI-related hospitalization	0	5,008 (0.6%)	10,209 (1.1%)	27,029 (2.3%)	42,246 (0.8%)	
ILI-related hospitalization	0	91,258 (59.9%)	97,894 (59.8%)	130,450 (59.7%)	191,133 (59.3%)	518,747 (59.8%)
ILI-related hospitalization	0	689 (0.1%)	1,527 (0.2%)	345 (0.3%)	2,762 (0.1%)	843 (0.2%)

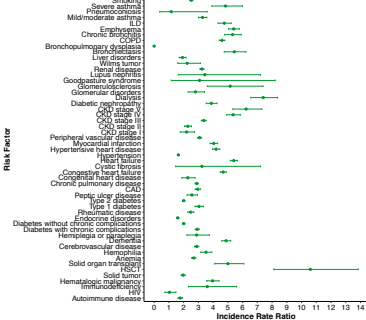
Figure 2. Annual incidence of ILI and ILI-related hospitalization, 2015-2019



ILI-related hospitalization IRs were highest for hematopoietic stem cell transplant (HSCT), cystic fibrosis, severe asthma, lupus nephritis, and immunodeficiency (Figure 2).

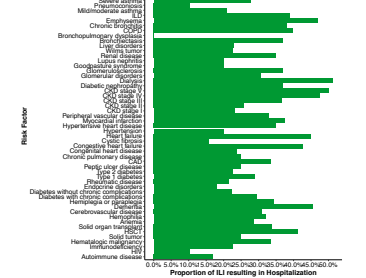
RESULTS CONT.

Figure 3. IRR of ILI-related hospitalization relative to all vaccinated, 2015-2019



Risk for ILI-related hospitalization is 5.4-10.6 times higher for HSCT, late-stage chronic kidney disease, respiratory diseases, and heart failure relative to all vaccinated individuals (Figure 3).

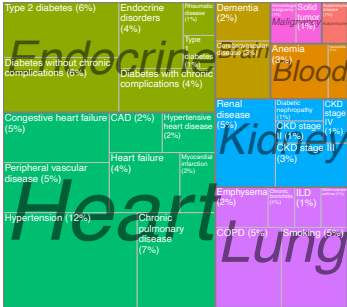
Figure 4. Rates of ILI-related hospitalization among infected individuals, 2015-2019



Rates of hospitalization among infected are up to 51.3% in late-stage chronic kidney disease (Figure 4).

RESULTS CONT.

Figure 5. Proportion of total cohort ILI-related hospitalizations with each risk factor



Among 5,195,160 individuals, 59,207 ILI-related hospitalizations were observed post-vaccination. Proportion of total events in individuals with each risk factor was plotted here and grouped by broad disease area to visualize contributing burden of illness from each condition.

CONCLUSIONS

- Immunocompromised and individuals with severe chronic cardiopulmonary or renal disease retained the highest residual risk of ILI-related hospitalization despite vaccination.
- Additional prophylactic intervention complementing vaccination could potentially offer enhanced protection for these patients.