

Impact of Enhanced Influenza Vaccines on Direct Healthcare Costs for the U.S. Elderly: A Comprehensive Real-World Evaluation of Adjuvanted Trivalent Influenza Vaccine Compared to Trivalent High-Dose Influenza Vaccine for the 2018-19 Influenza Season

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BACKGROUND

- Seasonal influenza epidemics have a substantial economic burden (~\$11.2B/year in the United States [U.S.]) due to increased physician office visits, emergency room (ER) visits, and hospitalizations, especially among elderly (age 65 years and above).¹
- A real-world study conducted among elderly enrolled in Medicare FFS for 2018-19 flu season in the U.S. demonstrated comparable clinical effectiveness between adjuvanted trivalent influenza vaccine (aTIV) and trivalent high dose influenza vaccine (TIV-HD).²
- There are no studies comparing economics outcomes related to these two enhanced vaccines during season 2018-19 among elderly in the U.S.

OBJECTIVE

To evaluate the annualized mean all-cause and influenza-related healthcare costs among elderly vaccinated with aTIV or TIV-HD during the 2018-19 influenza season.

METHODS

STUDY DESIGN AND DATA SOURCES

- A retrospective cohort analysis using IQVIA’s professional fee claims (Dx), prescription claims (Rx) and hospital charge master data (CDM) in the U.S.
- Representative of all payers in the U.S. Database covers ~82% of all physicians activities, ~90% of all pharmacies claims and data for over 400 hospitals across all regions.

SAMPLE SELECTION

- Subjects ≥65 years were included in the study if they met the following criteria:
 - At least 1 claim for aTIV or TIV-HD between 8/1/2018 and 1/31/2019; date of vaccination termed the index date
 - The flu season was defined from 8/1/2018– 7/31/2019 for this study.²
 - With a 6-month pre-index period (baseline) and variable follow-up through end of flu season
 - Without any other flu vaccine during the flu season or influenza-related hospitalizations/ER visits or office visits from 8/1/2018 up to 13 days post-index

MEASURES

- Baseline characteristics were assessed in the 6-month baseline period (**Table 1**).
- Study outcomes were assessed from (index date + 14) through end of flu season:
 - Annualized mean all-cause total costs and influenza-related outcomes and costs (inpatient², ER², office visit, pharmacy) on a per subject basis, averaged across the cohort
 - Annualized cost = (cost over variable follow-up) * (360/days in variable follow-up)

STATISTICAL ANALYSIS

- Adjustment for treatment selection bias: 1:1 propensity score matching (PSM),³ including pre-match baseline variables with absolute standardized mean difference (SMD) ≥0.1.
- Regression analysis: Generalized estimating equations (GEEs) using the recycled predictions method.⁴

RESULTS

- Prior to PSM, the study sample comprised 561,243 aTIV and 1,672,797 TIV-HD subjects (**Table 1**).
- After PSM, study cohorts were balanced with SMD<0.10 for all study covariates (561,243 matched aTIV and TIV-HD pairs).

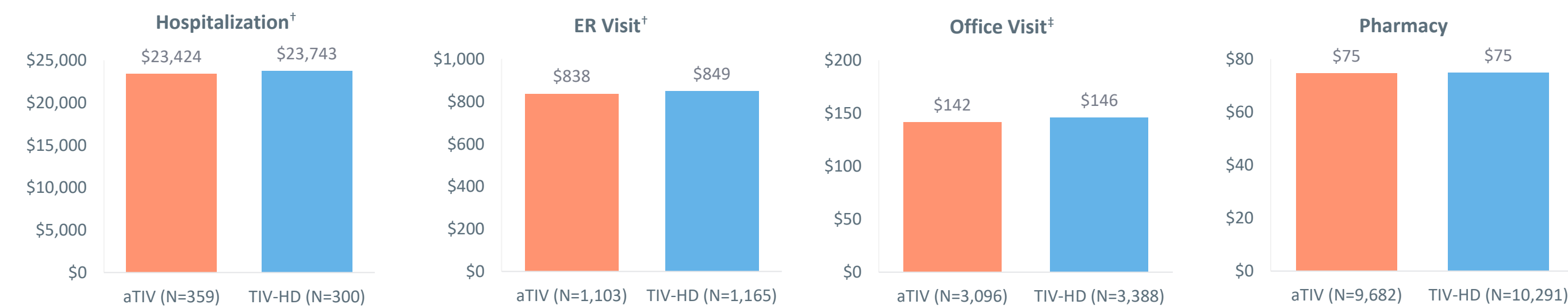
TABLE 1. BASELINE CHARACTERISTICS (UNADJUSTED)

CHARACTERISTIC	aTIV N=561,243	TIV-HD N=1,672,797	SMD
Mean (SD) age (years)	75.1 [6.3]	75.0 [6.3]	-0.01
Female (%)	59.5%	59.6%	0.00
Payer type (%)			
Cash	0.3%	0.3%	0.01
Medicaid	0.0%	0.1%	0.01
Medicare Part D	30.1%	26.0%	-0.09
Medicare	48.5%	51.3%	0.05
Third party	20.9%	22.3%	0.03
Other/Unknown	0.1%	0.1%	-0.02
Geographic region (%)			
Northeast	17.4%	16.3%	-0.03
Midwest	15.7%	18.3%	0.07
South	49.8%	44.2%	-0.11
West	17.1%	21.2%	0.10
Month of flu vaccine (%)			
August	3.4%	4.2%	0.04
September	28.6%	30.7%	0.04
October	49.8%	47.4%	-0.05
November	11.8%	12.6%	0.02
December	4.1%	3.3%	-0.04
January	2.3%	1.7%	-0.04
Mean (SD) CCI score	0.9 (1.3)	0.9 (1.4)	0.04
Pre-index hospitalization [%]	8.0%	8.2%	0.01

CHARACTERISTIC	aTIV N=561,243	TIV-HD N=1,672,797	SMD
Pre-index comorbid conditions of interest (%)			
Asthma	3.6%	3.7%	0.01
Blood disorders	0.3%	0.3%	0.00
Chronic lung disease	8.3%	8.7%	0.01
Diabetes	21.0%	22.6%	0.04
Heart disease	12.4%	12.7%	0.01
Kidney disorders	8.8%	9.2%	0.01
Liver disorders	2.2%	2.3%	0.00
Neurological or neurodevelopmental conditions	4.8%	5.0%	0.01
Weakened immune system	10.1%	10.2%	0.00
IBD (ulcerative colitis and Crohn’s disease)	0.6%	0.6%	0.00
Composite of the above	47.4%	49.1%	0.03
Indicators of frail health status (%)			
Home oxygen use	4.4%	4.8%	0.02
Wheelchair use	2.3%	2.6%	0.02
Walker use	3.3%	3.4%	0.01
Dementia	1.2%	1.3%	0.00
Urinary catheter use	0.3%	0.3%	0.00
Falls	0.9%	0.8%	0.00
Fractures	0.5%	0.5%	0.00
Composite of the above	10.5%	11.0%	0.02

- Influenza-related outcomes were infrequent. Costs among those with ≥1 influenza-related outcome were similar (**Figure 1**).
- Following GEE adjustment, predicted mean annualized cost per subject was comparable between aTIV and TIV-HD for all-cause total costs (**Figure 2**).
- Following GEE adjustment, influenza-related total costs, influenza-related hospitalization and ER visit costs were similar between aTIV and TIV-HD; however, aTIV was associated with significantly lower mean annualized influenza-related pharmacy costs (**Figure 3**).

FIGURE 1. INFLUENZA-RELATED COST PER OUTCOME AMONG SUBJECTS WITH ≥1 INFLUENZA-RELATED OUTCOME



[†]Inpatient or ER visit with a diagnosis for influenza in any position; [†]Office visit was defined as a physician office visit (outpatient) with a diagnosis code for influenza in any position. Overlapping confidence intervals indicate the incremental difference is not statistically significant.

RESULTS

FIGURE 2. PREDICTED MEAN ANNUALIZED TOTAL ALL-CAUSE COST PER SUBJECT

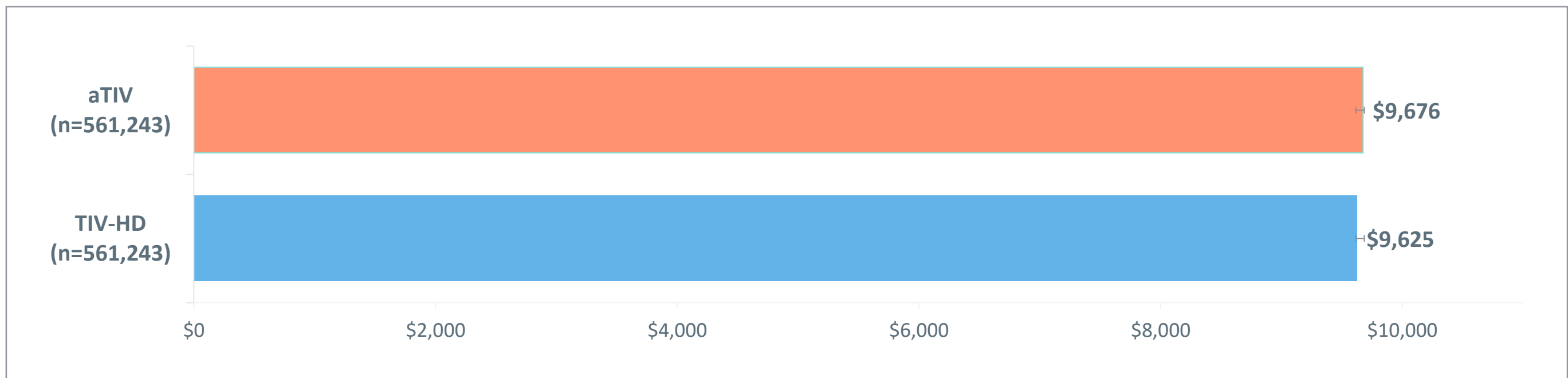
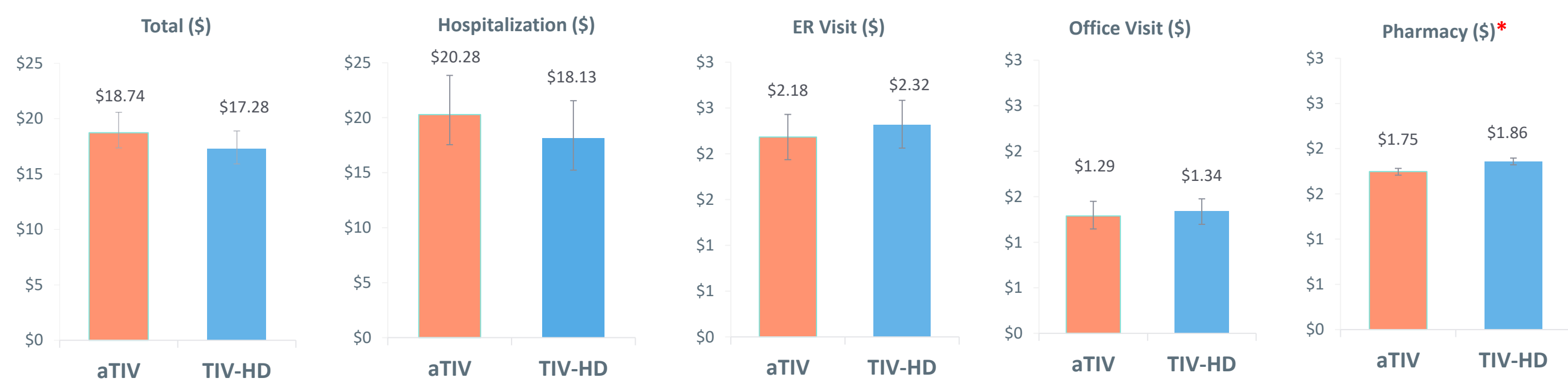


FIGURE 3. PREDICTED MEAN ANNUALIZED INFLUENZA-RELATED COST PER SUBJECT



*p<0.001

CONCLUSION

- All-cause and influenza-related total healthcare costs during the 2018-19 flu season were comparable between elderly vaccinated with aTIV or TIV-HD.
- These results are consistent with our previous retrospective analysis conducted using similar methodologies during 2017-18 influenza season showing similar economic outcomes between aTIV and TIV-HD.⁵
- More real-world studies are needed to understand economic outcomes associated with these vaccines using different data sources and for different flu seasons.

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