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Patterns in prescribing and dispensing of influenza antivirals among adults with influenza presenting to urgent care and emergency department settings, VISION Network, 2023–2024

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Abstract

Background: We describe prescribing and dispensing patterns of influenza antivirals among patients with laboratory-confirmed influenza within U.S. urgent care and emergency department settings.

Methods: A retrospective cross-sectional study was conducted for encounters from four large, integrated health systems participating in the VISION network of adult patients presenting with acute respiratory illness to urgent cares or emergency departments and with positive influenza virus test results during the 2023–2024 influenza season. The analysis was restricted to adult patients at higher risk of influenza complications based on presence of underlying medical conditions, older age, pregnancy, and severe obesity. We calculated proportions and odds of prescribed and dispensed antivirals by demographic and clinical characteristics.

Results: A total of 10,700 patient encounters were eligible for analysis. Among encounters with a positive standard molecular influenza test result (N=5,231), 58% (range across sites: 47–64%) were prescribed antivirals, with 67% of prescribing occurring on the encounter date. Among those prescribed antivirals (N=3,050), 80% (range across sites: 75–91%) had them dispensed, with 65% of dispensing occurring on the prescription date. Encounters among persons aged ≥65 years had lower odds of same-day prescribing (0.57 [95% CI: 0.42–0.78]) and lower odds of same-day dispensing (0.58 [95% CI: 0.36–0.94]) compared to those 18–49 years.

Conclusions: Gaps in antiviral treatment within urgent care and emergency department settings remain for patients at higher risk of influenza complications, notably among older adults.

Strategies to improve earlier initiation of antiviral treatment may help reduce the risk of influenza-associated complications.

Keywords

influenza; antivirals; oseltamivir; prescribing; dispensing

INTRODUCTION

Seasonal influenza produces considerable disease burden, with preliminary estimates of 15–33 million medical visits, 380,000–900,000 hospitalizations, and 17,000–100,000 deaths in the United States during the 2023–2024 season.¹ Antiviral treatment is a complementary tool to vaccination in the prevention, control, and management of seasonal influenza. Early treatment with antivirals can reduce influenza symptom duration as well as risk of some influenza-associated complications, hospitalizations, and mortality.^{2–5} While appropriate use of influenza antivirals depends on multiple factors including symptom duration and illness severity, treatment is recommended as soon as possible in the United States for adult outpatients at higher risk of influenza complications who present with suspected or laboratory-confirmed influenza.^{3, 6}

Gaps have been identified in seasonal influenza vaccine coverage by demographic characteristics such as age and race and ethnicity; however, less is known about use of influenza antivirals.^{7–9} Prior research suggests regional gaps in influenza treatment, but recent evidence is limited.¹⁰ Moreover, no study to date has described both influenza antiviral prescribing and dispensing practices and patient characteristics at each of these stages. Unequal structural and systemic drivers can lead to health care access and outcome differences across characteristics including age, race, ethnicity, and sex.¹¹ Prior analyses showed differences in COVID-19 antiviral treatment across demographic groups, suggesting the influence of factors such as access to care, negative interactions with healthcare services, limited dissemination of public health messaging on treatment benefits, provider bias, and educational, financial, and cultural barriers.^{12, 13}

The VIRTUAL Sars-cov-2, Influenza, and Other respiratory viruses Network (VISION) is a Centers for Disease Control and Prevention (CDC)-sponsored network of health systems with integrated clinical, laboratory, and treatment data that performs studies on the epidemiology of medically attended illness related to respiratory virus infections. Using electronic health record (EHR) data from the 2023–2024 influenza season, the primary study objective was to characterize influenza antiviral prescribing and dispensing practices among adults with laboratory-confirmed influenza presenting to emergency department (ED) and urgent care (UC) settings based on patient demographics and clinical characteristics. As a secondary objective, patterns in prescribing and dispensing were explored by influenza test type at one VISION partner healthcare system.

METHODS

Setting and design

Four participating VISION partner healthcare systems (HealthPartners, Kaiser Permanente Northwest, Kaiser Permanente Northern California, and Kaiser Permanente Southern California) in five U.S. states (California, Minnesota, Oregon, Washington, and Wisconsin) contributed data to this retrospective cross-sectional study (Supplementary Table 1). EHR data were included from 94 urgent cares and 142 emergency departments. VISION partners performed geocoding of patient address to assign census tract-based 2020 Social Vulnerability Index (SVI) rankings.¹⁴ Contributing network partners have patient memberships that have been found to be regionally representative of the general population.^{15, 16}

These activities were reviewed and approved by institutional review boards (IRBs) at Kaiser Permanente Northwest, Kaiser Permanente Northern California, and Kaiser Permanente Southern California (45 C.F.R. part 46.101(c); 21 C.F.R. part 56). The Westat IRB determined that the activities are non-research. Patient informed consent was not required. The study followed guidelines from the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

Study population

Data were analyzed from the 2023–2024 influenza season among adult patients with acute respiratory illness (ARI)-associated ED/UC encounters and a positive influenza laboratory test. Participating VISION partners contributed complete influenza antiviral treatment data for prescribing and dispensing. Medical encounters were included if they occurred at participating partners and the patient met an ARI case definition based on *International Classification of Diseases, 10th Revision* discharge diagnosis codes (Supplementary Table 2). Three participating VISION partners required patient membership, and one partner included encounters from both member and non-member patients.

All patients received clinician-initiated testing for influenza and had a positive test result ≤ 2 days before or up to 72 hours after an encounter. Influenza tests were categorized as standard molecular (reverse transcription-polymerase chain reaction [RT-PCR] and multiplex assays using nucleic acid amplification and performed on platforms associated with extended test runtimes [>30 minutes to several hours]), 2) rapid molecular (isothermal nucleic acid amplification and RT-PCR performed on platforms yielding results in approximately 15–30 minutes), or 3) rapid antigen (rapid influenza diagnostic tests [RIDTs] with results available in 10–15 minutes).¹⁷ ED and UC encounters occurring within ≤ 7 days of one another were combined by contributing partners into a single encounter (ED/UC). Data were analyzed at the encounter level to allow for unique opportunities for providers to implement influenza antiviral treatment guidelines.

Seasonal influenza vaccination data was obtained from EHRs, state immunization systems, and claims data. A person was considered to have received a 2023–2024 seasonal influenza vaccination if they received ≥ 1 dose on or after August 1, 2023 and at least 14 days prior to the date of the encounter.

Eligibility

ARI-associated ED/UC encounters were considered eligible if the patient was aged ≥ 18 years. Encounters were restricted to those occurring during the 2023–2024 influenza season (October 1, 2023 to April 30, 2024).¹⁸ While the Infectious Diseases Society of America (IDSA) recommends empiric antiviral treatment for adult outpatients at higher risk of influenza complications with suspected or laboratory-confirmed influenza, this analysis only included encounters with positive influenza laboratory testing.³ To align with IDSA guidance on treating outpatients considered at higher risk of influenza complications, encounters were limited to patients meeting one or more of the following criteria (Supplementary Table 3): 1) being ≥ 65 years old, 2) having certain underlying medical conditions documented at the encounter (hereafter, “higher risk-underlying medical conditions [HR-UMCs]”), 3) having a body mass index (BMI) indicating severe obesity (≥ 40 kg/m²), or 4) being pregnant on the encounter date.³ Other persons considered at higher risk of influenza complications including those who were up to two weeks postpartum or residents of a nursing home/long-term care facility were not included in the criteria due to under-capture of post-partum data and because information on type of residence is not collected by VISION. Encounters were excluded if a patient received influenza antivirals prior to the encounter (within 14 days) for their current illness.

Influenza antiviral treatment

VISION partners obtained antiviral treatment data by performing a search for treatment codes and text strings across electronic sources (Supplementary Table 1). A patient was considered to have received influenza antivirals if on or within 14 days following the encounter date they were prescribed and dispensed a medication recommended in the United States for influenza treatment (oseltamivir, zanamivir, peramivir, or baloxavir marboxil).^{6, 19}

Statistical analysis

Among all eligible encounters, demographic and clinical characteristics overall and stratified by VISION partner were described using frequencies and proportions or medians and interquartile ranges (IQRs). To assess differences across VISION partners, Chi-square tests were performed for categorical variables, and Kruskal-Wallis or Wilcoxon rank-sum tests for continuous variables ($p < 0.05$ significance).

To reflect similar diagnostic practices across all contributing VISION partners, the primary analysis was restricted to encounters with positive standard molecular testing. To characterize influenza antiviral treatment practices, demographic and clinical characteristics were first described stratified into binary antiviral groups: 1) among all encounters, prescribed versus not prescribed antivirals; and 2) among those prescribed antivirals, dispensed or not dispensed antivirals. Chi-squared or Wilcoxon rank-sum tests were performed to assess significant ($p < 0.05$) differences between groups. Second, to explore characteristics with evidence of an association with antiviral prescribing and/or dispensing ($p < 0.05$), odds ratios (ORs) were generated using logistic regression for the following outcomes: 1) among all encounters, prescribed antivirals; 2) among those prescribed, prescribed on the same day as the encounter; 3) among those prescribed, dispensed antivirals; 4) among those dispensed, dispensed on the same day as the prescription. ORs

were adjusted by VISION healthcare system, encounter setting (ED, UC, or combined ED and UC), influenza season surveillance week (to account for variation in prescribing based on influenza activity), number of HR-UMC categories, age (continuous), BMI (continuous), race and ethnicity, sex, and seasonal influenza vaccination status. Categories of race and ethnicity were included as model covariates as social constructs reflecting differences in health access and outcomes driven by structural and systemic factors.

To explore patterns in prescribing and dispensing by influenza test type, the secondary analysis was restricted to the one VISION partner performing multiple influenza test types. Descriptive results were presented by antiviral group (prescribed and dispensed, prescribed only, not prescribed), further stratified into test type performed (standard molecular, rapid molecular, or rapid antigen).

RESULTS

Eligibility

Among 27,081 adult ED/UC ARI encounters with positive influenza testing and occurring from October 1, 2023, to April 30, 2024, 16,381 (60%) were excluded (Supplementary Figure 1): 16,047 (59%) were not considered at higher risk of influenza complications, and 334 (1%) received influenza antivirals within 14 days prior to the encounter. In total, 10,700 ED/UC encounters were included.

Demographic and clinical characteristics – overall

Eligible ED/UC encounters peaked during the week starting on December 24, 2023 (Supplementary Figure 2). Among 10,700 eligible encounters from four VISION partners, most occurred at urban facilities (97%) and ED settings (61%) (Supplementary Table 4). Median age was 65 years (IQR 41–74), with 59% female, 36% Hispanic, 37% non-Hispanic White, 16% Medicaid recipients, and 35% living in census tracts within the highest (i.e., most vulnerable) SVI quartile. Among the 7,138 eligible encounters with an antiviral medication prescription, 7,135 (99.96%) were prescribed oseltamivir while only three (<1%) were prescribed zanamivir (Supplementary Table 4).

Demographic and clinical characteristics – by VISION partner

Care setting varied across VISION partners ($p<0.001$), with one partner exclusively contributing ED encounters and three partners contributing both ED and UC encounters (Supplementary Table 4). Three VISION partners solely performed standard molecular influenza testing at all care settings. Across all partners, most (94–96%) influenza testing was performed on the encounter date (Supplementary Figure 3). Median patient age ranged from 61–68 years ($p<0.001$). Racial and ethnic demographics differed across VISION partners ($p<0.001$), with two partners having $\geq 65\%$ of encounters among non-Hispanic White patients, while another partner had a higher (49%) proportion of Hispanic patients. SVI-designated social vulnerability varied across partners ($p<0.001$), with one having higher representation of census tracts within the lowest vulnerability quartile (38%), and another having higher representation among the highest vulnerability quartile (45%). Across

partners, there was significant variation in proportion of encounters with one or more categories of HR-UMCs (37–79%, $p<0.001$).

Antiviral prescribing and dispensing – across all four contributing VISION partners

Among encounters from all contributing VISION partners with positive influenza standard molecular testing results ($N=5,231$), 58% were prescribed antivirals (Table 1), with 67% of prescribing occurring on the encounter date (Figure 1). Among those prescribed antivirals ($N=3,050$), 80% had them dispensed (Table 1), with 65% of dispensing occurring on the prescription date (Figure 2). Antiviral treatment practices varied across VISION partners (47–64% prescribed, 75–91% prescribed and dispensed, both $p<0.001$) (Table 1, Figure 3). Encounters occurring exclusively at UCs had lower prescribing (50%) than those at EDs (61%) or combined ED/UCs (60%) ($p<0.001$); however, higher dispensing was found among UC (85%) than ED (78%) encounters ($p<0.001$).

Antiviral prescribing ($p<0.001$) and dispensing ($p=0.01$) varied across age groups (Table 1). Patient encounters aged ≥ 65 years had the highest proportion prescribed antivirals (63%); however, those aged 50–64 years had the highest proportion dispensed antivirals (85%) among those prescribed. Significant differences were also found in both prescribing and dispensing based on race and ethnicity, BMI, certain categories of HR-UMCs (cardiovascular disease, neurologic and neurodevelopment conditions), and receipt of 2023–2024 seasonal influenza vaccination (all $p<0.05$). No significant differences in prescribing and dispensing were found among encounters with positive influenza standard molecular testing based on sex, Medicaid status, SVI, or pregnancy status (all $p>0.05$).

Adjusted odds of antiviral prescribing and dispensing – across all VISION partners

In adjusted models among patients with a positive standard influenza molecular test, patients aged 50–64 years had higher adjusted odds (aOR 2.72 [1.63–4.55]) of being dispensed antivirals compared with those 18–49 years (Figure 4). No significant differences were found in odds of prescribing and dispensing for those aged ≥ 65 years compared to 18–49 years. However, lower adjusted odds of being prescribed antivirals on the encounter date (aOR 0.57 [95% CI: 0.42–0.78]) and dispensed antivirals on the prescription date (aOR 0.58 [95% CI: 0.36–0.94]) were found for those aged ≥ 65 years compared with those 18–49 years (Supplementary Table 5).

Among other demographic and clinical characteristics, no clear patterns in prescribing and dispensing were found. Slightly higher adjusted odds of being prescribed antivirals was found for encounters among Hispanic patients (aOR 1.39 [95% CI: 1.05–1.83]) (Figure 2). Using BMI 18.5 to $<25 \text{ kg/m}^2$ as the reference group, those with BMI $<18.5 \text{ kg/m}^2$ had lower adjusted odds of dispensing (aOR 0.22 [95% CI: 0.07–0.76]). No significant differences in adjusted odds of prescribing and dispensing were found based on number of categories of HR-UMCs.

Higher adjusted odds of prescribing (aOR 1.28 [95% CI: 1.07–1.54]) and dispensing (aOR 1.84 [95% CI: 1.30–2.60]) were found for those vaccinated against seasonal influenza; however, no differences were found in same-day prescribing or dispensing.

Antiviral prescribing and dispensing by influenza test type within one VISION partner

In a secondary analysis among 6,142 eligible encounters from VISION partner 4, multiple types of influenza tests were performed: 19% rapid antigen (10–15 minutes estimated test runtime), 70% rapid molecular (20 minutes), and 11% standard molecular (3–8 hours) (Supplementary Tables 1 and 4).^{20–22} Characteristics varied across test type, notably urbanicity, encounter setting, age, race and ethnicity, BMI, and presence of underlying medical conditions (all $p < 0.001$) (Supplementary Table 6).

The proportion of patient encounters prescribed influenza antivirals increased as associated test runtime decreased (standard molecular 58%, rapid molecular 72%, rapid antigen 84%, $p < 0.001$, Figure 5A, Supplementary Table 7). Among those prescribed antivirals, proportion dispensed also increased as runtimes decreased (standard molecular 91%, rapid molecular 94%, rapid antigen 97%, $p < 0.001$). These results were also consistent for same-day encounter date and prescribing (standard molecular 44%, rapid molecular 87%, rapid antigen 97%) and same-day prescribing and dispensing (standard molecular 84%, rapid molecular 90%, rapid antigen 98%) (Figure 5B).

DISCUSSION

In this analysis of influenza antiviral treatment practices within four large U.S. health systems among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares and emergency departments and with laboratory-confirmed influenza during the 2023–2024 influenza season, we found heterogeneity and gaps in antiviral prescription and dispensing practices. Among all patients with positive standard molecular influenza virus test results, 58% were prescribed and 47% were dispensed antivirals. Across contributing VISION partners, antivirals were prescribed in 47–64% of the encounters with positive influenza standard molecular testing results, and 75–91% of those prescribed were dispensed antivirals. Treatment practices were associated with numerous factors, including encounter setting, patient age, influenza vaccination receipt, and—at the one VISION partner performing numerous diagnostic tests—influenza test type. Notably, no patterns in treatment practices were found based on factors such as race and ethnicity, SVI, and Medicaid status in these integrated healthcare systems.

Our analysis aligns with previous findings showing opportunities for improvement in antiviral prescribing and dispensing among outpatient populations identified at higher risk of influenza complications.^{23–27} Of note in our study among older adults (≥ 65 years), lower odds of being prescribed antivirals on the encounter date and dispensed antivirals on the prescription date suggest barriers to early treatment initiation which could reduce antiviral therapy effectiveness. Other studies have noted challenges in treatment of older patients including lack of social and financial support, misunderstanding of appropriate medication regimens, and multiple existing prescriptions for managing chronic conditions.^{28–31} Additionally, while severe obesity has been associated with higher influenza severity and mortality^{32, 33}, we found that only 52% of influenza patients with a BMI ≥ 40 kg/m² were prescribed antivirals. These gaps may be driven by multiple factors, including delayed seeking of medical care and diagnosis, and provider uncertainty on treatment benefits for this population.^{34, 35}

At a single VISION partner performing multiple influenza testing types, use of more rapid influenza diagnostic tests showed higher overall and same-day antiviral prescribing and dispensing. These results suggest a relationship between health care provider antiviral prescribing practices and earlier availability of actionable test results at the point of care. Previous studies also found that the use of antigen-based rapid influenza diagnostic tests (RIDTs) increased early prescribing of antivirals.³⁶⁻³⁹ Other studies have suggested that rapid point-of-care testing also leads to more appropriate use of influenza treatments by reducing unnecessary antibiotics.^{40, 41} Despite these benefits, RIDTs have been associated with lower diagnostic sensitivity than standard molecular tests.⁴²⁻⁴⁴ Consequently, IDSA recommends using higher sensitivity rapid molecular assay tests in lieu of RIDTs to balance reduced turnaround time with better performing diagnostic tests.³

In our analysis, a little over half of patients presenting to emergency department or urgent care centers with symptoms of acute respiratory illness, a laboratory-confirmed influenza diagnosis, and at higher risk for influenza-associated complications due to age or presence of underlying conditions, were prescribed influenza antiviral treatment. Although we were unable to precisely characterize guideline adherence around early initiation of treatment due to lack of symptom onset dates, all patients included in our analysis had one or more risk factors for severe complications from influenza infection and many would likely have benefited clinically from antiviral treatment. Gaps found by our study in influenza antiviral utilization among patients with an indication for treatment may echo findings from other studies of the impact of geography, health insurance plans, healthcare provider characteristics, healthcare setting, health system-level policies, and patient demographics on treatment practices.⁴⁵⁻⁴⁷ Provider perspectives may also be influenced by a lack of consensus around the benefits to influenza antiviral treatment among outpatients and those with non-severe influenza.^{4, 48-50} Additionally, our study reflects patients seen at urgent care clinics and emergency departments, where continuity of care may be lower than in primary care settings, which in turn can influence identification of higher risk patients, appropriate prescribing practices, and communication with patients on treatment benefits.^{51, 52}

Limitations

This study has several limitations. First, this analysis reflects data captured by the VISION Network, with contributing partners predominantly comprising large, integrated managed care networks whose membership reflects populations with greater access to care. Similar analyses using expanded data sources may illuminate health disparities that are not reflected by VISION.^{10, 12, 53} Second, VISION does not capture illness onset dates, precluding assessment of guideline adherence for early treatment initiation following symptom onset. These data would be particularly relevant for patients with reduced access to healthcare and delayed treatment based on demographic characteristics. Characterizing time from illness onset to encounter date may also put into context clinical decisions driving gaps in prescribing among patients with positive influenza testing and considered at higher risk of influenza complications. Additionally, VISION does not capture the time of day that medical encounters, influenza test results, and antiviral prescription and dispensing occurred, limiting diagnostic turnaround time and time-to-treatment characterization. For standard molecular diagnostic tests with shorter

associated runtimes (e.g., Cepheid GeneXpert Xpress) than multi-hour tests, describing total time associated with diagnostic activities (e.g., sample collection, transportation, laboratory backlog, results interpretation) would provide a more complete understanding of diagnostic delays. Third, as influenza testing and prescribing are clinician-driven and may be influenced by site-specific guidelines, clinical presentation, illness severity, and prior testing, variation in testing and prescribing practices across VISION partners may have occurred. However, VISION does not capture data on individual medical providers or patient illness severity at presentation, limiting description of these differences. Fourth, VISION combines ED/UC encounters occurring within ≤ 7 days of a previous encounter, limiting the ability to stratify all encounters by UC or ED setting. These settings may reflect unique populations in terms of access, care seeking, illness severity, and testing practices.

CONCLUSION

Gaps in antiviral prescribing and dispensing exist for adult patients at higher risk of influenza complications seen within urgent care and emergency department settings. Antiviral prescribing and dispensing practices varied by care setting, patient age, and underlying medical conditions, and—at the one site performing different types of tests—influenza test type. Strategies to improve earlier initiation of influenza antivirals for older, chronically ill patients along with expanded use of rapid and highly sensitive point-of-care testing in ED and UC settings could improve treatment initiation among patients with influenza.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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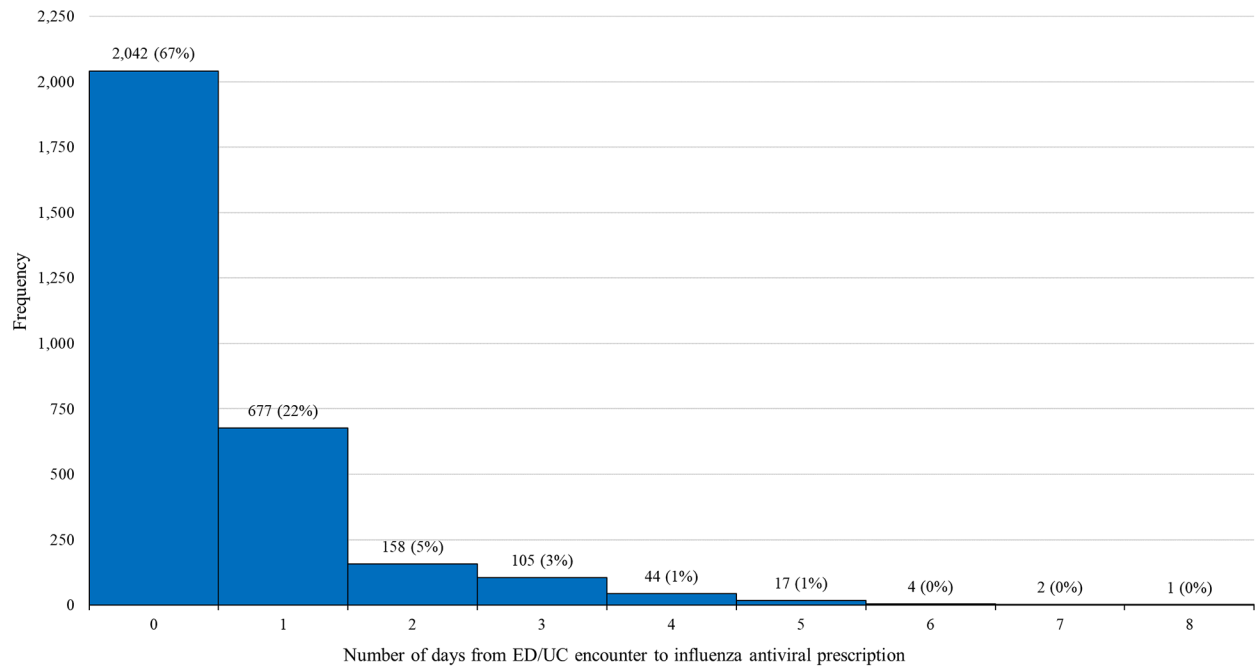


Figure 1.

Days from date of encounter to influenza antiviral prescription among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive standard molecular influenza virus test results and prescribed influenza antivirals (N=3,050), VISION Network, October 1, 2023 through April 30, 2024

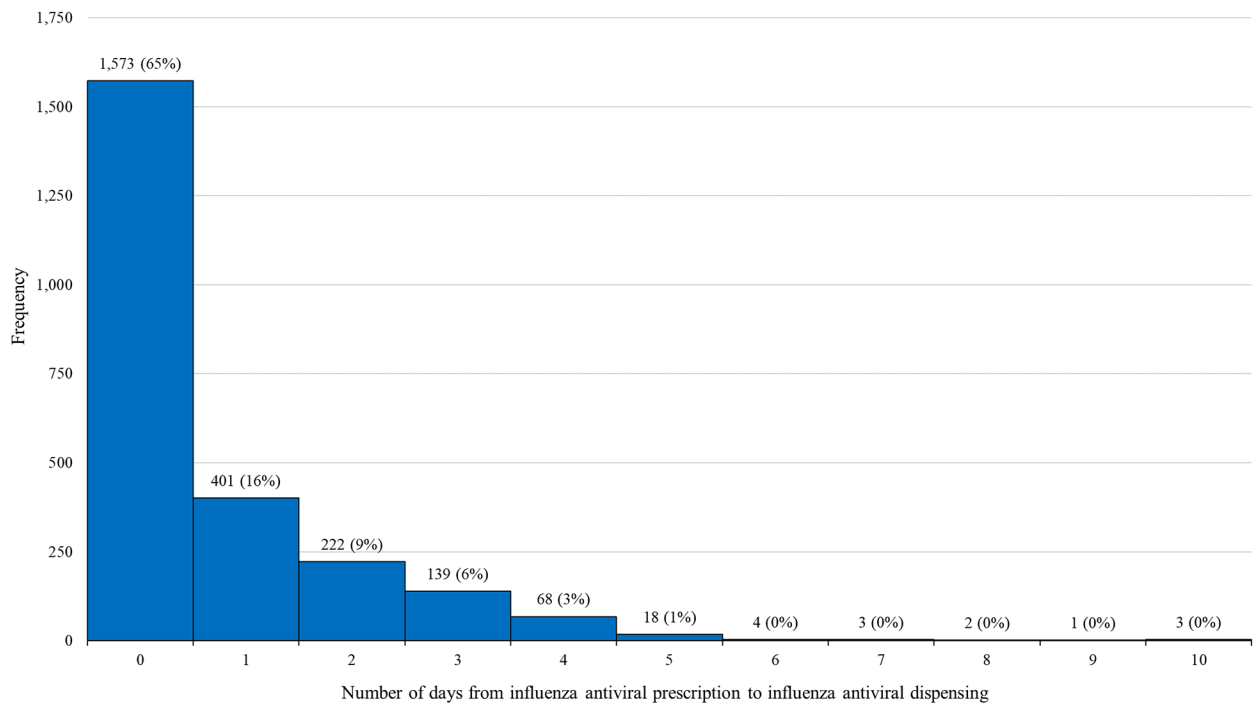


Figure 2.

Days from date of influenza antiviral prescription to influenza antiviral dispensing among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive standard molecular influenza virus test results and dispensed influenza antivirals (N=2,434), VISION Network, October 1, 2023 through April 30, 2024

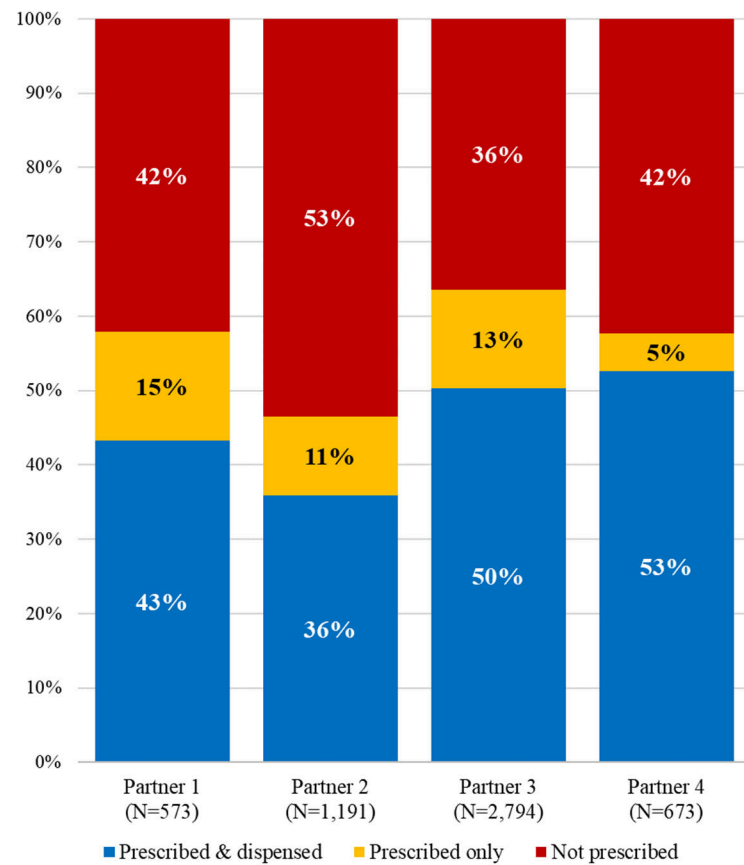
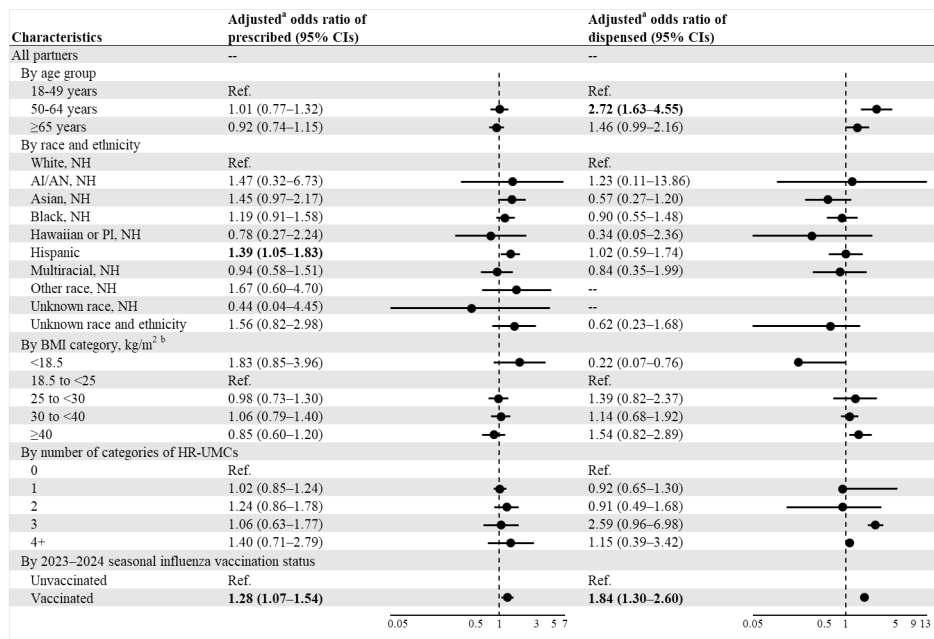


Figure 3.

Prescribing and dispensing of influenza antivirals by VISION partner, VISION Network, October 1, 2023 through April 30, 2024. Data shown are among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive standard molecular influenza virus test results.

**Figure 4.**

Adjusted odds ratio of prescribing and dispensing of influenza antivirals by social and clinical characteristics among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive standard molecular influenza virus test results, VISION Network, October 1, 2023 through April 30, 2024

Abbreviations: AI/AN = American Indian or Alaska Native; BMI = body mass index; CI = confidence interval; HR-UMCs = underlying medical conditions considered to increase risk of influenza complications; NH = Non-Hispanic; PI = Pacific Islander; SVI = Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Social Vulnerability Index (2020)

^a Age group models were adjusted for VISION healthcare system, encounter setting, week of the season, number of categories of higher risk underlying medical conditions considered to increase risk of influenza complications (cardiovascular disease except hypertension alone, chronic pulmonary disease including asthma, hematologic disorders including sickle cell, hepatic disorders, immunosuppressing conditions, metabolic disorders including diabetes mellitus, neurologic and neurodevelopment conditions including stroke and other cerebrovascular diseases, and renal disease), race and ethnicity, BMI (continuous), sex, and seasonal influenza vaccination status. Models for race and ethnicity were adjusted for VISION healthcare system, encounter setting, week of the season, number of categories of underlying medical conditions considered to increase risk of influenza complications, age (continuous), BMI (continuous), sex, and seasonal influenza vaccination status. Models for BMI were adjusted for VISION healthcare system, encounter setting, week of the season, number of categories of underlying medical conditions considered to increase risk of influenza complications, race and ethnicity, age (continuous), sex, and seasonal influenza vaccination status. Models for HR-UMCs were adjusted for VISION healthcare system, encounter setting, week of the season, race and ethnicity, age (continuous), BMI

(continuous), sex, and seasonal influenza vaccination status. Vaccination models were adjusted for VISION healthcare system, encounter setting, week of the season, number of categories of higher risk underlying medical conditions considered to increase risk of influenza complications, race and ethnicity, age (continuous), BMI (continuous), and sex.

^b BMI missing for N=457 encounters.

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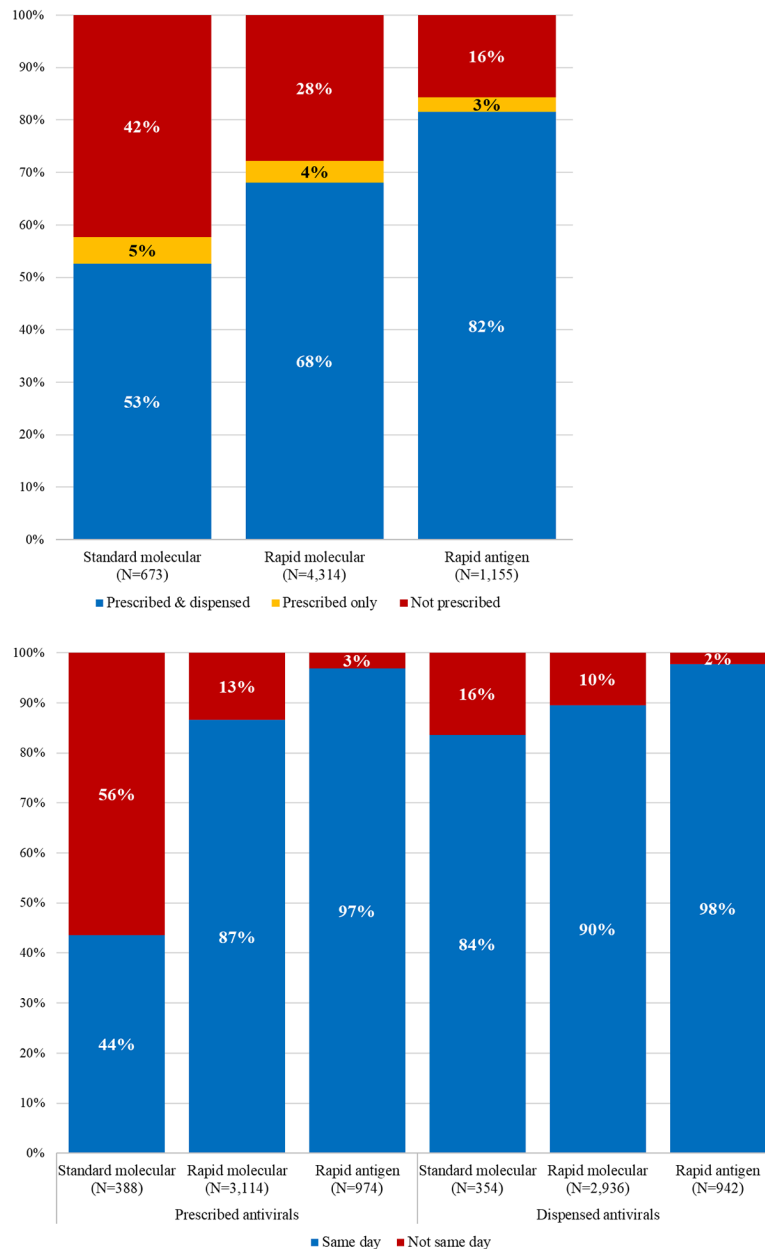


Figure 5.

Prescribing and dispensing of influenza antivirals, VISION Network, October 1, 2023 through April 30, 2024. Data shown are among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive influenza virus test results, from the VISION partner performing multiple types of influenza testing by influenza test type (A), and same-day prescribing and dispensing and influenza test type (B).

5A. By influenza test type

5B. By prescribing on same day of encounter and dispensing on same day of prescription and influenza test type

Table 1.

Characteristics of encounters among adult patients at higher risk of influenza complications presenting with acute respiratory illness to urgent cares or emergency departments and with positive standard molecular influenza virus test results, stratified by antiviral prescribing and dispensing group, VISION Network, October 1, 2023 through April 30, 2024

Characteristic	Antiviral group							
	Prescribing, N (row %)				Dispensing, N (row %)			
	Total encounters	Not prescribed	Prescribed ^a	p-value ^b	Total prescribed	Prescribed but not dispensed	Prescribed and dispensed ^a	p-value ^b
All ED/UC encounters	5,231	2,181 (42%)	3,050 (58%)	--	3,050	616 (20%)	2,434 (80%)	--
VISION partner				<0.001				<0.001
Partner 1	573	241 (42%)	332 (58%)		332	84 (25%)	248 (75%)	
Partner 2	1,191	637 (53%)	554 (47%)		554	126 (23%)	428 (77%)	
Partner 3	2,794	1,018 (36%)	1,776 (64%)		1,776	372 (21%)	1,404 (79%)	
Partner 4	673	285 (42%)	388 (58%)		388	34 (9%)	354 (91%)	
Month of encounter				<0.001				0.42
October–November	462	195 (42%)	267 (58%)		267	44 (16%)	223 (84%)	
December–January	3,145	1,230 (39%)	1,915 (61%)		1,915	389 (20%)	1,526 (80%)	
February–March	1,283	593 (46%)	690 (54%)		690	147 (21%)	543 (79%)	
April	341	163 (48%)	178 (52%)		178	36 (20%)	142 (80%)	
Encounter setting				<0.001				<0.001
Urgent care	1,161	582 (50%)	579 (50%)		579	88 (15%)	491 (85%)	
Emergency department	3,894	1,529 (39%)	2,365 (61%)		2,365	514 (22%)	1,851 (78%)	
Combined ED/UC	176	70 (40%)	106 (60%)		106	14 (13%)	92 (87%)	
Age, median years (IQR)	66 (44–76)	64 (40–73)	68 (47–77)	<0.001	68 (47–77)	69 (46–80)	67 (47–76)	0.02
Age group				<0.001				0.01
18–49 years	1,570	757 (48%)	813 (52%)		813	170 (21%)	643 (79%)	
50–64 years	758	337 (44%)	421 (56%)		421	62 (15%)	359 (85%)	
≥65 years ^c	2,903	1,087 (37%)	1,816 (63%)		1,816	384 (21%)	1,432 (79%)	
Sex ^d				0.07				0.88
Male	2,119	846 (40%)	1,273 (60%)		1,273	257 (20%)	1,016 (80%)	
Female	3,111	1,335 (43%)	1,776 (57%)		1,776	359 (20%)	1,417 (80%)	
Race and ethnicity				0.02				0.02
American Indian or Alaska Native, Non-Hispanic	21	7 (33%)	14 (67%)		14	3 (21%)	11 (79%)	
Asian, Non-Hispanic	544	189 (35%)	355 (65%)		355	69 (19%)	286 (81%)	
Black, Non-Hispanic	664	285 (43%)	379 (57%)		379	81 (21%)	298 (79%)	
Hawaiian or Pacific Islander, Non-Hispanic	62	30 (48%)	32 (52%)		32	4 (12%)	28 (88%)	
Hispanic	1,152	465 (40%)	687 (60%)		687	112 (16%)	575 (84%)	

Characteristic	Antiviral group							
	Prescribing, N (row %)				Dispensing, N (row %)			
	Total encounters	Not prescribed	Prescribed ^a	P-value ^b	Total prescribed	Prescribed but not dispensed	Prescribed and dispensed ^a	P-value ^b
Multiracial, Non-Hispanic	128	55 (43%)	73 (57%)		73	23 (32%)	50 (68%)	
Other race, Non-Hispanic	17	7 (41%)	10 (59%)		10	0 (0%)	10 (100%)	
Unknown race, Non-Hispanic	5	3 (60%)	2 (40%)		2	0 (0%)	2 (100%)	
White, Non-Hispanic	2,498	1,071 (43%)	1,427 (57%)		1,427	307 (22%)	1,120 (78%)	
Unknown race and ethnicity	140	69 (49%)	71 (51%)		71	17 (24%)	54 (76%)	
Medicaid recipient ^e				0.15				0.45
No	4,503	1,863 (41%)	2,640 (59%)		2,640	514 (19%)	2,126 (81%)	
Yes	689	305 (44%)	384 (56%)		384	81 (21%)	303 (79%)	
SVI 2020 ^f				0.08				0.76
Quartile 1 (low vulnerability)	1,161	515 (44%)	646 (56%)		646	122 (19%)	524 (81%)	
Quartile 2	1,418	594 (42%)	824 (58%)		824	162 (20%)	662 (80%)	
Quartile 3	1,375	566 (41%)	809 (59%)		809	167 (21%)	642 (79%)	
Quartile 4 (high vulnerability)	1,240	486 (39%)	754 (61%)		754	158 (21%)	596 (79%)	
BMI category, kg/m ² ^f				<0.001				<0.001
<18.5	94	34 (36%)	60 (64%)		60	26 (43%)	34 (57%)	
18.5 to <25	978	368 (38%)	610 (62%)		610	139 (23%)	471 (77%)	
25 to <30	1,269	503 (40%)	766 (60%)		766	149 (19%)	617 (81%)	
30 to <40	1,327	504 (38%)	823 (62%)		823	148 (18%)	675 (82%)	
≥40	1,106	531 (48%)	575 (52%)		575	94 (16%)	481 (84%)	
Number of categories of HR-UMCs ^c				<0.001				0.32
0	2,898	1,248 (43%)	1,650 (57%)		1,650	316 (19%)	1,334 (81%)	
1	1,838	781 (42%)	1,057 (58%)		1,057	223 (21%)	834 (79%)	
2	314	94 (30%)	220 (70%)		220	53 (24%)	167 (76%)	
3	122	40 (33%)	82 (67%)		82	14 (17%)	68 (83%)	
4+	59	18 (31%)	41 (69%)		41	10 (24%)	31 (76%)	
Cardiovascular ^g				<0.001				0.01
No	4,781	2,054 (43%)	2,727 (57%)		2,727	533 (20%)	2,194 (80%)	
Yes	450	127 (28%)	323 (72%)		323	83 (26%)	240 (74%)	
Chronic pulmonary ^h				0.57				0.14
No	3,873	1,606 (41%)	2,267 (59%)		2,267	472 (21%)	1,795 (79%)	
Yes	1,358	575 (42%)	783 (58%)		783	144 (18%)	639 (82%)	

Characteristic	Antiviral group							
	Prescribing, N (row %)				Dispensing, N (row %)			
	Total encounters	Not prescribed	Prescribed ^a	P-value ^b	Total prescribed	Prescribed but not dispensed	Prescribed and dispensed ^a	P-value ^b
Hematologic ⁱ				0.81				0.91
No	5,206	2,170 (42%)	3,036 (58%)		3,036	613 (20%)	2,423 (80%)	
Yes	25	11 (44%)	14 (56%)		14	3 (21%)	11 (79%)	
Hepatic				0.41				0.48
No	5,187	2,160 (42%)	3,027 (58%)		3,027	610 (20%)	2,417 (80%)	
Yes	44	21 (48%)	23 (52%)		23	6 (26%)	17 (74%)	
Immunosuppressing ^j				0.44				0.76
No	4,982	2,083 (42%)	2,899 (58%)		2,899	587 (20%)	2,312 (80%)	
Yes	249	98 (39%)	151 (61%)		151	29 (19%)	122 (81%)	
Metabolic ^k				0.01				0.47
No	4,687	1,983 (42%)	2,704 (58%)		2,704	541 (20%)	2,163 (80%)	
Yes	544	198 (36%)	346 (64%)		346	75 (22%)	271 (78%)	
Neurologic and neurodevelopment conditions ^l				0.02				<0.001
No	5,003	2,103 (42%)	2,900 (58%)		2,900	569 (20%)	2,331 (80%)	
Yes	228	78 (34%)	150 (66%)		150	47 (31%)	103 (69%)	
Renal				0.01				0.33
No	5,045	2,122 (42%)	2,923 (58%)		2,923	586 (20%)	2,337 (80%)	
Yes	186	59 (32%)	127 (68%)		127	30 (24%)	97 (76%)	
Pregnant ^c				0.08				0.57
No	4,942	2,075 (42%)	2,867 (58%)		2,867	582 (20%)	2,285 (80%)	
Yes	289	106 (37%)	183 (63%)		183	34 (19%)	149 (81%)	
Received 2023–2024 seasonal influenza vaccination				<0.001				<0.001
No	3,150	1,406 (45%)	1,744 (55%)		1,744	405 (23%)	1,339 (77%)	
Yes	2,081	775 (37%)	1,306 (63%)		1,306	211 (16%)	1,095 (84%)	

Abbreviations: BMI = body mass index; ED/UC = emergency department and urgent care; HR-UMCs = underlying medical conditions considered to increase risk of influenza complications; IQR = interquartile range; NH = Non-Hispanic; SVI = Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Social Vulnerability Index (2020)

^aIncludes neuraminidase inhibitors (NAIs) (Oseltamivir [Tamiflu], Peramivir [Rapivab], and Zanamivir [Relenza]) and Baloxavir marboxil (Xofluza).

^bChi-square test performed for categorical and binary variables, Wilcoxon rank-sum test used for continuous variables.

^cCriteria for being at higher risk for influenza complications. BMI was missing for N=409 standard molecular testing encounters.

^dSex missing for N=1 standard molecular testing encounters.

^eMedicaid status missing for N=39 standard molecular testing encounters.

^fSVI was missing for N=37 standard molecular testing encounters.

^gCardiovascular diseases include heart failure, ischemic heart disease, pulmonary embolism, heart valve, atrial fibrillation, congenital heart disease, and other heart disease, and does not include hypertension alone.

^hChronic pulmonary disease includes asthma, chronic obstructive pulmonary disease, and other chronic lung disease conditions.

ⁱHematologic disorders include sickle cell disease and other blood disorders.

^jImmunosuppressing conditions include human immunodeficiency virus (HIV), hematological malignancy, other intrinsic immune condition or immunodeficiency, solid malignancy, transplant, rheumatologic/inflammatory disorders, and chronic steroid use.

^kMetabolic disorders include diabetes mellitus and other endocrine disorders.

^lNeurologic and neurodevelopment conditions include dementia, Down's syndrome, other neurological and musculoskeletal disorders, stroke, and other cerebrovascular disease.