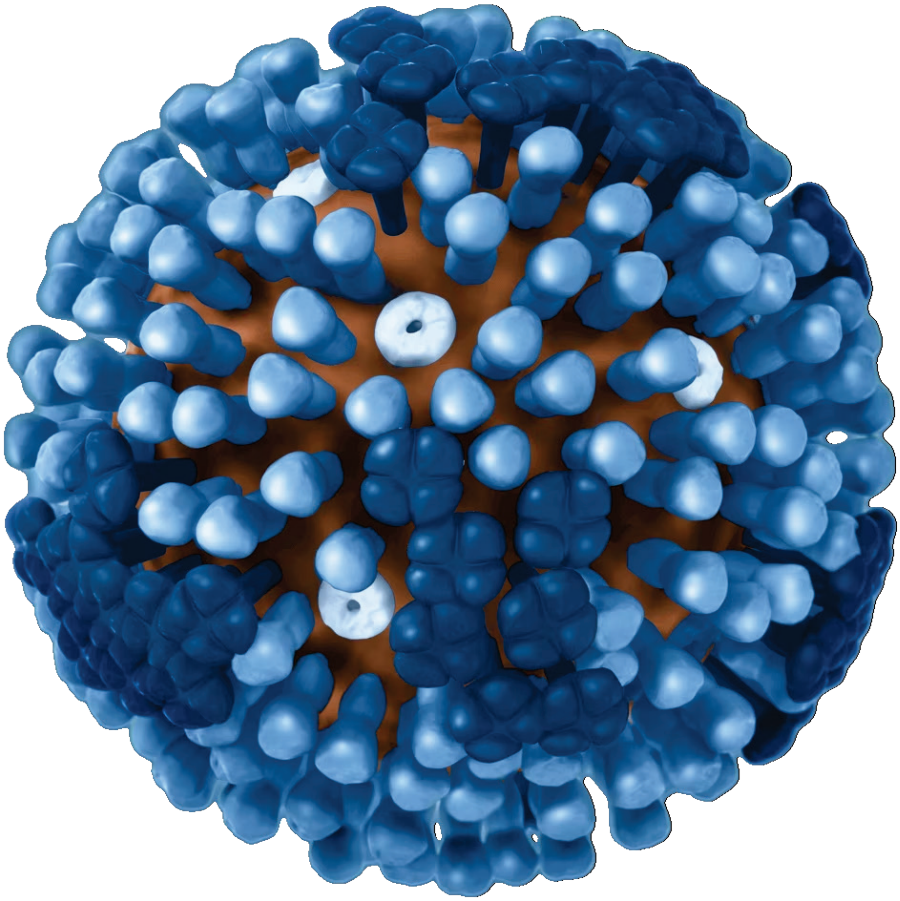
NORTHERN NEVADA

Public Health



Washoe County Influenza Surveillance Program

2023-2024 Influenza Hospitalization & Mortality Report

Division of Epidemiology and Public Health Preparedness (EPHP) 775-328-2447

Danika Williams, PhD, MPH, Epidemiologist, Respiratory Virus Surveillance Coordinator

Table of Contents

Introduction

Northern Nevada Public Health (NNPH) conducts influenza surveillance year-round. Goals of the Influenza Surveillance program are 1) Characterize the prevailing strains of influenza in the community, 2) Measure the impact of the disease in the community, and 3) Obtain and disseminate information regarding influenza activity to health care providers, the public, and those responsible for influenza control measures.

NNPH's influenza surveillance program consists of four major components: 1) Weekly reports of influenza-like illness by selected sentinel healthcare providers, 2) The collection of a limited number of specimens by sentinel healthcare providers, 3) Monitoring of influenza, pneumonia, and COVID-19 mortality through death certificates, and 4) Routine reporting and review of confirmed cases of influenza that have been hospitalized or expired. NNPH Epidemiology Program staff review available medical records of these cases to obtain key information, such as demographics, length of hospital stay, past medical history, treatment information, and vaccination history. NNPH Epidemiology Program also produces and disseminates weekly influenza reports during the influenza season (Centers for Disease Control and Prevention MMWR Week 40 through the end of Week 20), summarizing this information.

Influenza surveillance data are used to monitor the impact of influenza on different populations (e.g., people in certain age groups, people with underlying medical conditions) as well as to detect changes that inform public health responses (e.g., changes in the virus-type circulating, hospitalization rates, treatment recommendations, and vaccination efforts). Reviews of surveillance data after the active season allows a retrospective evaluation of the most impacted populations and can help inform future season preparations and during season response for both public health and the medical community. Prior to the 2018-2019 influenza season, influenza hospitalizations and deaths were analyzed and published annually to aid in these surveillance purposes, as well as to assess the severity and trends of influenza in the prior season more in depth. However, due to the COVID-19 pandemic, this publication was suspended. A five-year cumulative report for 2018-2022 season was published in July 2024 to reestablish continued release of this analytical report. This publication is a resuming of the annual cycle.

Northern Nevada Public Health's Influenza Surveillance website can be found here:
https://tinyurl.com/WCFluSurv

Data Sources

Data included in this report were reported and collected through manual medical record reviews from hospitals (local and out of state), Nevada state immunization registries, and the Washoe County Medical Examiner. Testing was conducted by local providers or laboratories, as

well as the Nevada State Public Health Laboratory, and reported to the Epidemiology Program. **Note**: Pursuant to NAC 441A.575, only pediatric deaths and hospitalized influenza cases were considered reportable, starting with the 2018-2019 influenza season.

"TN" as superscript (e.g., [TN]) indicates a formal definition or terminology that can be found under Technical Notes at the end of the report.

Acknowledgements

Northern Nevada Public Health would like to acknowledge and thank the following for their contributions to year-round influenza surveillance:

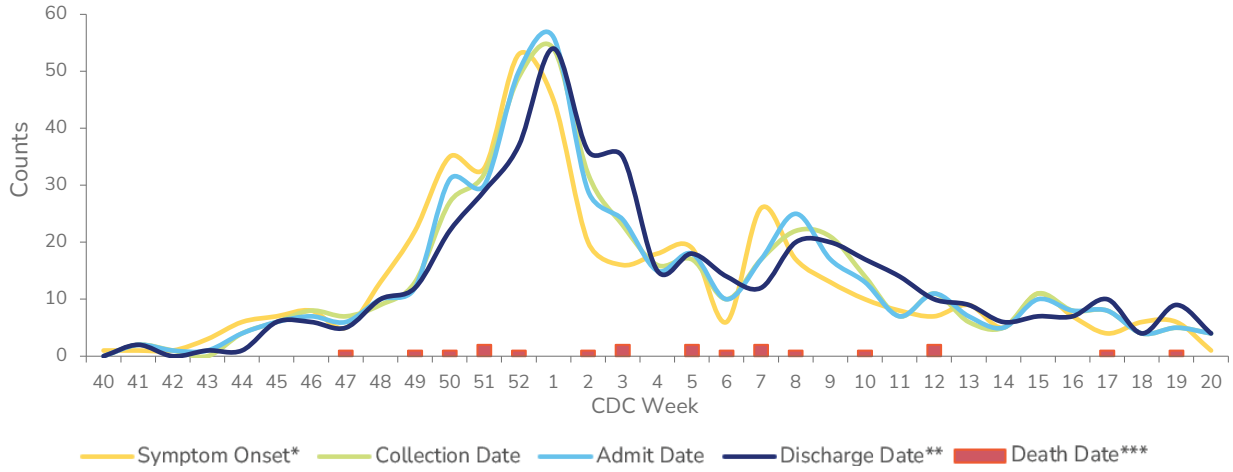
- Area sentinel surveillance sites: Northern Nevada Health System, Renown Health System, Saint Mary's Regional Medical Center, and the University of Nevada, Reno Student Health Center.
- Local and regional hospitals, physicians, laboratories, schools, daycares
- Nevada State Public Health Laboratory (NSPHL)
- Nevada and federal public health partners, including the Nevada Office of Epidemiology.

A special thank you to Northern Nevada Public Health Epidemiology Program staff, especially Liliana Wilbert and Lissa Callahan for their contributions to the writing of this report.

Hospitalizations

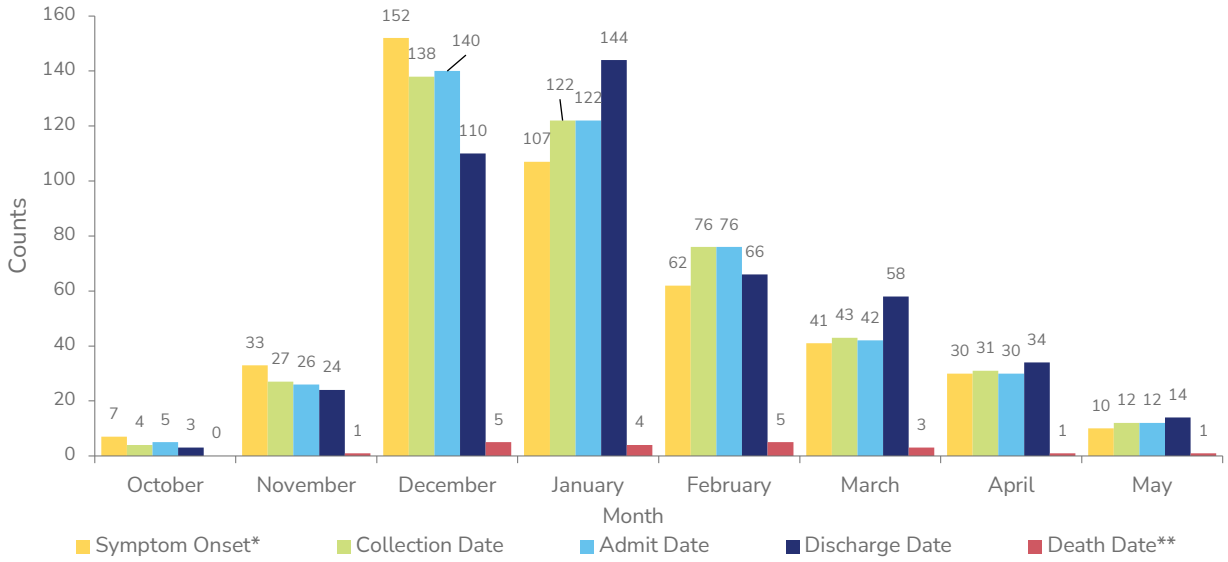
During the 2023-2024 **influenza season**[TN] (October 1, 2023 - May 18, 2024), 453 Washoe County residents were **hospitalized**[TN] with influenza. More than half (56.7%, n=257) of all hospitalizations were admitted between the **MMWR**[TN] weeks of 48 through 4, which coincided with the months of December 2023 and January 2024 **(See Fig. 1 & Fig. 2)**. This reflected the peak of influenza activity during the season. Also peaking in December 2023, followed by January 2024, was the highest count of symptom onset dates and collection dates, respectively, of influenza specimens from hospitalizations **(See Fig. 2)**. Discharge dates of hospitalized cases peaked in January 2024 (occurring after the peak month of highest admittance dates), and deaths among hospitalized cases peaked in December 2023 and February 2024, followed by January 2024, coinciding with the peak and post-peak of influenza activity in the season.

Figure 1. Counts by Week of Dates of Importance for Influenza Hospitalizations, Washoe County, 2023-2024 Influenza Season



**8 cases had no symptom onset date recorded; 3 cases had no symptoms. **One discharge in week 21 not shown. ***20 deaths among hospitalizations occurred.*

Figure 2. Counts by Month of Dates of Importance for Influenza Hospitalizations, Washoe County, 2023-2024 Influenza Season

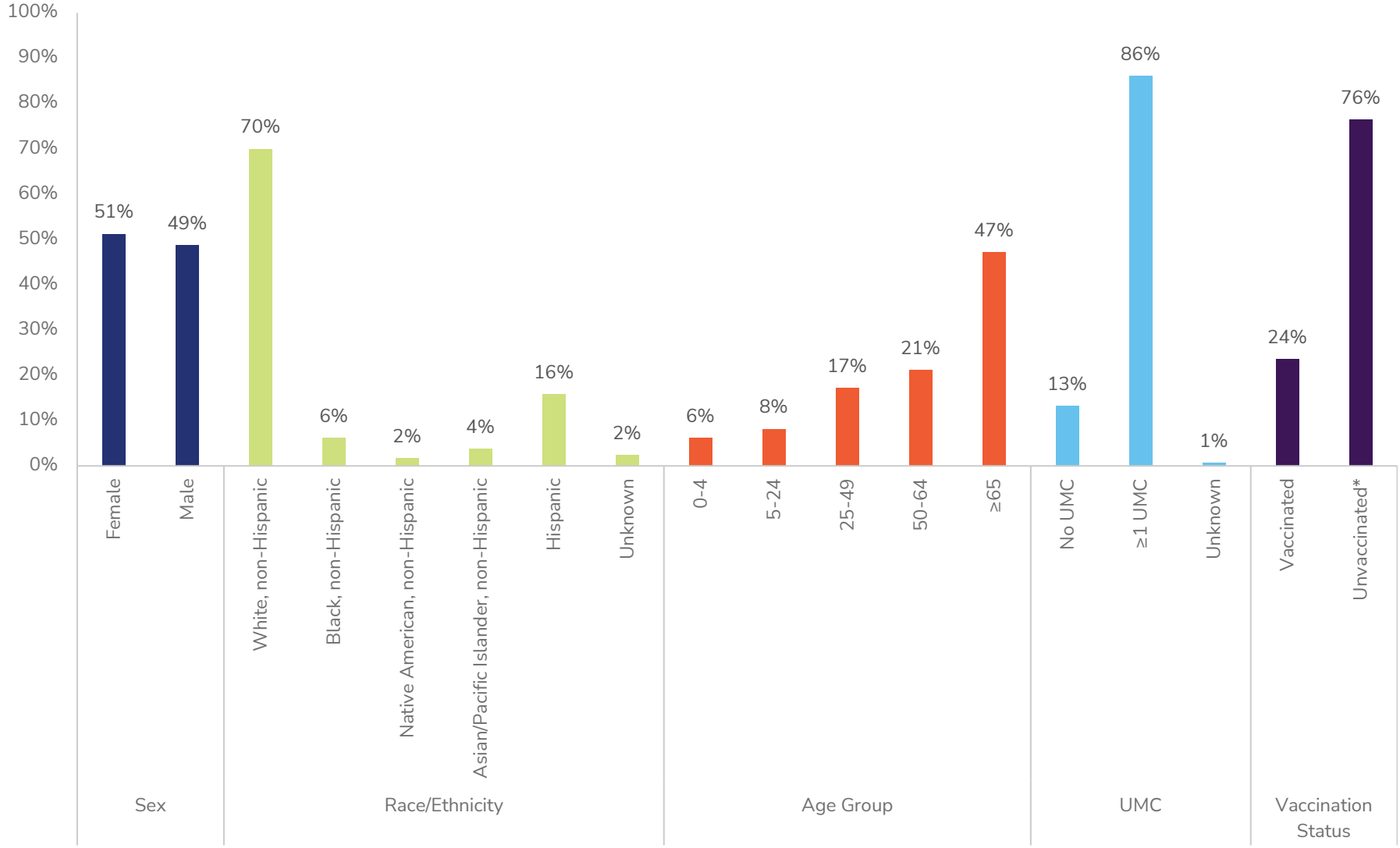


**8 cases had no symptom onset date recorded; 3 cases had no symptoms. **20 deaths among hospitalizations occurred.*

Demographics

The average age of hospitalized cases was 56.8 years old (range 0 to 97 years). Cases 65 years or older made up the highest proportion of hospitalized cases (47.2%, n=214) **(See Fig. 3)**. Females constituted 51.2% (n=232) of hospitalized cases, and most cases were non-Hispanic White (70.0%, n=317). Thirty-three (7.3%) cases were long-term care residents prior to hospitalization.

Figure 3. Demographics of Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

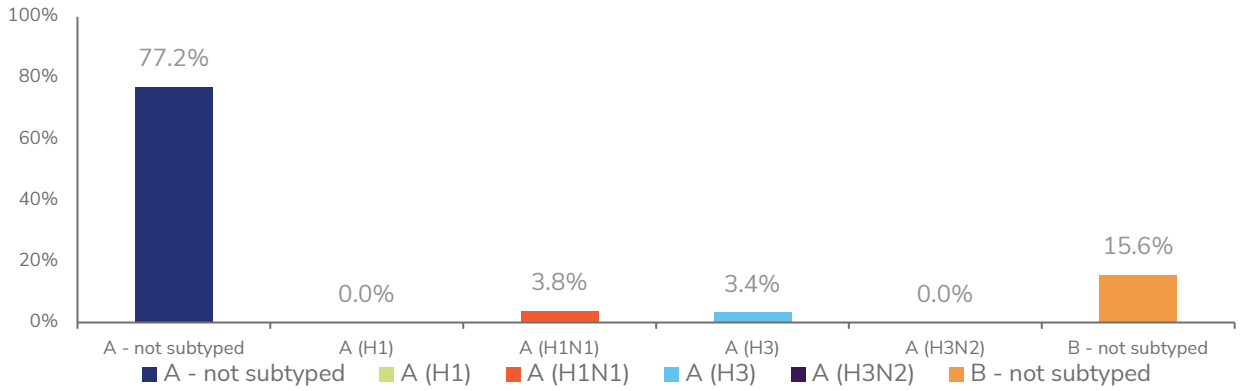


**1.2% were unvaccinated due to being too young.*
UMC- Underlying Medical Condition

Types of Influenza Viruses

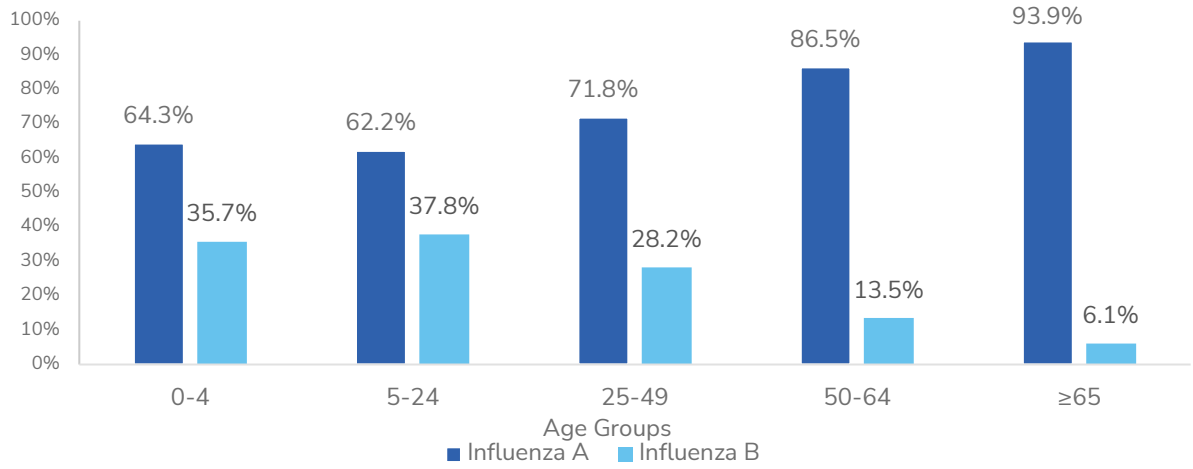
Among hospitalized cases, the **type of influenza virus**[TN] was reported as part of the positive laboratory report. Of the 453 laboratory results, 84.1% (n=381) were positive for influenza type A, and 15.9% (n=72) were positive for influenza type B; 91.8% (n=416) were done by PCR (see **Testing Methods for Influenza Viruses**[TN]), 7.9% by antigen (n=36), and 0.2% (n=1) by an unknown method **(See Fig. 4)**. Of the influenza type A cases that had subtyping testing completed, 3.8% (n=16) were influenza A (H1N1) and 3.4% (n=14) were influenza A (H3). Among influenza A cases, the average length of hospitalization was 5.07 days (range 1 to 101 days), while among influenza B cases, the average length of hospitalization was lower at 3.7 days (range 1 to 17 days). Among age groups, influenza A had the highest proportion among the ≥65 and 50-64 year age groups (93.9% and 86.5%, respectively), while influenza B had its highest proportion among the 5-24 and 0-4 age groups (37.8% and 35.7%, respectively) **(See Fig. 5)**. For more flu type comparisons, see *Hospitalizations Outcomes*.

Figure 4. Influenza Typing and Subtyping Percent Distribution Among Hospitalized Influenza Cases with a PCR Test (n=416), Washoe County, 2023-2024 Influenza Season*



** No Influenza B Victoria or Yamagata were reported via subtyping in these seasons among hospitalized cases.*

Figure 5. Influenza Type (A or B) Percent Distribution Among Hospitalized Influenza Cases (n=453), by Age Group, Washoe County, 2023-2024 Influenza Season



Underlying Medical Conditions & Risk Factors

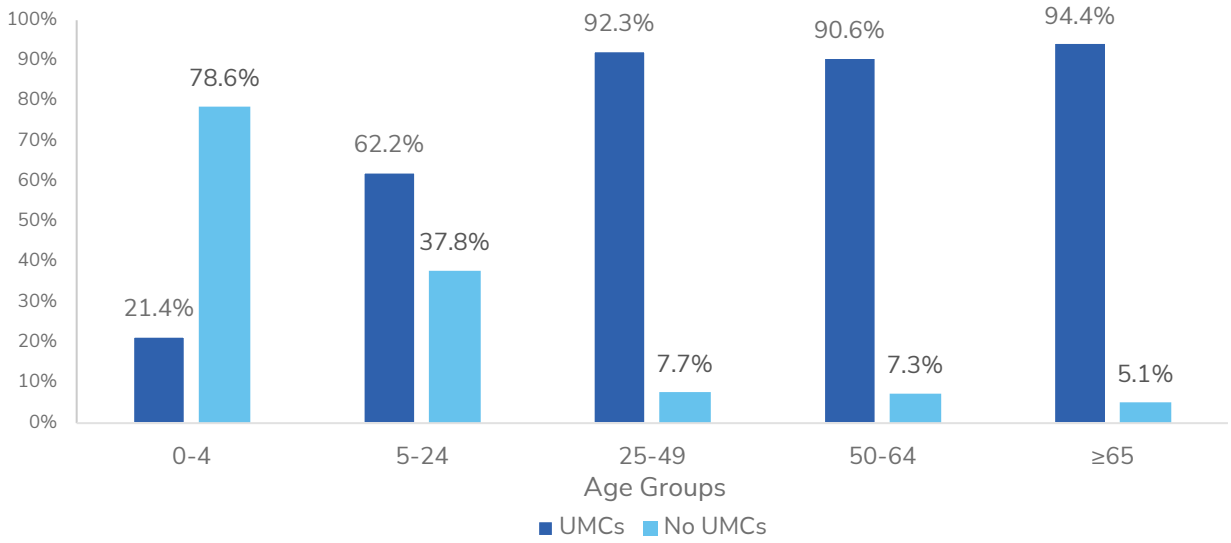
Medical history was reviewed for all hospitalized cases to determine if there were any documented **underlying medical conditions (UMCs) or risk factors**[TN] that could contribute to an increased risk of flu-related complications. Of the 390 who reported an UMC (3 of the 453 hospitalizations had unknown UMC), the most reported risk factors were "other" (59.2%, n=231) which included endocrine, kidney, liver, blood neurological, or cardiac diseases, obesity (47.2%, n=184), chronic pulmonary diseases (35.9%, n=140), diabetes (27.2%, n=106), and asthma (19.2%, n=75) **(See Table 1).** Age is a known risk factor, as both populations younger (under 5 years) and older (those 65 years and over) are at elevated risk; 6.2% of hospitalized cases (n=28) were aged under 5 years and 47.2% of hospitalized cases (n=214) were aged 65 years or older **(See Fig. 3).** Those under the age of 5 years of age were the only age group with a larger proportion of no UMCs compared to having an UMC (78.6% to 21.4%), while those over the age of 25 years all had a proportion of over 90% having an UMC no matter the age group **(See Fig. 6).** The average length of hospital stay in days was 1.7 times longer for those with UMCs compared to those without UMCs, at 5.1 and 3.0 days respectively. Of those vaccinated, those with UMCs made up the largest proportion (91.6%, n=98) **(See Fig. 7).** Of those admitted to the ICU, required mechanical intubation, and who died, those with UMCs made up the largest proportion of each (87.7%, 81.3%, 100%, respectively) **(See Fig. 7).**

Table 1. Underlying Medical Conditions and Risk Factors of Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

Risk Factor*	Percent of Cases ł	Rank
Other Condition**	59.2%	1
Obese	47.2%	2
Chronic Pulmonary Disorder	35.9%	3
Diabetes	27.2%	4
Asthma	19.2%	5
Immunocompromised***	9.7%	6
Pregnant or 2 Weeks Postpartum ł	2.9%	7

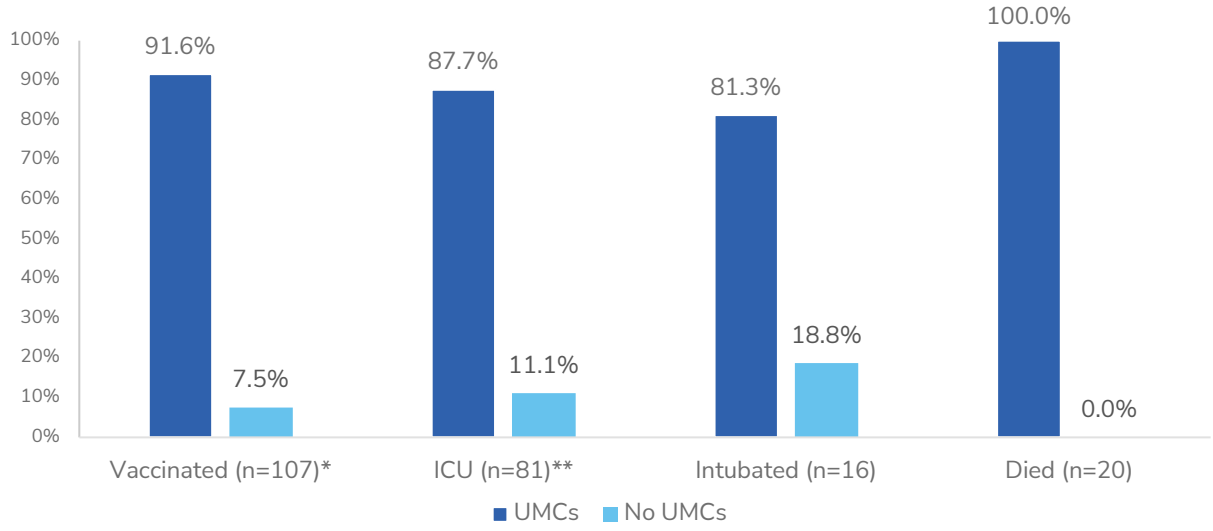
** Not Mutually Exclusive*
*** Other medical conditions include endocrine, kidney, liver, blood neurological, or cardiac diseases.*
**** Condition or Medication*
ł n=390, 3 unknown UMC, ǂ n=453

Figure 6. Percent of those with UMCs by Age Group, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season



n=453, 3 had unknown UMC; UMCs- Underlying Medical Conditions

Figure 7. Percent of those with UMCs by Vaccination Status and Severe Outcome, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

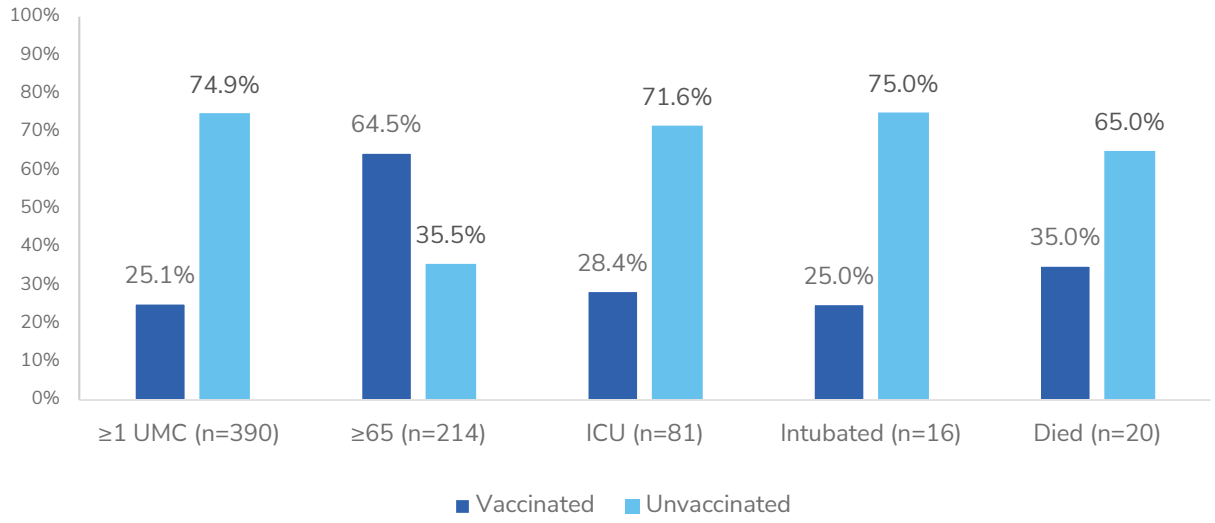


** 1 unknown UMC (0.9%) not included; ** 1 unknown UMC (1.2%) not included.*
n=453, UMCs- Underlying Medical Conditions.

Vaccination

Of hospitalized cases, 76.4% (n=346) did not have a documented history of current seasonal **influenza vaccine[TN] (See Fig. 3)**. The average age of those vaccinated (n=107) was 67.7 years of age (range 1 to 93 years), while the average age of those unvaccinated (n=346) was lower at 53.5 years of age (range 0 to 97 years). For those who were vaccinated, the average days from vaccination to onset of illness was 97.8 days (range 16 to 237 days); in other words, on average, 14 weeks or 3.5 months had elapsed from vaccination to infection. Of hospitalized patients, 74.9% (n=292) with at least one UMC were unvaccinated, 35.5% (n=76) of those 65 years of age or older and at higher risk of influenza complications were unvaccinated, 71.6% (n=58) of those in the intensive care unit (ICU) were unvaccinated, 75.0% (n=12) of those requiring mechanical ventilation were unvaccinated, and 65.0% (n=13) of those who died were unvaccinated **(See Fig. 8)**. Only 1.2% (n=4) of those unvaccinated were too young to be vaccinated. The average length of hospital stay for those unvaccinated was 4.5 days, which was slightly shorter than those who were vaccinated who had average of 5.8 days. However, the range of the length of stay for hospitalizations was wider for those unvaccinated at 1 to 101 days compared to 1 to 60 days for the vaccinated.

Figure 8. Vaccination Status Among those with Risk Factors for Severe Illness and by Severe Outcome, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Seasons



UMC- Underlying Medical Condition

Vaccination status was further reviewed in categories based on time from vaccination to illness as it relates to level of protection from vaccination*: with 14 -120 days (~ 4 months) considered "immune", 121 -182 days (~6 months) considered "waning" immunity, >182 days (> 6 months) considered "limited" immunity, and no vaccination considered "unvaccinated". Those "unvaccinated" made up the largest proportion (76.4%, n=346), followed by "immune" at 16.6% (n=75), those with "waning" immunity at 5.1% (n=23), and those with "limited" immunity at 2.0% (n=9) **(See Fig. 9)**. Among age groups, those with the highest proportion of those considered "immune" were those 65 years of age and older (22.4%, n=48), while the lowest were between the ages of 5-24 years of age (5.4%, n=2) **(See Fig. 10)**. The age group with the highest proportions of those with "waning" immunity and "limited" immunity were also those who were 65 years and older (8.9% and 4.2%, n=19 and n=9, respectively). Those between the ages of 0-4 years of age had no cases classified as having "waning" or "limited" immunity, while the 5-24, 25-49, and 50-64 year age groups had no cases classified as having "limited" immunity. The 5-24 year age group had the highest unvaccinated proportion at 91.9% of those cases (n=34). These categories were further reviewed among those with or without UMCs, with or without ICU admission, with or without mechanical ventilation, and those who expired or died **(See Fig. 11)**. Those with UMCs were a higher proportion of "immune" compared to those with no UMCs (17.4%, n=68; 11.7%, n=7), while those with no UMCs had a higher proportion of those being unvaccinated compared to those with UMCs(86.7%, n=52; 74.9%, n=292). Those admitted to the ICU had a higher fraction of combined "waning" and "limited" immunity (9.9%, n=8) compared to those not admitted to the ICU (6.5%, n=24). Those not requiring mechanical ventilation were more "immune" compared to those intubated (16.9%, n=74; 6.3%,

n=1). Additionally, those who required mechanical ventilation had a higher proportion of "waning" and "limited" immunity compared to those not intubated (18.8%, n= 3; 6.6%, n=29). Those who survived had a higher proportion of those considered "immune" compared to those who died (16.9%, n=73; 10.0%, n=2), while those who died had a higher proportion of those with "waning" and "limited" status compared to those who survived (25.0%, n=5; 6.2%, n=27).

***Note**: Categories of vaccination status were estimates and simplifications of multiple studies on waning immunity and do not reflect the age or health of the individual and their individual response to the influenza vaccine and true level of protection but rather to be used as an estimate for use in this analysis.[1-4]

---

[1] Barnaby Young, Sapna Sadarangani, Lili Jiang, Annelies Wilder-Smith, Mark I-Cheng Chen, Duration of Influenza Vaccine Effectiveness: A Systematic Review, Meta-analysis, and Meta-regression of Test-Negative Design Case-Control Studies, The Journal of Infectious Diseases, Volume 217, Issue 5, 1 March 2018, Pages 731–741, https://doi.org/10.1093/infdis/jix632

[2] Chung Hannah, Campitelli Michael A, Buchan Sarah A, Campigotto Aaron, Crowcroft Natasha S, Gubbay Jonathan B, Jung James KH, Karnauchow Timothy, Katz Kevin, McGeer Allison J, McNally J Dayre, Richardson David C, Richardson Susan E, Rosella Laura C, Russell Margaret L, Schwartz Kevin L, Simor Andrew, Smieja Marek, Sundaram Maria E, Warshawsky Bryna F, Zahariadis George, Kwong Jeffrey C, on behalf of the Canadian Immunization Research Network (CIRN) Provincial Collaborative Network (PCN) Investigators. Measuring waning protection from seasonal influenza vaccination during nine influenza seasons, Ontario, Canada, 2010/11 to 2018/19. Euro Surveill. 2024;29(8):pii=2300239. https://doi.org/10.2807/1560-7917.ES.2024.29.8.2300239

[3] Grohskopf LA, Blanton LH, Ferdinands JM, Chung JR, Broder KR, Talbot HK. Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices — United States, 2023–24 Influenza Season. MMWR Recomm Rep 2023;72(No. RR-2):1–25. DOI: http://dx.doi.org/10.15585/mmwr.rr7202a1

[4] Influenza (Flu). Immunogenicity, Efficacy, and Effectiveness of Influenza Vaccines. Centers for Disease Control and Prevention. Updated September 11, 2019. Accessed July 18, 2024. https://www.cdc.gov/flu/professionals/acip/immunogenicity.htm#Duration

Figure 9. Level of Protection from Vaccination, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

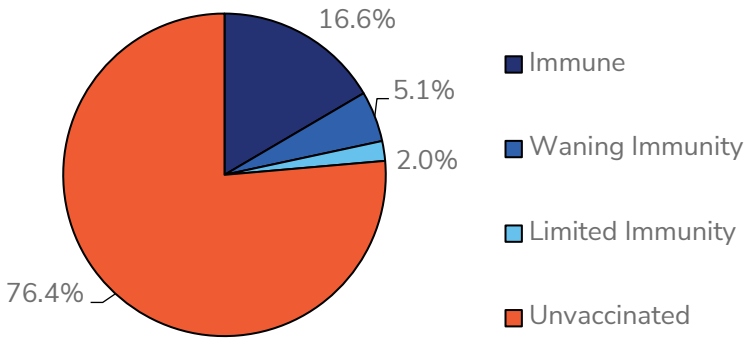


Figure 10. Level of Protection from Vaccination by Age Group, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

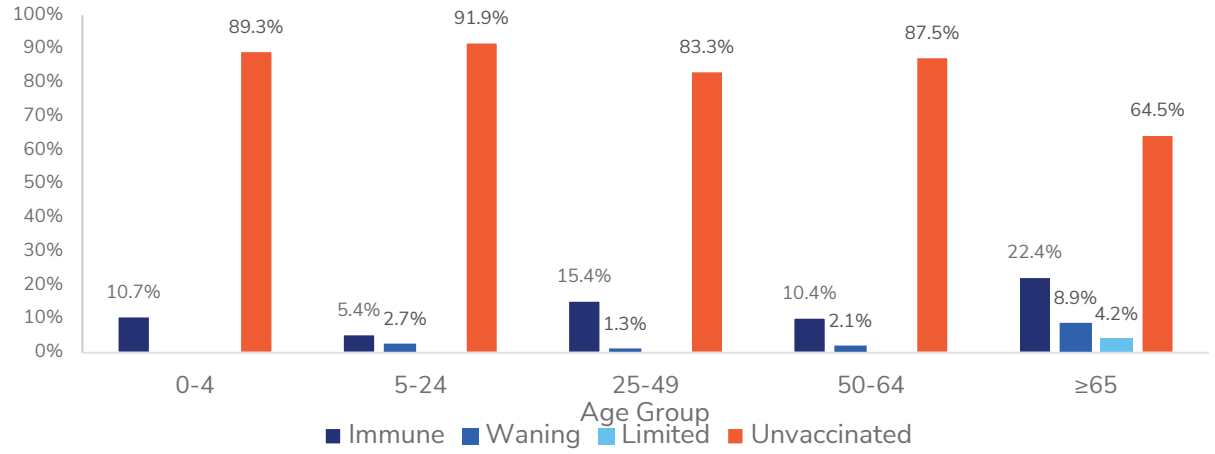
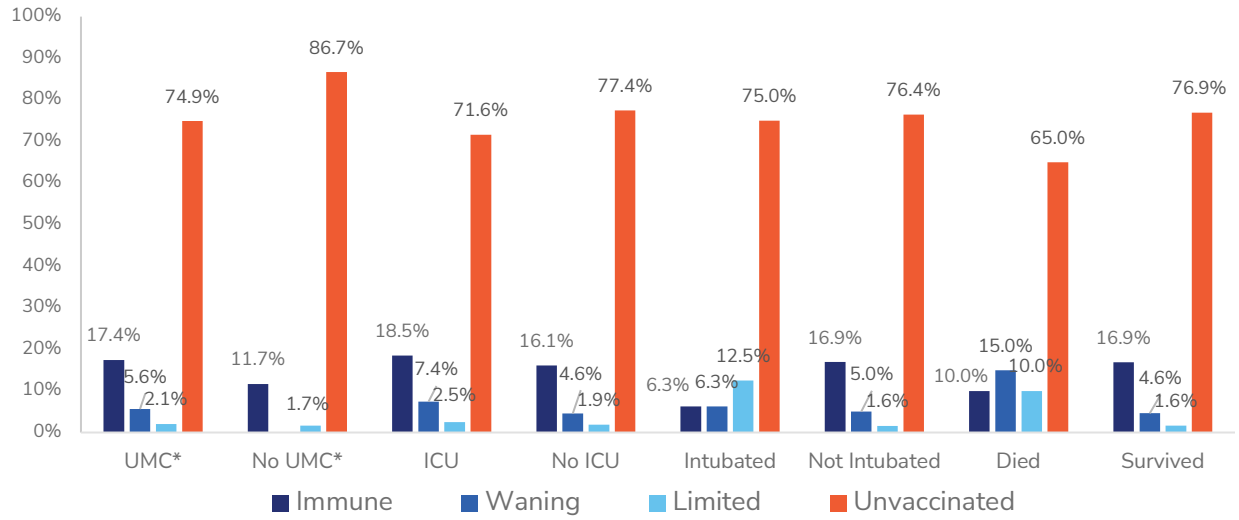


Figure 11. Level of Protection from Vaccination by UMC Status and by Severe Outcome, Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season



** 3 cases had unknown UMC: 1 waning, 2 unvaccinated. UMC- Underlying Medical Condition*

Symptomology

Among the 99.3% (n=450) of hospitalized cases with symptoms reported, the most common symptoms were cough (84.0%, n=378), shortness of breath (69.3%, n=312), other symptoms (67.1%, n=302), fever (63.1%, n=284), and weakness or fatigue (60.2%, n=271) **(See Table 2)**. When looking at the top five symptoms by age group, symptoms common across age groups included fever, cough, and other symptoms **(See Fig. 12)**. Fever was most prominent in the younger age groups (<25 years of age), while shortness of breath was more prominent in the older age groups (≥25 years of age). Unique to the younger age groups (<25 years of age) was reporting rhinorrhea in the top five symptoms, while unique to those over the age of four was reporting weak/tired in the top five symptoms. The average days from onset of symptoms to

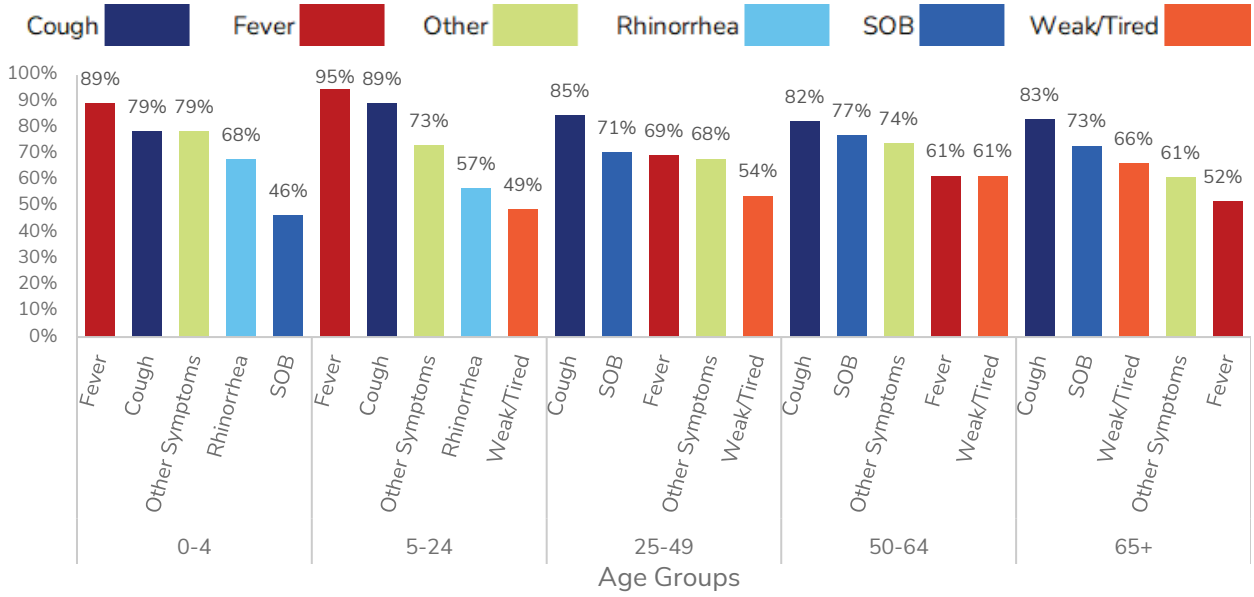
admittance was 4.3 days (range -33 to 33 days). The average days from onset of symptoms to influenza test as 4.6 days (range -3 to 34 days), with one case tested post-mortem and three tested one day prior to symptom onset (i.e., tested when asymptomatic).

Table 2. Types of Symptoms Among Hospitalized Influenza Cases, Washoe County, 2023-2024 Influenza Season

Symptom ł	Percent of Cases ǂ
Cough	84.0%
Shortness of Breath	69.3%
Other Symptoms	67.1%
Fever	63.1%
Weak/Tired	60.2%
Chills	40.4%
Body or Muscle Aches	34.4%
Rhinorrhea	34.0%
Nausea	25.8%
Vomiting	23.8%
Headache	18.0%
Altered Mental Status	16.2%
Diarrhea	14.0%
Sore Throat	12.0%
Rash	1.8%
Seizures	0.2%

ł Not Mutually Exclusive (multiple symptoms could be reported by a single person)
ǂ n=450

Figure 12. Top Five Symptoms[ł] Among Hospitalized Influenza Cases, By Age Group, Washoe County, 2023-2024 Influenza Season



ł Not Mutually Exclusive (multiple symptoms could be reported by a single person).
n=450; SOB- Shortness of Breath

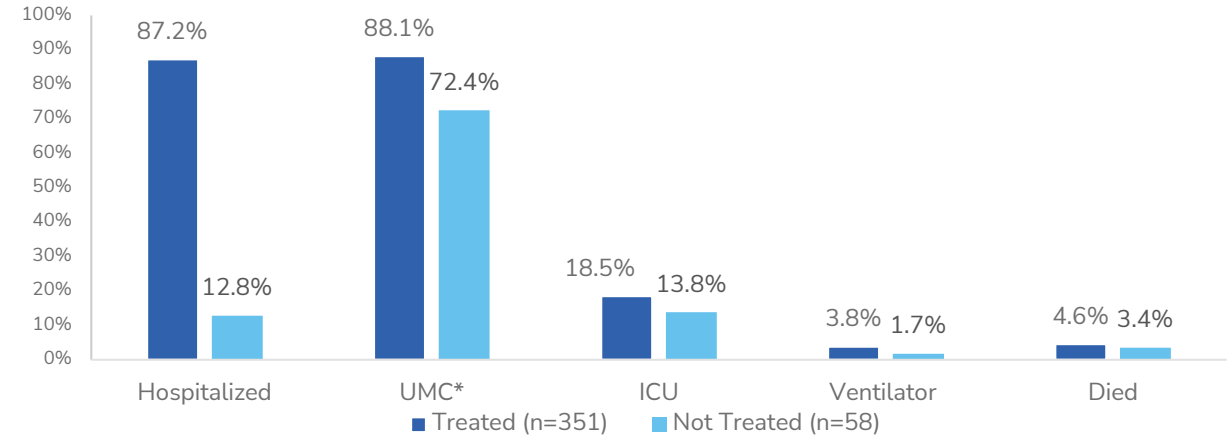
Treatment

A total of 87.0% (n=395) of hospitalized cases were treated* with **Oseltamivir (Tamiflu)™ (See Fig. 13)**. Among treated cases, the average length of hospitalization was 5.0 days (range 1 to 101 days), while among untreated cases the average length of hospitalizations was 3.7 days (range 1 to 31 days). Eighty-eight percent (n=348) of patients treated with an antiviral medication had an UMC compared to 72.0% (n=42) who were untreated. Nineteen percent (n=73) of patients treated with an antiviral medication were admitted to the ICU compared to 14.0% (n=8) of those who were untreated. Four percent (n=15) of patients treated with an antiviral medication were intubated or placed on mechanical ventilation versus 2.0% (n=1) who were untreated. Five percent (n=18) of patients treated with an antiviral medication died, in contrast to 3.0% (n=2) of untreated patients. The average age of those treated was 59.2 years of age (range 0 to 94 years of age), while the average age of those untreated was lower at 40.9 years of age (range 0 to 97 years of age). For those who were treated, the average days from onset of symptoms was 4.9 days (range 0 to 34 days).

***Note**: Treatment is typically only given within 48 hours of illness onset unless the patient "is at higher risk for influenza complications" or has "severe, complicated, or progressive illness."[1] This may result in those being treated having longer hospitalization stays or worse outcomes due to the worsened state of the patient at the time of treatment or their higher risk and reason for treatment.

[1] Influenza Antiviral Medications: Summary for Clinicians. Atlanta, GA: National Center for Immunization and Respiratory Diseases, CDC, Dec. 2023. Accessed April 2024 https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm

Figure 13. Treatment Status Among Hospitalized Influenza Cases, and by UMC and Severe Outcome, Washoe County, 2023-2024 Influenza Season



** 3 cases treated had unknown UMC and are not included here. UMC- Underlying Medical Condition.*

Outcomes

The average length of hospital admission was 4.9 days (range 1 to 101 days), with the youngest age group (0-4 years of age) having the lowest average and smallest range of days (3.2 days, range 1 to 13 days) while the oldest age group had the highest average and widest range of days (5.7 days, range 1 to 101 days) **(See Fig. 14).** Of hospitalized cases, 23.6% (n=107) were vaccinated, 17.9% (n=81) were admitted to the ICU, 3.5% (n=16) were intubated or placed on mechanical ventilation, and 4.4% (n=20) died **(See Table 3).** Hospitalized patients in the ICU were on average 50.3 years old (range 0 to 94 years). Hospitalized patients who were intubated or placed on mechanical ventilation were on average 56.3 years old (range 5 to 78 years). Hospitalized patients who died were on average 74.8 years old (range 54 to 94 years). Most hospitalized cases (84.1%) were infected with influenza A. Between influenza A and influenza B cases, a higher proportion of influenza B cases were admitted into the ICU and died **(See Table 3).**

Figure 14. Length of Stay of Hospitalized Influenza Patients (Minimum, Average, Maximum), by Age Group, Washoe County, 2023-2024 Influenza Season

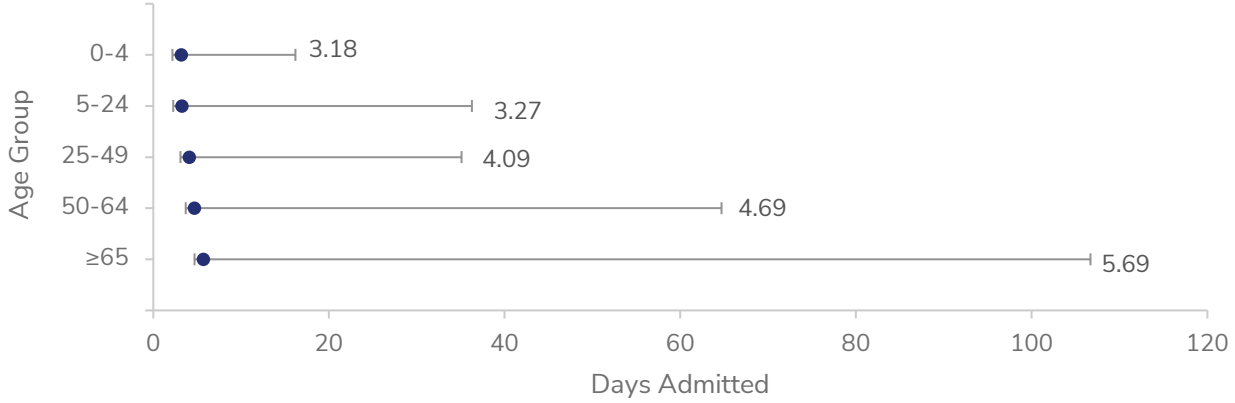
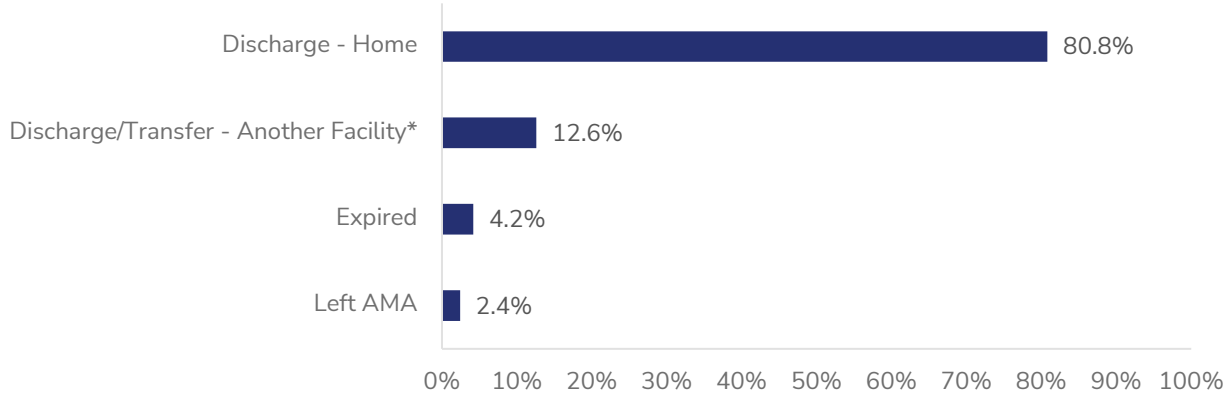


Table 3. Influenza Subtypes and Outcomes among Hospitalized Influenza Patients, Washoe County, 2023-2024 Influenza Season

	Hosp.	Vaccinated		ICU		Intubated		Death	
	#	#	%	#	%	#	%	#	%
Total # of cases reported	**453**	**107**	**23.6**	**81**	**17.9**	**16**	**3.5**	**20**	**4.4**
Influenza A	381	98	25.7	66	17.3	15	3.9	16	4.2
Influenza B	72	9	12.5	15	20.8	1	1.4	4	5.6

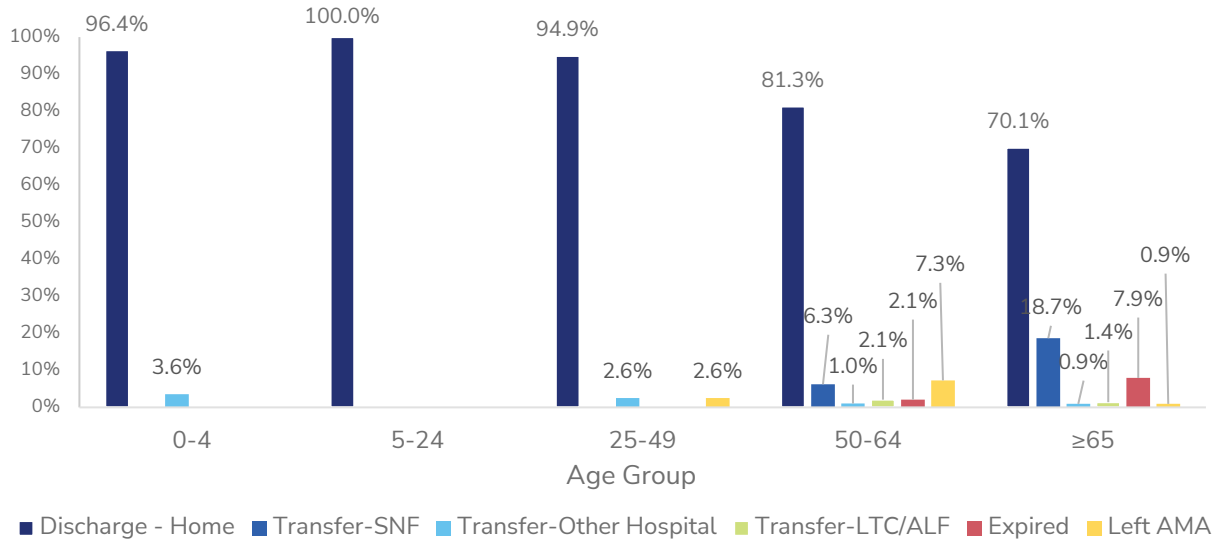
Following hospital admission, most hospitalized cases' **discharge dispositions**[TN] were discharged home (80.8%, n=366), followed by discharged or transferred to another facility (12.6%, n=57), expired (4.2%, n=19), or left against medical advice (2.4%, n=11), respectively **(See Fig. 15)**. One case that had been hospitalized had been discharged from the hospital prior to death to a skilled nursing facility, whereas all others who had been hospitalized died while admitted; thus why 20 died but 19 had a disposition of expired. If discharged to another facility, this was most often to a skilled nursing facility (80.7%), followed by another hospital (10.5%), or long term care/assisted living facility (8.8%), respectively. Among different age groups, discharge home was always the most common disposition **(See Fig. 16).** However, only age groups above 24 years of age included dispositions of left against medical advice (AMA) and expired, with the 50-64 year age group having the highest percentage of AMA (7.3%, n=7) and the over 64 years of age having the highest proportion of expired (7.9%, n=17). For those who died, the average length between onset of symptoms and death was 13.6 days (range 2 to 29 days).

Figure 15. Dispositions of Hospitalized Influenza Patients, Washoe County, 2023-2024 Influenza Season



**Another Hospital, Skilled Nursing Facility, Long Term Care Facility, Assisted Living Facility, or Hospice.*

Figure 16. Dispositions of Hospitalized Influenza Patients, by Age Group, Washoe County, 2023-2024 Influenza Season

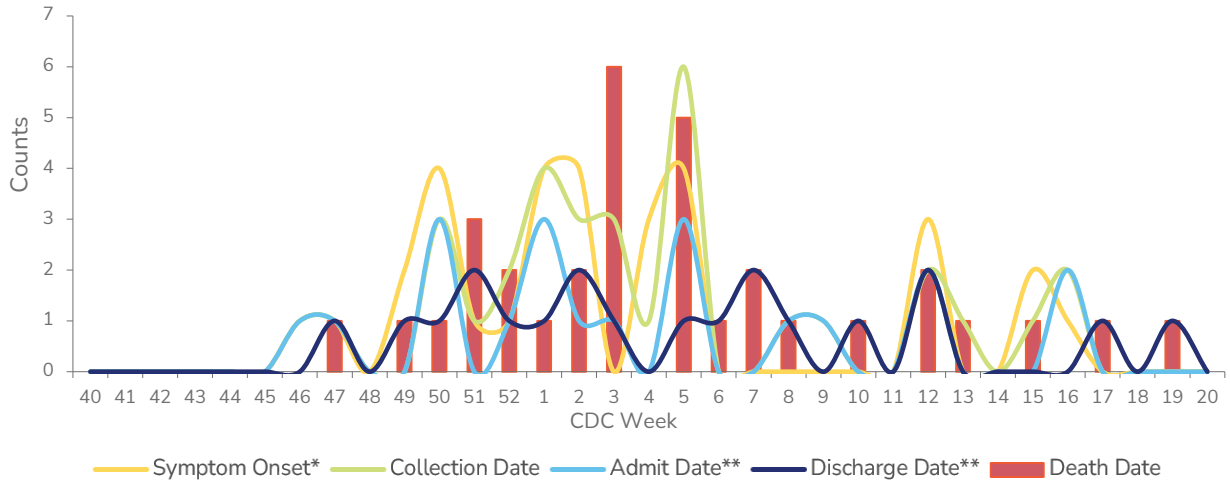


SNF- Skilled Nursing Facility, LTC- Long Term Care Facility, ALF- Assisted Living Facility, AMA- Against Medical Advice

Mortality

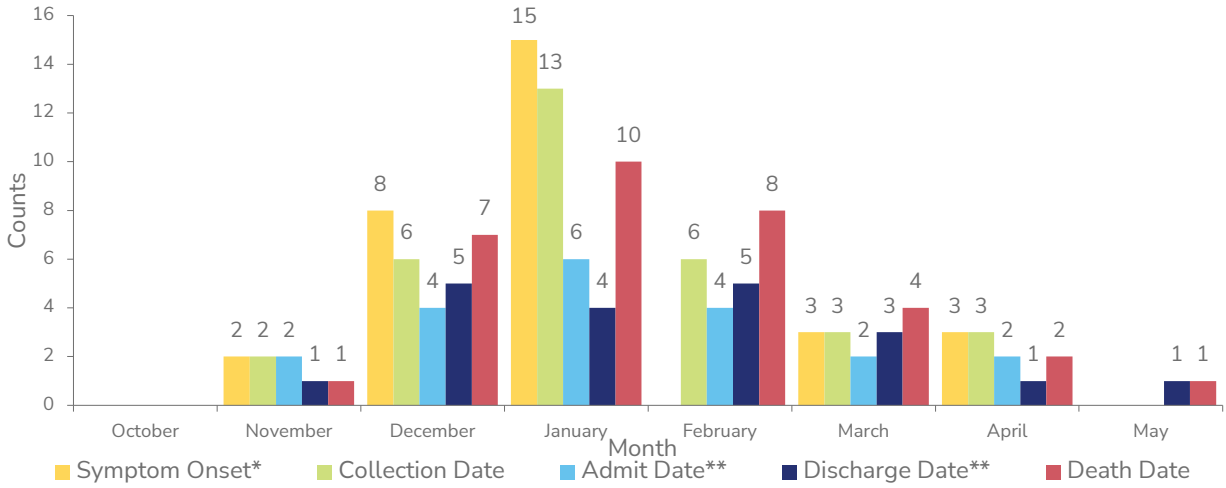
During the 2023-2024 **influenza season**[TN] (October 1, 2023 - May 18, 2024), 33 Washoe County residents were classified as having an **influenza-associated death**[TN]. Sixty-one percent (n=20) of these deaths were hospitalized for at least 24 hours, of which 42.4% (n=14) were admitted to the ICU and 21.2% (n=7) were intubated or placed on mechanical ventilation. For those hospitalized cases, the average days of hospitalization admission was 8.3 days (range 2 to 25 days). More than half (57.6%, n=19) of all deaths occurred between the **MMWR**[TN] weeks of 51 through 5 (mid-December 2023 through beginning of February 2024), comparatively occurring slightly after hospital admission peak dates of weeks 48 through 4, or December 2023 and January 2024 **(See Fig. 17 & Fig. 18)**. Between the months of December 2023 and February 2024, 25 deaths occurred or 75.8% of all deaths for the season. This coincided and followed the peak of influenza activity during the season and was closer to historical patterns prior to the COVID-19 pandemic, which disrupted typical seasonality trends. The peak timing for expired cases for specimen collection date of influenza specimens (39.4%, n=13), admit dates of those that were hospitalized (18.2%, n=6), symptom onset dates (45.5%, n=15), and deaths (30.3%, n=10) occurred in January 2024, slightly delayed compared to the December 2023 hospitalizations **(See Fig. 18)**.

Figure 17. Counts by Week of Dates of Importance for Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season



** 2 cases had no symptom onset date recorded. ** 20 deaths had been hospitalized.*

Figure 18. Counts by Month of Dates of Importance for Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

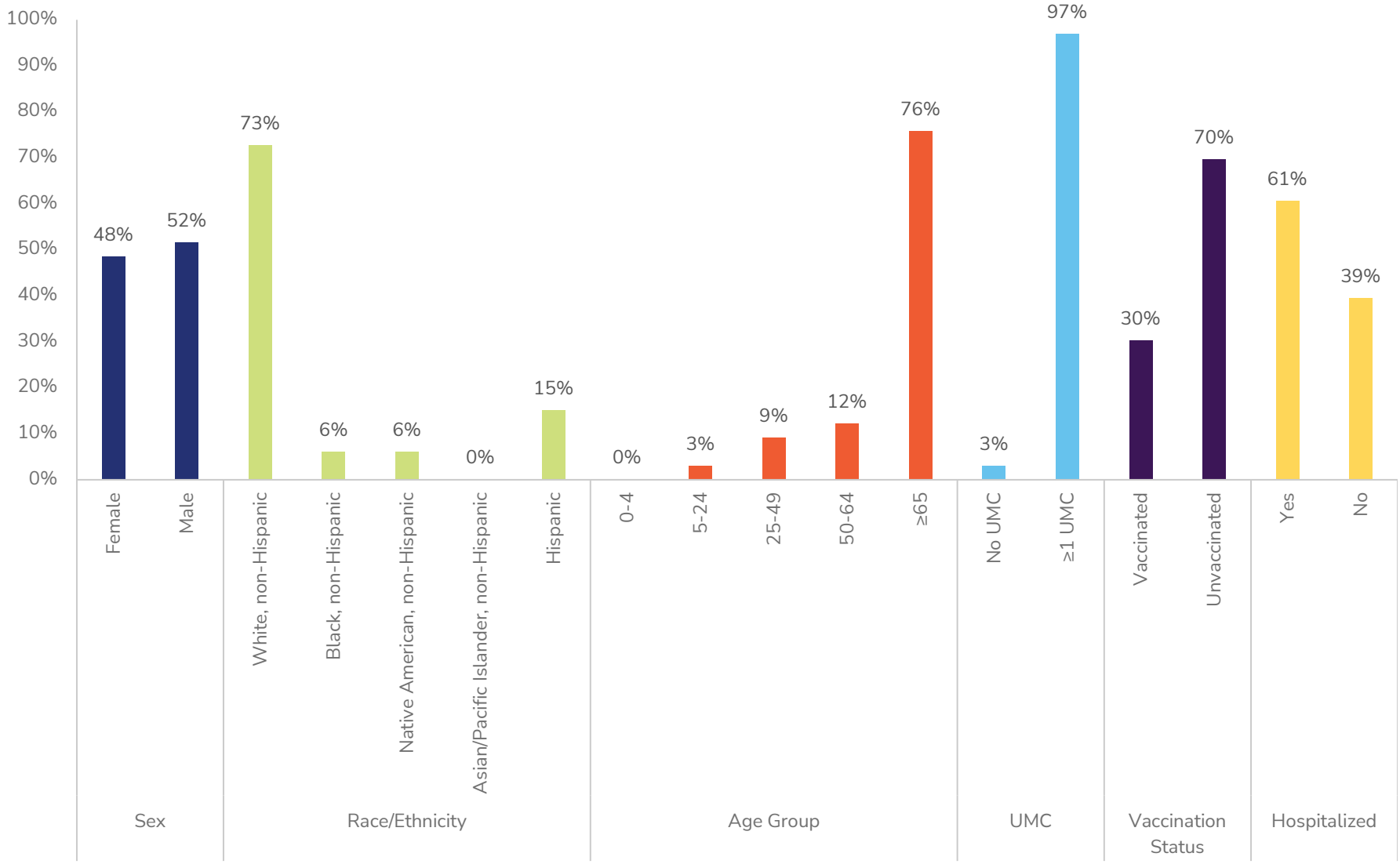


** 2 cases had no symptom onset date recorded. ** 20 deaths had been hospitalized.*

Demographics

The average age of expired cases was 68.1 years old (range 5 to 94 years). Cases 65 years or older made up the highest proportion of expired cases (75.6%, n=25) **(See Fig. 19)**. Males constituted 51.5% (n=17) of expired cases, and most cases were White, non-Hispanic (72.8%, n=24). Seven (21.2%) of the expired cases were long-term care residents prior to hospitalization. Demographics of expired cases generally followed the same trends as those non-expired hospitalized cases except the age of expired cases was higher on average (compared to 56.8 years for hospitalized), and a larger proportion of expired cases had been long-term care residents compared to hospitalized cases in general (7.3%).

Figure 19. Demographics of Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

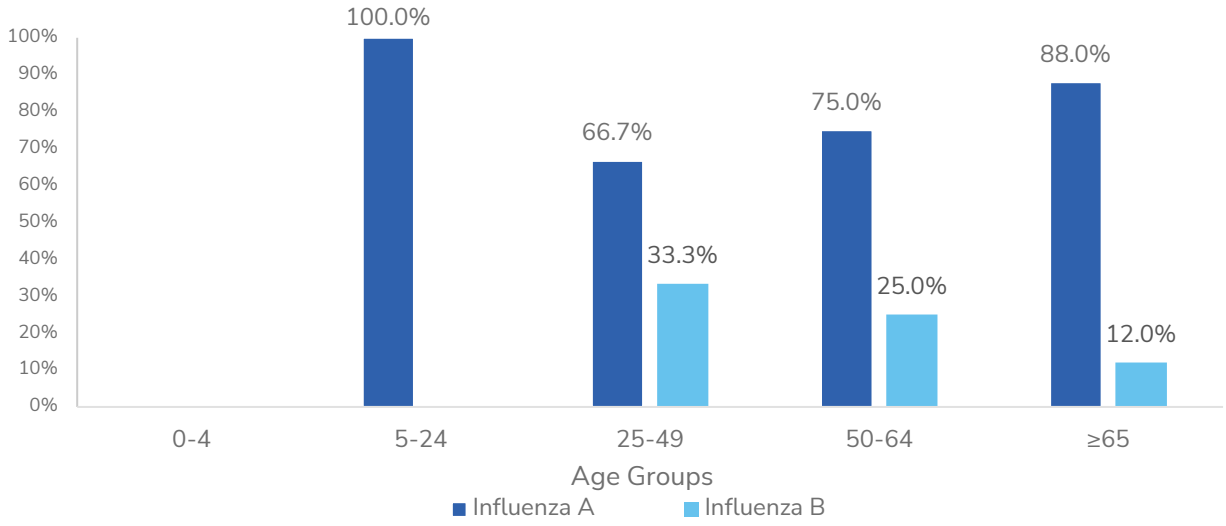


UMC- Underlying Medical Condition

Types of Influenza Viruses

Among expired cases, the **type of influenza virus**[TN] was reported as part of the positive laboratory report. Eighty-five percent (n=28) were positive for influenza type A and 15.2% (n=5) were positive for influenza type B, similar proportions to non-expired hospitalized cases. Only three expired cases had subtyping performed, of these 66.7% (n=2) were influenza A (H1N1) and 33.3% (n=1) were influenza A (H3). Among expired influenza A cases that were hospitalized, the average length of hospitalization was 9.1 days (range 2 to 25 days), while among expired influenza B cases, the average length of hospitalization was lower at 5.3 days (range 2 to 10 days). Among all expired (hospitalized and non-hospitalized), influenza A had the highest proportion among the 5-24 and ≥65 year age groups (100% and 88%, respectively), while influenza B had its highest proportion among the 25-49 and 50-64 year age groups (33.3% and 25%, respectively) **(See Fig. 20)**. This trend was similar to the non-expired hospitalized cases in that influenza A was most common in all age groups, however, what differed was that among expired cases, 5-24 had only influenza A (n=1), and there was a greater proportion of influenza B in those over 25-49 (33.3%, n=1), 50-64 (25%, n=1), and 65 years of age (12%, n=3) compared to those non-expired hospitalized (28.2%, 13.5%, 6.1%, respectively). For more flu type comparisons, see *Mortality Outcomes*.

Figure 20. Influenza Type (A or B) Percent Distribution Among Expired Influenza Cases (n=33), by Age Group, Washoe County, 2023-2024 Influenza Season



Underlying Medical Conditions & Risk Factors

Medical history was reviewed for all expired cases to determine if there were any documented **underlying medical conditions (UMCs) or risk factors**[TN] that could contribute to an increased risk of flu-related complications. Of the 32 out of 33 expired cases who reported an UMC, the most reported risk factors were "other" (78.1%, n=25), which included endocrine, kidney, liver,

blood neurological, or cardiac diseases, chronic pulmonary diseases (46.9%, n=10), diabetes (40.6%, n=15), obesity (31.3%, n=13), and being immunocompromised (18.8%, n=6) **(See Table 4).** These trends were similar to non-expired hospitalized cases in general; however, among those who expired, the proportion of "other" condition was much larger (78.1% for expired compared to 59.2% for non-expired). Obesity was higher in rank in hospitalized compared to those who expired (2 at 47.2% non-expired compared to #4 at 31.3% for expired), and those hospitalized had a higher proportion of asthma (19.2% compared to 6.3%). Those who expired had a higher proportion of being immunocompromised (18.8% compared to 9.7%).

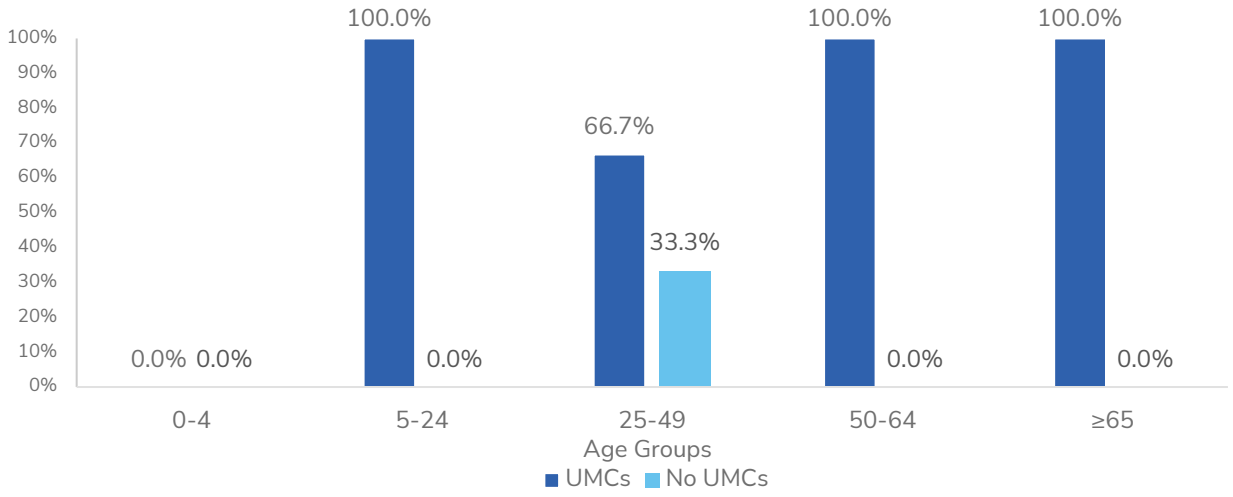
Table 4. Underlying Medical Conditions & Risk Factors of Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

Risk Factor*	Percent of Cases ǂ	Rank
Other Condition**	78.1%	1
Chronic Pulmonary Disorder	46.9%	2
Diabetes	40.6%	3
Obese	31.3%	4
Immunocompromised***	18.8%	5
Asthma	6.3%	6
Pregnant or 2 Weeks Postpartum ǂ	0.0%	7

** Not Mutually Exclusive*
*** Include diseases or disorders of the endocrine system, liver, or blood.*
**** Condition or Medication*
ǂ n=32, 1 case had no UMC; ǂ n=33

Age is a known risk factor, as both populations younger (under 5 years) and older (those 65 years and over) are at elevated risk. No expired cases were under 5 years old, but 75.8% of expired cases (n=25) were aged 65 years or older **(See Fig. 19).** Those 25-49 were the only age group to have any expired cases report no UMC (33.3%, n=1) and those 5-24, 50-64, and 65 and over had 100% of expired cases reporting an UMC (n=1, n=4, n=25, respectively) **(See Fig. 21).** Compared to non-expired hospitalized cases, expired cases had the highest proportion of UMCs within most age groups (100% for 5-24, 50-64, 65 and older). One-hundred percent of those vaccinated (n=10), hospitalized (n=20), admitted to the ICU (n=14), or who were intubated or placed on mechanical ventilation (n=7) had an UMC. The average days from onset of symptoms to death was over twice as long for those with an UMC compared to those without, with those without an UMC having an average of 5 days from symptom onset to death (n=1), while those with an UMC having an average of 11.8 days from symptom onset to death (n=32, range 0 to 34 days).

Figure 21. Percent of those with UMCs by Age Group, Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

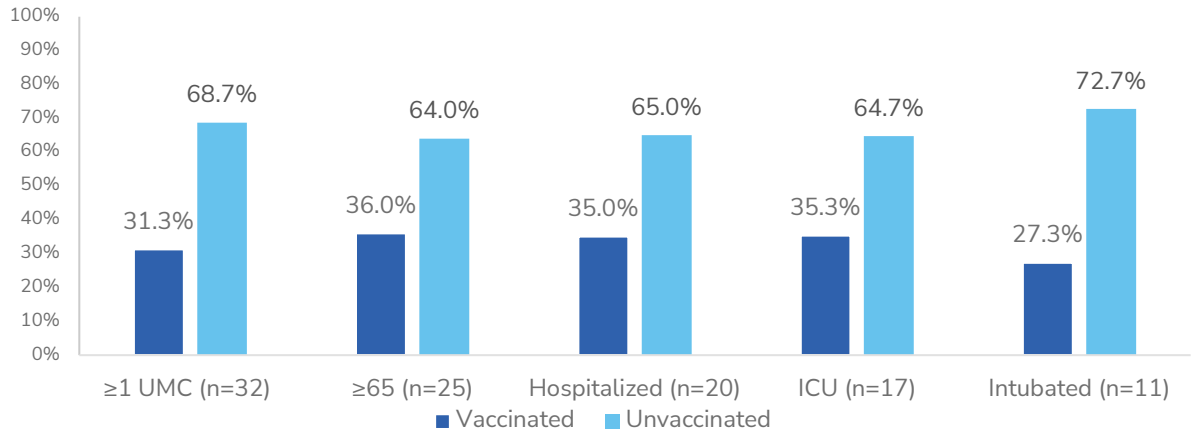


n=33; UMCs- Underlying Medical Conditions

Vaccination

Of expired cases, 69.7% (n=23) did not have a documented history of current seasonal **influenza vaccine[TN] (See Fig. 19)**. The average age of those vaccinated (n=10) was 72.9 years of age (range 56 to 83 years), while the average age of those unvaccinated (n=23) was lower at 66 years of age (range 5 to 94 years). For those who were vaccinated, the average days from symptom onset date to date of death was 13.8 days (range 2 to 34 days), while the average for those unvaccinated was slightly shorter at 10.5 days (range 0 to 29 days). Among those with at least one UMC, 68.8% (n=22) were unvaccinated **(See Fig. 22)**. Among those 65 years of age or older and at higher risk of influenza complications, 64% (n=16) were unvaccinated. Among those hospitalized, 65% (n=13) were unvaccinated. Among those hospitalized and in the intensive care unit (ICU), 64.7% (n=11) were unvaccinated. Among those hospitalized and requiring mechanical ventilation, 72.7% (n=8) were unvaccinated. These trends were similar to the vaccination status of non-expired hospitalized cases except those expired had a higher proportion of those over 65 years of age (64% compared to 35.5%). The average length of hospital stay for those who were hospitalized and unvaccinated was 7.3 days (range 2 to 22 days), which was slightly shorter than those who were vaccinated who had an average of 10.1 days (range 2 to 25). However, as all but one expired case died while hospitalized (one was discharged from their hospitalization prior to death), the length of stay was indicative more of survival time prior to death after being admitted. In other words, this could be otherwise interpreted as those hospitalized and unvaccinated died slightly quicker than those who were hospitalized and were vaccinated.

Figure 22. Vaccination Status Among Expired Influenza Cases by Risk Factors for Severe Illness and by Severe Outcome, Washoe County, 2023-2024 Influenza Season



UMC- Underlying Medical Condition

Vaccination status was further reviewed in categories based on time from vaccination to illness as it relates to level of protection from vaccination (see *Hospitalizations Vaccination* for details): with 14 -120 days (~4 months) considered "immune", 121 - 182 days (~6 months) considered "waning immunity", >182 days (> 6 months) considered "limited immunity", and no vaccination considered "unvaccinated". Those "unvaccinated" made up the largest proportion of deceased (69.7%, n=23), followed by "immune" at 15.2% (n=5), those with "waning" immunity at 9.1% (n=3), and those with "limited" immunity at 6.1% (n=2) **(See Fig. 23)**. This mirrored non-expired hospitalization vaccination trends except those expired had a greater proportion with "waning" or "limited" immunity (15.2%, n=5 compared to 7.1%, n=32). Among age groups, those with the any proportion considered "immune" were those 50-64 years of age (25.0%, n=1) and 65 years of age and older (16.0%, n=4), while those 5-24 and 25-49 were 100% unvaccinated (n=1, n=3, respectively) **(See Fig. 24)**. Only those 65 years of age and older had any individual also under the category of "waning" or "limited" immunity (12.0%, n=3 and 8.0%, n=2, respectively). This differed from non-expired hospitalized cases in that all age groups among non-expired hospitalized cases had immune individuals. These categories were further reviewed among those with or without UMCs, hospitalized and not hospitalized, with or without ICU admission, and with or without mechanical ventilation **(See Fig. 25)**. Those with UMCs had a higher proportion of those being "immune" compared to those with no UMCs (15.6%, n=5; 0.0%, n=0), while those with no UMCs had a higher proportion of those being unvaccinated compared to those with UMCs (100.0%, n=1; 68.8%, n=22). Those hospitalized had a higher proportion of combined "waning" and "limited" immunity (25.0%, n=5) compared to those not hospitalized (0%, n=0), while those not hospitalized had a higher proportion of "immune" status (23.1%, n=3) than those not hospitalized (65.0%, n=13). More nonhospitalized cases were unvaccinated (76.9%, n=10) than those who were hospitalized (65.0%, n=13). Those admitted to the ICU had

a lower proportion of “immune” status compared to those not admitted to the ICU (7.1%, n=1 compared to 16.7%, n=1) as well as combined “waning” and “limited” immunity (28.6%, n=4 compared to 16.7%, n=1). Unvaccinated status among ICU and non-ICU were nearly the same (64.3%, n= 9 and 66.7%, n=4, respectively). Those not requiring mechanical ventilation had a higher proportion of “immune” compared to those intubated (15.4%, n=2; 0%, n=0). Additionally, those who were required mechanical ventilation had a higher proportion of “waning” and “limited” immunity compared to those not intubated (42.9%, n= 3; 15.4%, n=2). However, those who were not intubated had a higher proportion of those being unvaccinated, although both groups had more than 50.0% of their group unvaccinated (69.2%, n=9 and 57.1%, n=4, respectively). Among expired cases, those in the ICU and those intubated had lower “immune” proportions (7.1% and 0.0%, respectively) compared to those non-expired hospitalized cases (18.5% and 6.3%, respectively).

Figure 23. Level of Protection from Vaccination, Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

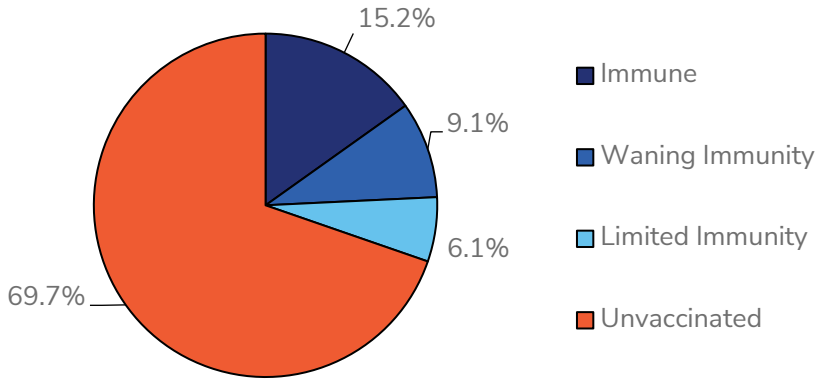


Figure 24. Level of Protection from Vaccination by Age Group, Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

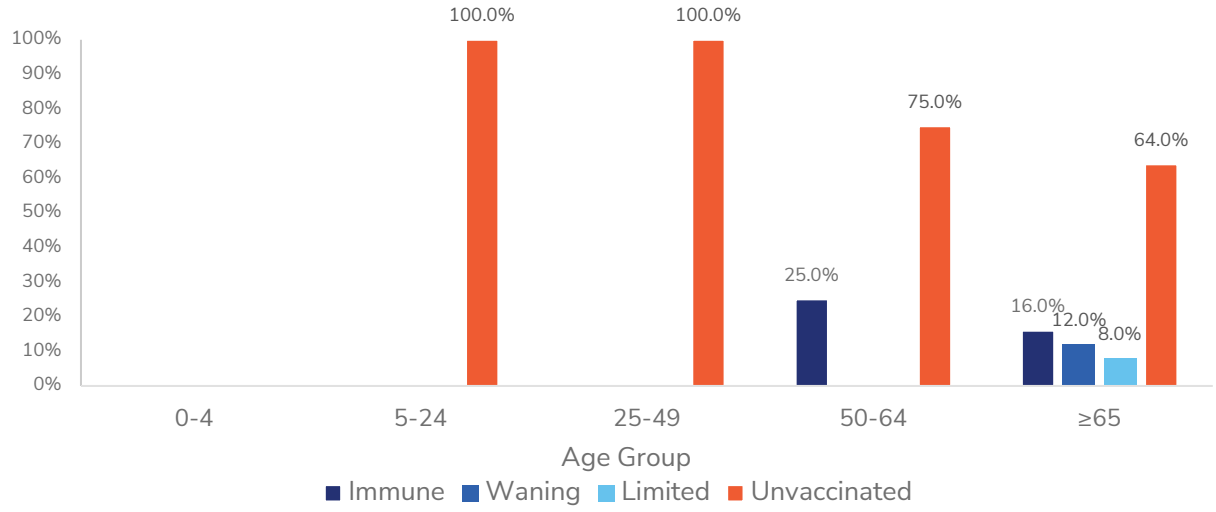
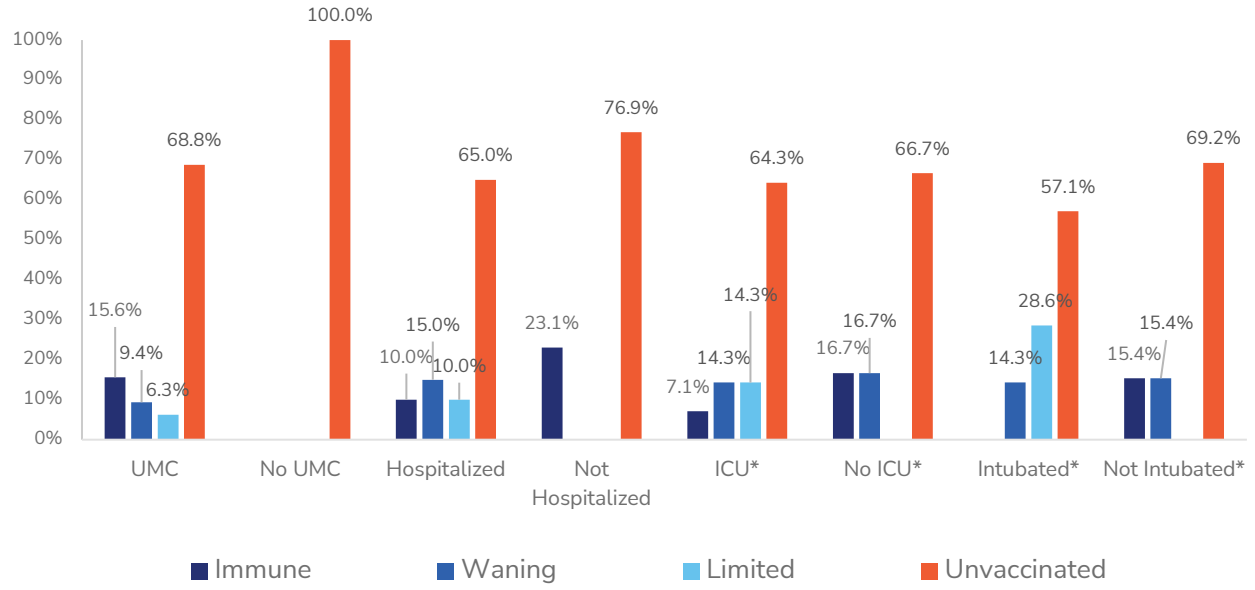


Figure 25. Level of Protection from Vaccination by UMC Status and by Severe Outcome, Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season



**20 cases were hospitalized. UMC- Underlying Medical Condition*

Symptomology

All expired cases (100%) reported symptoms. The most common symptoms reported were cough (72.7%, n=24), shortness of breath (69.7%, n=23), weakness or fatigue (54.5%, n=18), other symptoms (54.5%, n=18), and altered mental status (48.5%, n=16) **(See Table 5)**. This differed from non-expired hospitalized cases as those who died reported fever less frequently (36.4% compared to 63.1%) and more often reported altered mental status (48.5% compared to 16.2%). Also, no expired cases reported seizures or rash as did a percentage of some non-hospitalized cases. However, both groups reported cough and shortness of breath as the two most reported symptoms. The average time between symptom onset and death was 11.6 days (range 0 to 34 days). The average time between symptom onset and influenza test was 5.7 days (range -1 to 35 days), with one case tested post-mortem. This was slightly longer for expired cases compared to non-expired hospitalized cases by 21.4% or 1.1 days. For those hospitalized (n=20), the average time between symptom onset and hospital admission was 3.7 days (range 0 to 21 days). This was slightly shorter for expired cases compared to non-expired hospitalized cases by 15% or 0.6 days.

Table 5. Types of Symptoms Among Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

Symptom ǂ	Percent of Cases ǂ
Cough	72.7%
Shortness of Breath	69.7%
Weak/Tired	54.5%
Other Symptoms	54.5%
Altered Mental Status	48.5%
Fever	36.4%
Chills	30.3%
Rhinorrhea	24.2%
Nausea	21.2%
Body or Muscle Aches	18.2%
Vomiting	18.2%
Headache	15.2%
Sore Throat	9.1%
Diarrhea	9.1%
Seizures	0.0%
Rash	0.0%

ǂ Not Mutually Exclusive (multiple symptoms could be reported by a single person) =33

Treatment

A total of 66.7% (n=22) of expired cases were treated with **Oseltamivir (Tamiflu)**™. When comparing those treated and untreated, the average age of those treated was older than those untreated (72 years compared to 60 years of age),while amongst those hospitalized and expired, length of stay at the hospital was shorter for those untreated* (3.5 days compared to 8.8 days) **(See Table 6)**. Days from symptom onset to treatment averaged 4.8 days, with those 50-64 years of age having the longest duration, with an average of 6.7 days, and those aged 25-49 having the shortest duration, with an average of 3 days. All patients (n=22) treated with an antiviral medication had an UMC compared to 90.9% (n=10) who were untreated **(See Fig. 26).** Most patients (81.8%, n=18) treated with an antiviral medication were hospitalized when compared to only 18.2% (n=2) of untreated. Most patients (68.2%, n=15) treated with an antiviral medication were admitted to the ICU compared to only 18.2% (n=2) of those who were untreated. More patients (36.4%, n=8) treated with an antiviral medication were intubated or placed on mechanical ventilation than those who were untreated (27.3%, n=3). While these data at first may indicate treatment lead to worse outcomes (e.g., being treated meant more hospitalizations), it may be attributed to non-hospitalized deaths lacking opportunity to be prescribed treatment or those with treatment might have also been in a worsened state of

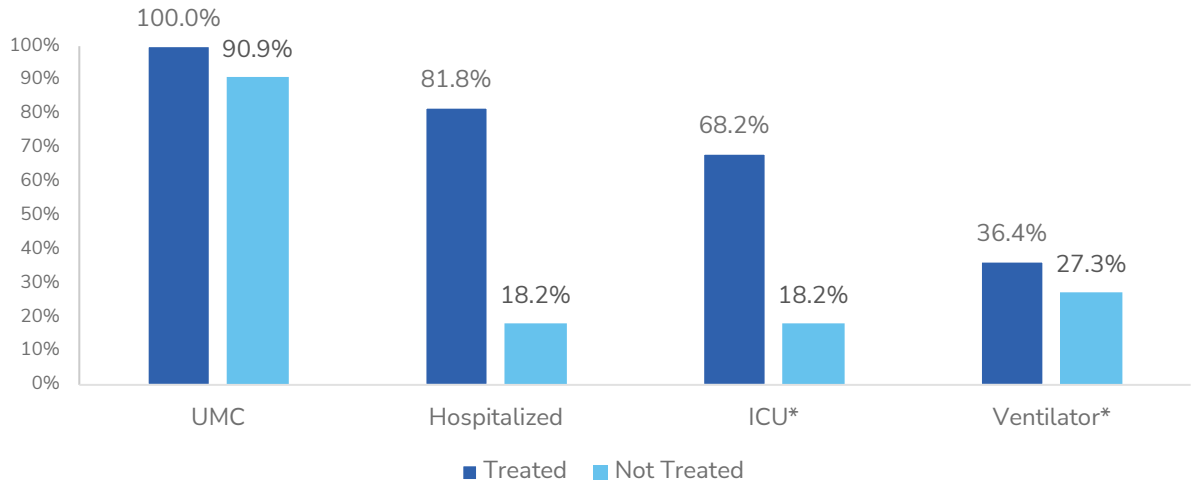
health which necessitated treatment. *See *Hospitalizations Treatment* subsection for further explanation.

Table 6. Measures (Averages and Ranges) Among Expired Influenza Cases by Treatment Status, Washoe County, 2023-2024 Influenza Season

Metric	Treated ŧ	Not Treated ǂ
Length of Stay in Days	8.8 (2-25)	3.5 (2-5)
Age in Years	72.1 (43-94)	60.3 (5-83)
Symptom Onset to Treatment in Days	4.8 (0-22)	N/A
Age 0-4	*	N/A
Age 5-24	**	N/A
Age 25-49	3 (3-3)	N/A
Age 50-64	6.7 (3-11)	N/A
Age ≥65	4.6 (0-22)	N/A
Treatment to Death in Days	8.2 (0-25)	N/A

** No cases ** One case, not treated ŧ n=22 ǂ n=11*

Figure 26. Treatment Status Among Expired Influenza Cases, by UMC and Severe Outcome, Washoe County, 2023-2024 Influenza Season



** 20 expired cases were hospitalized. UMC- Underlying Medical Condition*

Outcomes

Of expired cases, 30.3% (n=10) were vaccinated and 60.6% (n=20) were hospitalized **(See Table 7)**. Of those hospitalized, 85% (n=17) were admitted to the ICU and 55% (n=11) were intubated or placed on mechanical ventilation**.** Most expired cases were infected with influenza A (84.8%, n=28), a similar proportion to non-expired hospitalized cases. Among expired cases, a higher proportion of those with influenza A were vaccinated compared to those with influenza B. Among hospitalized decedents, intubation was more common in influenza A cases, whereas ICU admission was more frequent in influenza B cases. These trends were similar to non-expired hospitalized cases. For those hospitalized, the average length of hospital admission was

8.3 days (range 2 to 25 days), 3.4 days longer than those non-expired hospitalized cases. One case that had been hospitalized had been discharged from the hospital prior to death to a skilled nursing facility, whereas all others who had been hospitalized (95%, n=19) died while admitted.

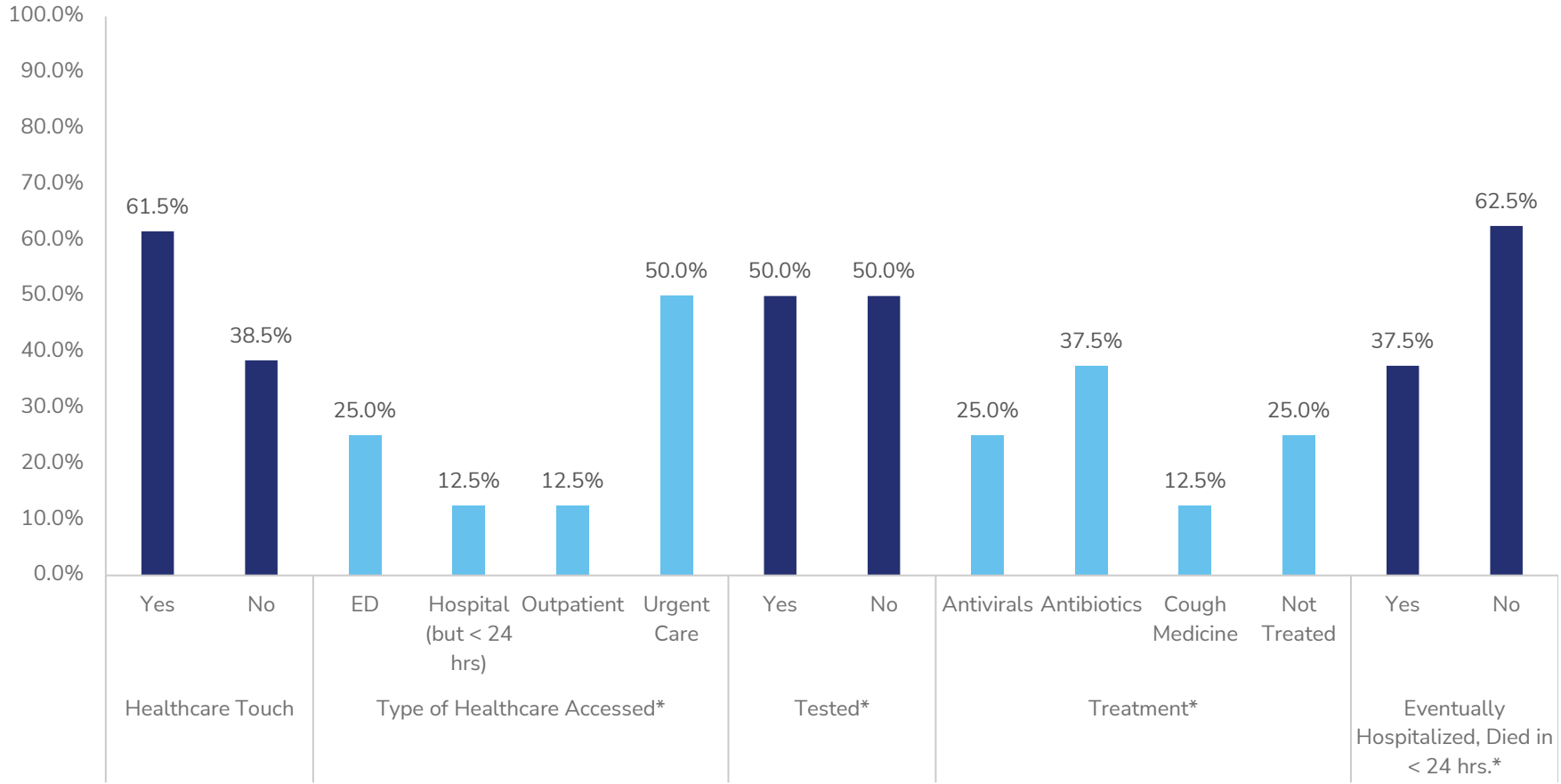
Table 7. Influenza Subtypes and Outcomes among Expired Influenza Cases, Washoe County, 2023-2024 Influenza Season

	Died		Vaccinated		Hospitalized		ICU		Intubated	
	#	%	#	%	#	%	#	%	#	%
Total # of cases reported	**33**	**N/A**	**10**	**30.3**	**20**	**60.6**	**17**	**51.5**	**11**	**33.3**
Influenza A	28	84.8	9	32.1	16	57.1	13	46.4	10	35.7
Influenza B	5	17.9	1	20.0	4	80.0	4	80.0	1	20.0

Healthcare Touch

Of expired cases, 39.4% (n=13) were not hospitalized **(See Fig. 27).** These cases were further reviewed to determine if any had interacted with the healthcare system at all prior to death ("**Healthcare Touch™**") possibly indicating missed opportunities for intervention or prevention of the influenza-associated death. Of these non-hospitalized cases, 61.5% (n=8) had a healthcare touch prior to death. Of these, most had gone to an urgent care (50%, n=4), the emergency room (ED) (25%, n=2), an outpatient visit to a doctor's office (12.5%, n=1), or were admitted to the hospital but for less than 24 hours (12.5%, n=1). Further, while all 8 (100%) were symptomatic, only 50% were tested for influenza at their healthcare touch (n=4), and only 25% (n=2) were prescribed antiviral medications. Further, most were treated with antibiotics (37.5%, n=3), followed by not treated at all (25%, n=2) or with prescription cough medicine (12.5%, n=1). Of this group, 37.5% (n=3) eventually were hospitalized after their healthcare touch but died in less than 24 hours, so they were not considered hospitalized. For those with a healthcare touch, the average days from onset of symptoms to that healthcare touch was 4.3 days (range 0 to 7 days), which is longer than the average days from onset of symptoms to hospitalization for those hospitalized and expired (3.7 days). The average days from healthcare touch to date of death was 7.1 days (range 1 to 28 days), which is shorter than average date of death from admit date for those hospitalized and expired (9.8 days). The average days from onset of symptoms to death among individuals with a healthcare touch was 11.4 days (range 5 to 34 days), which was shorter than those hospitalized and expired (13.6 days). The average age of these eight with a healthcare touch prior to influenza-associated death was 61.5 years (range 43 to 77 years), which is older than those hospitalized and who did not die (56.8 years), but younger than those hospitalized and expired (74.9 years).

Figure 27. Measures Among Non-Hospitalized Expired Influenza Cases by Healthcare Touch, Washoe County, 2023-2024 Influenza Season



**Of the 8 who had healthcare touch prior to death.*

Key Findings & Recommendations

The four key findings and recommendations from this report are:

1. **Seasonality of Influenza Activity**
   - **Finding**: During the 2023-2024 influenza season, the peak of hospitalizations occurred in December 2023 and January 2024, aligning with pre-pandemic trends.
   - **Recommendations**: Anticipate hospital capacity needs and community resources during December and January of the season to ensure resources are available to manage an increased influx of ill individuals in clinics and hospitals, as well as in schools and other community gathering places.
2. **Risk Factors and Underlying Medical Conditions (UMCs)**
   - **Finding**: A majority (86%) of hospitalized cases had UMCs, such as chronic pulmonary diseases, obesity, or diabetes, which increased the likelihood of severe outcomes. Individuals with UMCs had longer hospital stays and were more likely to require intensive care, mechanical ventilation, or to die. Expired individuals had the highest proportion of UMCs within most age groups and had higher proportions of immunocompromised conditions and other serious comorbidities compared to hospitalized patients who survived. The average age of hospitalized patients was 56.8 years, with those aged 65 and older comprising 47.2% of cases.
   - **Recommendations**: Prioritize individuals with UMCs for early vaccination and treatment interventions to mitigate complications and reduce deaths. Focus outreach and vaccination efforts on older adults (≥65 years of age) and vulnerable demographics, such as long-term care residents, to reduce the impact of severe influenza.
3. **Vaccination & Immunity**
   - **Finding**: A majority (76.4%) of hospitalized cases did not have a documented seasonal influenza vaccine, even among older individuals and those with risk factors who were at higher risk for influenza-complications. Generally, those hospitalized with “immune” statuses had less severe outcomes than those who had “waning” or “limited” immunity. Unvaccinated individuals also represented most expired cases (69.7%) and had a greater proportion of “waning” or “limited” immunity compared to non-expired hospitalized cases.
   - **Recommendations**: Strengthen vaccination campaigns, emphasizing the importance of vaccination for high-risk groups and dispelling myths regarding the vaccine’s efficacy in preventing severe disease. Consider a focus on ensuring earlier vaccination in the season for higher protection but also educating on waning immunity later in the season

and the importance of taking further precautions to avoid infection, such as handwashing and avoiding sick individuals.

4. **Testing & Treatment**
    - **Finding**: Most deaths occurred among those 65 years and older. Among those who died without hospitalization, 61.5% had prior healthcare interactions (e.g., urgent care, emergency room visits, doctor's office), but only 50% were tested for influenza, while just 25% received proper treatment with antivirals, and 50% received inadequate treatment such as antibiotics or cough medicine.
    - **Recommendations**: Develop strategies to ensure prompt influenza testing and antiviral treatment (i.e. early in illness, ideally within 48 hours of symptom onset) for symptomatic individuals at healthcare touchpoints, such as outpatient settings, to prevent complications and hospitalizations, as well as reduce mortality. Enhance post-discharge care and follow-up for high-risk groups, particularly those aged ≥65 years, to detect worsening conditions early and prevent deaths later in illness.

Technical Notes

Discharge Disposition

For cases admitted to the hospital, discharge disposition is defined as the final place or setting to which the patient was discharged on the day of discharge. Categories include:

- Discharged Home/self-care
- Transferred to another facility (includes hospice, long-term acute care, skilled nursing facility, or a different hospital).
- Left against medical advice (AMA)
- Expired
- Unknown

Healthcare Touch

A "healthcare touch" is a term related to "opportunistic prevention" or "opportunistic intervention" where a patient's interaction with the healthcare system may be considered opportunity for intervention or prevention.[1,2] Each patient's interaction with the healthcare system, such as routine healthcare visits, can serve as an opportunity for delivering interventions or prevention efforts. The idea is to capitalize on any contact with the healthcare system to promote health or prevent illness, focusing on moments where prevention or intervention could be implemented but often isn't due to barriers like time or awareness.

1 Keyworth, C., Epton, T., Goldthorpe, J. et al. Are healthcare professionals delivering opportunistic behaviour change interventions? A multi-professional survey of engagement with public health policy. Implementation Sci 13, 122 (2018). https://doi.org/10.1186/s13012-018-0814-x

2 Sándor, J., Tokaji, I., Harsha, N. et al. Organised and opportunistic prevention in primary health care: estimation of missed opportunities by population based health interview surveys in Hungary. BMC Fam Pract 21, 120 (2020). https://doi.org/10.1186/s12875-020-01200-2

Hospitalizations

An influenza hospitalization is defined as a case that was hospitalized for greater than or equal to 24 hours and meets the following clinical and laboratory evidence criteria.

Clinical Criteria

- Hospital admission date 14 days or less *after* a positive influenza test, **OR**
- Hospital admission date 3 days or less *before* a positive influenza test

Laboratory Criteria for Diagnosis

Evidence of a positive influenza test by at least one of the following methods:

- Positive viral culture for influenza
- Positive immunofluorescence antibody staining (Direct [DFA] or indirect [IFA]) for influenza
- Reverse transcriptase polymerase chain reaction (RT-PCR) positive for influenza
- Serologic testing positive for influenza
- A positive, unspecified influenza test noted in the medical chart (e.g., a written note in the admission History & Physical or discharge summary)
- A positive commercially available rapid diagnostic test for influenza

Medical records for all hospitalized influenza cases, who at time of illness were Washoe County residents, were reviewed for vaccination status, intensive care unit admission, death, as well as other variables.

Influenza-Associated Death

Starting with the 2018-2019 influenza season, the Nevada Division of Public and Behavioral Health (NDPBH) defines an influenza-associated death as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test with no period of complete recovery between the illness and death. NNPH adopted the NDPBH definition to standardize surveillance across Nevada jurisdictions. Hospitalization is not a requirement to count as an influenza-associated death.

Influenza Seasons

In the United States, the influenza season usually occurs in the fall and winter (MMWR week 40 through 20). While influenza viruses spread year-round, most of the time influenza activity peaks between December and February. See here for more information: https://www.cdc.gov/flu/about/season.html.

MMWR Weeks

The MMWR week is the week of the epidemiologic year for which the National Notifiable Diseases Surveillance System disease report is assigned by the reporting local or state health department for the purposes of MMWR disease incidence reporting and publishing. Values for MMWR week range from 1 to 53, although most years consist of 52 weeks. See here for more information https://ndc.services.cdc.gov/wp-content/uploads/MMWR_Week_overview.pdf.

Oseltamivir (Tamiflu)

Antiviral treatment for influenza. See more information here: https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm.

Testing Methods for Influenza Viruses

Diagnostic tests available for detection of influenza viruses in respiratory specimens include molecular assays (e.g., rapid molecular assays, reverse transcription polymerase chain reaction (RT-PCR), other nucleic acid amplification tests) and antigen detection tests (e.g., rapid influenza diagnostic tests and immunofluorescence assays). Viral culture is important for public health purposes but does not provide timely results to inform clinical management. More information on testing for influenza viruses can be found here: https://www.cdc.gov/flu/hcp/testing-methods/index.html.

Types of Influenza Viruses

There are two types of influenza viruses (A and B) that cause most human illness and that are responsible for influenza seasons each year. Influenza A viruses are further classified into subtypes, while influenza B viruses are further classified into two lineages: B/Yamagata and B/Victoria. The Nevada State Public Health Laboratory (NSPHL) performs influenza subtyping of specimens submitted for surveillance purposes. Specimens are primarily submitted to the NSPHL by sentinel provider sites; however, all typed specimens are included in surveillance, even those not submitted by sentinel providers. Subsequently, not all specimens submitted by surveillance providers are typed by NSPHL. Starting with the 2023-2024 season, Influenza A (H1) was reported separately from influenza A (2009 H1N1); rapids were no longer reported separately and instead are combined with unknown subtypes cumulatively as either influenza A (unknown) or influenza B (unknown). More information on types of influenza viruses can be found here: https://www.cdc.gov/flu/about/viruses-types.html.

Underlying Medical Conditions & Risk Factors

- Cardiac diseases include but are not limited to congenital heart disease, congestive heart failure, and coronary artery disease. This does not include hypertension, hypotension, hyperlipidemia, arrythmias including atrial fibrillation, or congenital heart defects.
- Chronic pulmonary diseases include but are not limited to COPD, cystic fibrosis, or emphysema.

- Diabetes includes Type I and II, but not pre-diabetes.
- Immunocompromised patients include both immunocompromising conditions (e.g., HIV, AIDS, cancers such as leukemia) and medications (e.g., chemotherapy, radiation treatment). This does not include a history of cancer.
- Neurological and Neurodevelopmental disorders include but are not limited to disorders of the brain or spinal cords, cerebral palsy, epilepsy, or stroke or history of stroke. This does not include psychiatric conditions, substance use disorders (alcohol or drugs), or chronic pain.
- Obesity is defined as 30+ BMI in adults and ≥95th percentile in children. BMI is not recommended to use for those younger than 2 years old. More information can be found here: https://www.cdc.gov/bmi/index.html.
- Other medical conditions include diseases of the liver (e.g., nonalcoholic fatty liver disease, Hepatitis A/B/C, or cirrhosis), disorders of endocrine system (e.g., Addison's Disease, Cushing's Disease) or blood (e.g., venous thromboembolism, hemophilia, sickle cell disease).
- Other risk factors include smoking, age (65+ years of age), and pregnancy.
- More information can be found here: https://www.cdc.gov/flu/highrisk/index.htm

Vaccination

An individual is considered vaccinated for influenza that season only if an influenza vaccine was administered at least or equal to two weeks prior to symptom onset. Those six months or younger are too young and not eligible to receive an influenza vaccine. Vaccination status was ascertained for hospitalized cases from either medical records or Nevada's immunization information system, WebIZ. See here for more information: https://www.cdc.gov/flu/vaccines/vaccinations.html.