

2010-2011 Influenza Hospitalization Report



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Background

The Oregon Emerging Infections Program (EIP) has conducted surveillance for pediatric influenza hospitalizations in collaboration with the Centers for Disease Control and Prevention (CDC) since 2003. **Surveillance** for adult influenza hospitalizations was added in 2005.

The objectives of EIP influenza surveillance are:

- Estimate age-specific hospitalization rates.
- Describe the temporal trends of laboratory-confirmed influenza hospitalization, including by influenza subtype.
- Describe characteristics of persons hospitalized with severe influenza illness.
- Describe the clinical features and course of influenza disease (e.g., severe illness and influenza-associated complications) among persons hospitalized with influenza.

In Oregon, the EIP surveillance area for influenza hospitalizations comprises the tri-county (Clackamas, Multnomah, and Washington) Portland metropolitan area with a population of 1,641,036 in 2010—which is 43% of the population of Oregon.

This report summarizes incidence and severity of influenza in Oregon's EIP surveillance area during the 2010-2011 influenza season (October 1, 2010 to April 30, 2011).

Methods

Cases are defined as laboratory-confirmed influenza hospitalizations among residents of the EIP area (Clackamas, Multnomah, and Washington counties) that test for influenza within 14 days before or 3 days after admission. Cases are reported by hospitals in the tri-county area. Health record reviews using the EIP case report form are performed by trained nurses, who collected standardized data regarding demographic characteristics, clinical manifestations, underlying conditions, and illness outcomes.

Surveillance Results

Between October 1, 2010 and April 30, 2011, 228 influenza-related hospitalizations were reported in the EIP area—199 adults and 29 pediatric cases. This represents a rate of 13.9 cases per 100,000 residents of the EIP area. This is less than half the rate of hospitalization during the 2009 pandemic, when the rate was 30.7 hospitalizations per 100,000 persons in the tri-county area.

Table 1 shows the sex, age, ethnicity, and race characteristics of Oregon EIP cases in 2010-2011. The median age of hospitalized cases was 57; most cases occurred among persons 51-70 years of age. Fifty-seven percent of cases were female. Fifty-eight percent of cases were reported as White, while Blacks—5.7% of hospitalized cases—were the next most frequently reported race. Ethnicity was unknown for most cases—58.8%.

Table 1. Characteristics of all Oregon EIP cases, 2010-2011.

Sex	No.	Percent
Male	97	42.54
Female	131	57.46
Age		
<6 months	4	1.75
6-23 months	5	2.19
24-59 months	5	2.19
5-10 years	8	3.51
11-17 years	7	3.07
18-30 years	13	5.7
31-50 years	42	18.42
51-70 years	78	34.21
>70 years	66	28.95
Ethnicity		
Hispanic and Latino	13	5.7
Non-Hispanic	81	35.53
Not specified	134	58.77
Race		
White	133	58.33
Black	13	5.7
Asian	4	1.75
Hawaiian/Pacific Islander	3	1.32
American Indian/Alaska Native	1	0.44
Multiple races	1	0.44
Unknown	73	32.02

Figure 1 shows the distribution of cases during the influenza season. The peak of influenza hospitalizations occurred during the week ending March 5, 2011. During the peak week, 36 influenza hospitalizations were reported. The first cases were reported the week ending December 18, 2010, and the last case was reported the week ending April 30, 2011.

Figure 1. Number of Oregon EIP area hospitalizations by week, 2010-2011.

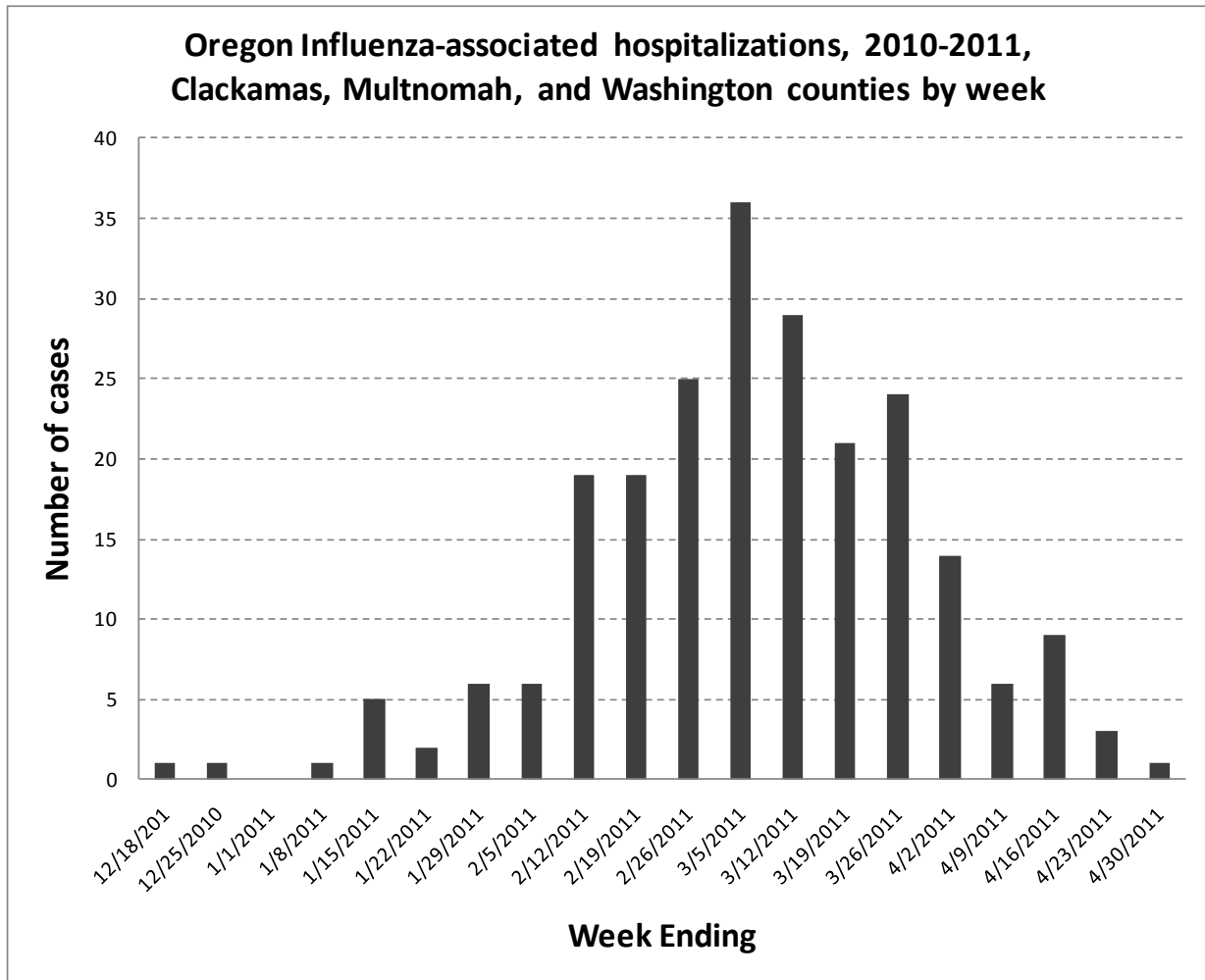


Table 2 shows procedures, conditions, antiviral use, and vaccination status for cases. Nearly all hospitalized cases (92%) underwent a chest x-ray within 24 hours of admission. Few cases, 7.5%, underwent mechanical ventilation. Nearly a fifth of cases (19%) were admitted to an ICU. Most cases had at least one underlying medical condition (85%), with an immunosuppressive condition the most frequently reported

(25.7%). Only 36.4% of hospitalized cases were reported as vaccinated for influenza prior to hospitalization.

Table 2. Procedures, conditions, antiviral use and vaccination status for all Oregon EIP cases, 2010-2011.

Procedures, conditions, and findings	No.	Percent
Chest x-ray within 24 hrs.	210	92.11
Mechanical ventilation		
No	211	92.54
Yes	17	7.46
ICU		
No	185	81.14
Yes	43	18.86
Treated with Antivirals^{&}		
Not treated	83	36.40
Treated	145	63.60
Any Underlying Medical Condition		
No	35	15.35
Yes	193	84.65
Condition		
Asthma	16	8.74
Cystic Fibrosis	1	0.55
Chronic lung disease	4	2.19
Chronic cardiovascular disease	23	12.57
Chronic metabolic disease	45	24.59
Renal disease	22	12.02
Cancer	4	2.19
Immunosuppressive condition	47	25.68
Pregnant	7	3.83
Obese ^{**}	14	7.65
Vaccinated prior to hospitalization		
Yes	83	36.40
No	107	46.93
Unknown	38	16.67

*Cases may have more than one underlying condition; categories are not mutually exclusive.

**Obesity and morbid obesity calculated using height and weight or where indicated in medical record. Obesity defined as BMI>30 and morbid obesity defined as BMI>40.

[&] Treated with antivirals defined as antiviral treatment during the course of illness.

Tables 3 and 4 show case characteristics, procedures, and antiviral use for adult cases by vaccination status. Only 39% of hospitalized adults were reported as vaccinated prior to hospitalization. Men were reported as having a higher rate of vaccination (48%)

compared to women (32%). The likelihood of vaccination increased with age—60.5% of persons 70 years of age and older were vaccinated prior to hospitalization.

Table 3. Case characteristics by vaccination status (vaccinated prior to admission) for adult influenza-associated hospitalizations, 2010-2011.

Sex	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Male	28 (34.57)	39 (48.15)	14 (17.28)	81 (40.70)
Female	57 (48.31)	38 (32.2)	23 (19.49)	118 (59.30)
Age				
18-30 years	8 (61.54)	2 (15.38)	3 (23.08)	13 (6.53)
31-50 years	29 (69.05)	4 (9.52)	9 (21.43)	42 (21.11)
51-70 years	31 (39.74)	31 (39.74)	16 (20.51)	78 (39.20)
>70 years	17 (25.76)	40 (60.61)	9 (13.64)	66 (33.17)
Ethnicity				
Hispanic and Latino	4 (66.67)	0 (0)	2 (33.33)	6 (3.02)
Non-Hispanic	28 (41.18)	25 (36.76)	15 (22.06)	68 (34.17)
Not specified	53 (42.4)	52 (41.6)	20 (16)	125 (62.81)
Race				
White	42 (37.5)	50 (44.64)	20 (17.86)	112 (56.28)
Black	7 (63.64)	2 (18.18)	2 (18.18)	11 (5.53)
Asian	0 (0)	3 (75)	1 (25)	4 (2.01)
Hawaiian/Pacific Islander	3 (100)	0 (0)	0 (0)	3 (1.51)
American Indian/Alaska Native	1 (100)	0 (0)	0 (0)	1 (0.50)
Multiple races	0 (0)	1 (100)	0 (0)	1 (0.50)
Unknown	32 (47.76)	21 (31.34)	14 (20.9)	67 (33.67)

Less than 10% of persons 31-50 years of age were reported as vaccinated. Hospitalized Whites were more likely to be vaccinated compared to other races (although small numbers prevent a direct comparison between races).

Table 4 shows the frequency and percent of procedures, and antiviral use by vaccination status for adult cases. Less than half (43%) of cases with at least one underlying medical condition were vaccinated prior to admission. Persons with underlying medical conditions are at high risk for adverse medical outcomes related to influenza infection.

Table 4. Procedures, findings and treatment by vaccination status for adult influenza-associated hospitalizations, 2010-2011.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
No Chest X-ray within 24 hrs	6 (50)	5 (41.67)	1 (8.33)	12 (6.03)
Chest X-ray within 24 hrs	79 (42.25)	72 (38.5)	36 (19.25)	187 (93.97)
Mechanical ventilation				
No	80 (43.72)	71 (38.8)	32 (17.49)	183 (91.96)
Yes	5 (31.25)	6 (37.5)	5 (31.25)	16 (8.04)
ICU				
No	74 (45.68)	60 (37.04)	28 (17.28)	162 (81.41)
Yes	11 (29.73)	17 (45.95)	9 (24.32)	37 (18.59)
Treated with Antivirals^{&}				
Not treated	31(47.69)	23(35.38)	11(16.92)	65(32.67)
Treated	54(40.30)	54(40.30)	26(19.4)	134(67.33)
Any medical condition				
None	14 (66.67)	0 (0)	7 (33.33)	21 (10.55)
At least one	71 (39.89)	77 (43.26)	30 (16.85)	178 (89.45)
Type of medical condition				
Asthma	8 (80)	1 (10)	1 (10)	10 (5.03)
Chronic lung disease	2 (66.67)	0 (0)	1 (33.33)	3 (1.51)
Chronic cardiovascular disease	10 (43.48)	8 (34.78)	5 (21.74)	23 (11.56)
Chronic metabolic disease	13 (29.55)	23 (52.27)	8 (18.18)	44 (22.11)
Renal disease	7 (33.33)	11 (52.38)	3 (14.29)	21 (10.55)
Cancer	1 (25)	3 (75)	0 (0)	4 (2.01)
Immunosuppressive condition	17 (37.78)	21 (46.67)	7 (15.56)	45 (22.61)
Pregnant	4 (57.14)	1 (14.29)	2 (28.57)	7 (3.52)
Obese	6 (42.86)	5 (35.71)	3 (21.43)	14 (7.04)
Neuromuscular disorder	3(33.3)	5(55.56)	1(11.11)	9(4.52)
Seizure disorder	0(0)	1(33.33)	2(66.67)	3 (1.51)
History of lymphoma, leukemia	1(100.00)	0(0)	0(0)	1(0.50)

*Cases may have more than one underlying condition; categories are not mutually exclusive.

**Obesity and morbid obesity calculated using height and weight or where indicated in medical record. Obesity defined as BMI>30 and morbid obesity defined as BMI>40.

[&] Treated with antivirals defined as antiviral treatment during the course of illness.

Tables 5 and 6 show case characteristics, procedures, and antiviral use for pediatric cases by vaccination status. Only 6 (24% of hospitalized children eligible for vaccination) hospitalized children were reported as vaccinated prior to hospitalization. There was no difference in the number of female versus male children vaccinated.

Fifteen of the 29 hospitalized children had underlying medical conditions; only three of those (20%) were vaccinated.

Table 5. Case characteristics by vaccination status (vaccinated prior to admission) for pediatric influenza-associated hospitalizations, 2010-2011.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Sex				
Male	13 (81.25)	3 (18.75)	0 (0)	16 (55.17)
Female	9 (69.23)	3 (23.08)	1 (7.69)	13 (44.83)
Age				
<6 months	3 (75)	0 (0)	1 (25)	4 (13.79)
6-23 months	3 (60)	2 (40)	0 (0)	5 (17.24)
24-59 months	3 (60)	2 (40)	0 (0)	5 (17.24)
5-10 years	7 (87.5)	1 (12.5)	0 (0)	8 (27.59)
11-17 years	6 (85.71)	1 (14.29)	0 (0)	7 (24.14)
Ethnicity				
Hispanic and Latino	4 (57.14)	3 (42.86)	0 (0)	7 (24.14)
Non-Hispanic	11 (84.62)	1 (7.69)	1 (7.69)	13 (44.83)
Not specified	7 (77.78)	2 (22.22)	0 (0)	9 (31.03)
Race				
White	17 (80.95)	3 (14.29)	1 (4.76)	21 (72.41)
Black	1 (50.00)	1 (50.00)	0 (0)	2 (6.90)
Unknown	4 (66.67)	2 (33.33)	0 (0)	6 (20.69)

Table 6. Procedures, underlying conditions and antiviral use by vaccination status for pediatric influenza-associated hospitalizations, 2010-2011.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
No Chest X-ray within 24 hrs	5 (83.33)	1 (16.67)	0 (0)	6 (20.69)
Chest X-ray within 24 hrs	17 (73.91)	5 (21.74)	1 (4.35)	23 (79.31)
Mechanical ventilation				
No	21 (75)	6 (21.43)	1 (3.57)	28 (96.55)
Yes	1 (100)	0 (0)	0 (0)	1 (3.45)
ICU				
No	17 (73.91)	5 (21.74)	1 (4.35)	23 (79.31)
Yes	5 (83.33)	1 (16.67)	0 (0)	6 (20.69)
Treated with Antivirals*				
Not treated	13(72.22)	4(22.22)	1(5.56)	18(62.07)
Treated	9(81.82)	2(18.18)	0(0)	11(37.93)
Any medical condition				
None	10 (71.43)	3 (21.43)	1 (7.14)	14 (48.28)
At least one	12 (80.00)	3 (20.00)	0 (0)	15 (51.72)
Type of medical condition				
Asthma	4 (66.67)	2 (33.33)	0 (0)	6 (20.69)
Cystic Fibrosis	1 (100)	0 (0)	0 (0)	1 (3.45)
Chronic lung disease	1 (100)	0 (0)	0 (0)	1 (3.45)
Chronic metabolic disease	1 (100)	0 (0)	0 (0)	1 (3.45)
Renal disease	1 (100)	0 (0)	0 (0)	1 (3.45)
Immunosuppressive condition	2 (100)	0 (0)	0 (0)	2 (6.90)
Neuromuscular disorder	0 (0)	1(100.00)	0 (0)	1 (3.45)
Seizure disorder	2(100.00)	0 (0)	0 (0)	2 (6.90)

*Cases may have more than one underlying condition; categories are not mutually exclusive.

& Treated with antivirals defined as antiviral treatment during the course of illness.

During the 2010-2011 influenza season, viruses that circulated in Oregon included A A/California/7/2009-like (A H1N1), A/Perth/16/2009-like (A H3N2), and B/Brisbane/60/2008-like. All three viruses were components of the 2011-12 influenza vaccine for the Northern Hemisphere.

Table 7 shows the frequency of virus subtypes detected among hospitalized cases in the Oregon EIP area. H1N1 and H3N2 were detected in approximately equal numbers of cases—36%. Less than 5% of cases were infected with influenza B. A single case was infected with both influenza A and B.

Table 7. Influenza virus types and subtypes among Oregon EIP cases, 2010-2011.

Virus	No.	Percent
Influenza A	215	94.30
H3	86	40.00
2009 H1	84	39.07
H1, unspecified	1	0.46
Unknown subtype*	44	20.46
Influenza B	11	4.82
Both A and B	1	0.44
Type unknown [†]	1	0.44
Total	228	100

[†]type unknown: influenza type not reported in medical records.

*Specimen not subtyped.

The age distribution of hospitalized cases in 2010-2011 varied from 2 previous influenza seasons (Figure 2). In 2010-2011, the highest rate of hospitalization occurred among persons 65 and older; in 2009-2010 (pandemic year) and 2008-2009, the highest rate of hospitalization occurred among children 0-4 years of age. For children 5-17, rates were higher during the pandemic compared to 2010-2011 and 2008-2009. This is also true for persons 18-49 and 50-64. More persons 65 and older were hospitalized for influenza in the Oregon EIP area in 2010-2011 than in the 2009 pandemic.

Deaths. There were 6 deaths among adults hospitalized in 2010-2011 (3.02%), and 1 death in a pediatric patient (3.45%). This percent of deaths among hospitalized patients is comparable to the 2009 pandemic (2% and 3% among adults and pediatric patients, respectively).

Figure 2. Age group-specific rates of influenza hospitalization, 2010-2011.

