

2011-2012 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 2011-2012 influenza season (October 1, 2011 to April 30, 2012).

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, 2011 and April 30, 2012, 205 influenza-related hospitalizations were reported in the EIP area—188 adults and 17 pediatric cases. This represents a crude rate of 12.5 cases per 100,000 residents of the EIP area, less than the rate during the 2010-2011 influenza season.

Table 1 shows the sex, age, ethnicity, and race characteristics of Oregon EIP cases in 2011-2012. The median age of hospitalized cases was 65.5—slightly older than the median age during the 2010-2011 influenza season. Persons 70 years of age or older were the leading age category in influenza hospitalizations (44.9%). Fifty-six percent of cases were female. Fifty-five percent of cases were reported as White, while Blacks—7.4% of hospitalized cases—were the next most frequently reported race (where race was known). Ethnicity was unknown for most cases—51.2%.

Table 1. Characteristics of all Oregon EIP cases, 2011-2012.

Sex	No.	Percent
Male	90	43.9
Female	115	56.1
Age		
<6 months	2	1.0
6-23 months	3	1.5
24-59 months	0	0.0
5-10 years	12	5.9
11-17 years	0	0.0
18-30 years	14	6.8
31-50 years	41	20.0
51-70 years	41	20.0
>70 years	92	44.9
Ethnicity		
Hispanic and Latino	9	4.4
Non-Hispanic	90	43.9
Not specified	106	51.7
Race		
White	112	55.2
Black	15	7.4
Asian/ Hawaiian or Pacific Islander	7	3.5
American Indian/Alaska Native	2	1.0
Multiple races	4	2.0
Unknown	63	31.0

Figure 1 shows the distribution of cases during the influenza season. The peak of influenza hospitalizations occurred during the week ending March 31, 2012 (MMWR week 13). During the peak week, 35 influenza hospitalizations were reported. The first cases were reported the week ending October 8, 2011, and the last case was reported the week ending April 28, 2012.

Figure 1. Number of Oregon EIP area hospitalizations by week, 2011-2012.

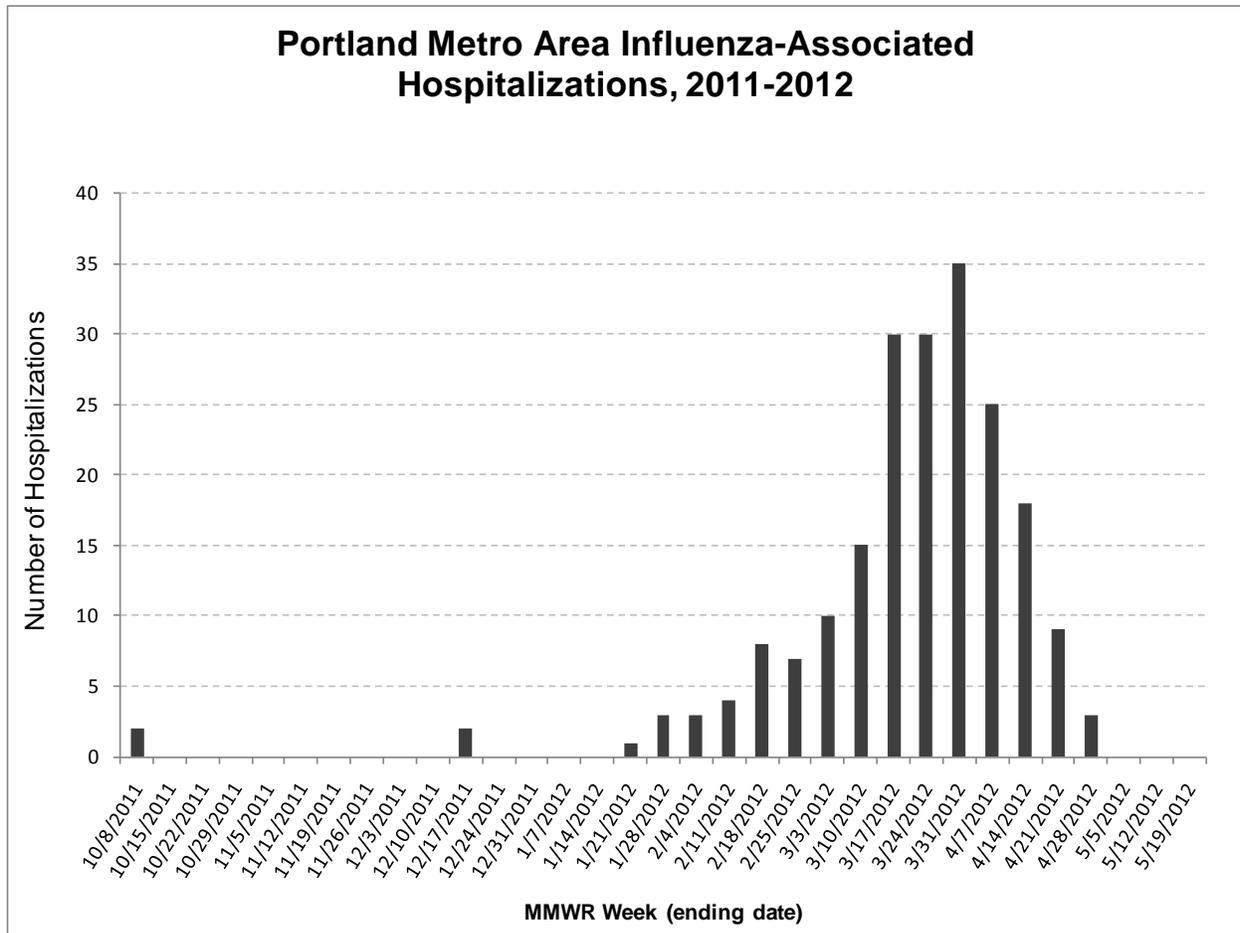


Table 2 shows procedures, conditions, antiviral use, and vaccination status for cases. Nearly all hospitalized cases (96%) underwent a chest x-ray within 24 hours of admission. Just over one tenth of cases, 12.2%, underwent mechanical ventilation. More than a fifth of cases (22.4%) were admitted to an ICU. Most cases had at least one underlying medical condition (97.6%), with an immunosuppressive condition the most frequently reported (13.0%). Only 47.8% 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, 2011-2012.

Procedures, conditions, and findings*	No.	Percent
Chest x-ray within 24 hrs.	197	96.10
Mechanical ventilation		
No	177	86.34
Yes	25	12.20
ICU		
No	157	76.59
Yes	46	22.44
Treated with Antivirals^{&}		
Not treated	72	35.12
Treated	133	64.88
Any Underlying Medical Condition	198	96.59
Condition		
Asthma	49	23.90
Cystic Fibrosis	1	0.49
Chronic lung disease	111	54.15
Cardiovascular disease	98	47.80
Chronic metabolic disease	84	40.98
Renal disease	50	24.39
Cancer	12	5.89
Immunosuppressive condition	57	27.80
Pregnant	9	8.18 [‡]
Obese**	50	24.39
Vaccinated prior to hospitalization		
Yes	98	47.80
No	96	46.83
Unknown	11	5.37

*Unknown values not shown

**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.

[‡] Percent of adult females.

Tables 3 and 4 show case characteristics, procedures, and antiviral use for adult cases (persons 18 and older) by vaccination status. Fifty-one percent of hospitalized adults were reported as vaccinated prior to hospitalization. Men were reported as having a higher rate of vaccination (52.6%) compared to women (49.1%). The likelihood of vaccination increased with age—67.4% of persons 70 years of age and older were vaccinated prior to hospitalization, compared to the lowest—14.3% among adults 18-30.

Table 3. Case characteristics by vaccination status (vaccinated prior to admission) for adult influenza-associated hospitalizations, 2011-2012.

Sex	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Male	30 (38.46)	41 (52.56)	7 (8.97)	78 (41.49)
Female	52 (47.27)	54 (49.09)	4 (3.64)	110 (58.51)
Age				
18-30 years	12 (85.71)	2 (14.29)	0 (0.00)	14 (7.45)
31-50 years	22 (53.66)	12 (29.27)	7 (17.07)	41 (21.81)
51-70 years	18 (43.90)	19 (46.34)	4 (9.76)	41 (21.81)
>70 years	30 (32.61)	62 (67.39)	0 (0.00)	92 (48.94)
Ethnicity				
Hispanic and Latino	6 (85.71)	0 (0.00)	1 (14.29)	7 (3.72)
Non-Hispanic	38 (47.50)	39 (48.75)	3 (3.75)	80 (42.55)
Not specified	38 (37.62)	56 (55.45)	7 (6.93)	101 (53.72)
Race				
White	46 (42.99)	55 (51.40)	6 (5.61)	107 (57.53)
Black	6 (46.15)	6 (46.15)	1 (7.69)	13 (6.99)
Asian or Pacific Islander	2 (33.33)	3 (50.00)	1 (16.67)	6 (3.23)
American Indian/Alaska Native	0 (0.00)	2 (100.00)	0 (0.00)	2 (1.08)
Multiple races	3 (100.00)	0 (0.00)	0 (0.00)	3 (1.61)
Unknown	25 (45.45)	27 (49.09)	3 (5.45)	55 (29.57)

Whites were more likely to be vaccinated compared to several other races (although small numbers prevent a direct comparison between races). Nearly all adults (98.9%) had at least one underlying condition.

Table 4 shows the frequency and percent of procedures and antiviral use by vaccination status for adult cases. A little more than half (51.1%) 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, 2011-2012.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
No Chest X-ray within 24 hrs	2 (50.00)	2 (50.00)	0 (0.00)	4 (2.13)
Chest X-ray within 24 hrs	80 (43.48)	93 (50.54)	11 (5.98)	184 (97.87)
Mechanical ventilation				
No	73 (45.06)	81 (50.00)	8 (4.94)	162 (86.17)
Yes	8 (34.78)	12 (52.17)	3 (13.04)	23 (12.23)
ICU				
No	67 (44.97)	75 (50.34)	7 (4.70)	149 (79.26)
Yes	14 (37.84)	19 (51.35)	4 (10.81)	37 (19.68)
Treated with Antivirals^{&}				
Not treated	30 (45.45)	32 (48.48)	4 (6.06)	66 (35.11)
Treated	52 (42.62)	63 (51.64)	7 (5.74)	122 (64.89)
Any medical condition				
None or unknown	2 (100.00)	0 (0.00)	0 (0.00)	2 (1.06)
At least one	80 (43.01)	95 (51.08)	11 (5.91)	186 (98.94)
Type of medical condition[†]				
Chronic lung disease	44 (41.51)	58 (54.72)	4 (3.77)	106 (56.38)
Cardiovascular disease	33 (34.02)	61 (62.89)	3 (3.09)	97 (51.60)
Chronic metabolic disease	32 (38.55)	50 (60.24)	1 (1.20)	83 (44.15)
Renal disease	15 (30.00)	34 (68.00)	1 (2.00)	50 (26.60)
Cancer	4 (33.33)	6 (50.00)	2 (16.67)	12 (6.38)
Immunosuppressive condition	22 (39.29)	30 (53.57)	4 (7.14)	56 (29.79)
Neurologic condition	24 (35.29)	43 (63.24)	1 (1.47)	68 (36.17)
Pregnant	7 (77.78)	2 (22.22)	0 (0.00)	9 (8.18)
Obese	25 (50.00)	23 (46.00)	2 (4.00)	50 (26.60)
Seizure disorder	3 (37.50)	4 (50.00)	1 (12.50)	8 (4.26)

*Cases may have more than one underlying condition; categories are not mutually exclusive. Not all categories or subcategories shown. Cases with missing status for mechanical ventilation, antiviral treatment, and ICU admission are not shown.

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

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

†Percent pregnant includes only females in denominator. Chronic lung disease includes asthma.

Tables 5 and 6 show case characteristics, procedures, and antiviral use for pediatric cases by vaccination status. Only 3 (17.6%) of 17 hospitalized children eligible for vaccination were reported as vaccinated prior to hospitalization. Twelve of the 17 hospitalized children had underlying medical conditions; only two of those (16.7%) were vaccinated.

Table 5. Case characteristics by vaccination status (vaccinated prior to admission) for pediatric influenza-associated hospitalizations, 2011-2012.

Sex	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Male	9 (75.00)	3 (25.00)	0 (0.00)	12 (70.59)
Female	5 (100.00)	0 (0.00)	0 (0.00)	5 (29.41)
Age			0 (0.00)	
<6 months	2 (100.00)	0 (0.00)	0 (0.00)	2 (11.76)
6-23 months	3 (100.00)	0 (0.00)	0 (0.00)	3 (17.65)
24-59 months	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
5-10 years	9 (75.00)	3 (25.00)	0 (0.00)	12 (70.59)
11-17 years	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Ethnicity				
Hispanic and Latino	1 (50.00)	1 (50.00)	0 (0.00)	2 (11.76)
Non-Hispanic	8 (80.00)	2 (20.00)	0 (0.00)	10 (58.82)
Not specified	5 (100.00)	0 (0.00)	0 (0.00)	5 (29.41)
Race				
White	5 (100.00)	0 (0.00)	0 (0.00)	5 (29.41)
Black	1 (50.00)	1 (50.00)	0 (0.00)	2 (11.76)
Asian or Pacific Islander	1 (100.00)	0 (0.00)	0 (0.00)	1 (5.88)
American Indian/Alaska Native	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Multiple races	1 (100.00)	0 (0.00)	0 (0.00)	1 (5.88)
Unknown	6 (75.00)	2 (25.00)	0 (0.00)	8 (47.06)

Table 6. Procedures, underlying conditions and antiviral use by vaccination status for pediatric influenza-associated hospitalizations, 2011-2012.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
No Chest X-ray within 24 hrs	3 (75.00)	1 (25.00)	0 (0.00)	4 (23.53)
Chest X-ray within 24 hrs	11 (84.62)	2 (15.38)	0 (0.00)	13 (76.47)
Mechanical ventilation				
No	12 (80.00)	3 (20.00)	0 (0.00)	15 (88.24)
Yes	2 (100.00)	0 (0.00)	0 (0.00)	2 (11.76)
ICU				
No	7 (87.50)	1 (12.50)	0 (0.00)	8 (47.06)
Yes	7 (77.78)	2 (22.22)	0 (0.00)	9 (52.94)
Treated with Antivirals^{&}				
Not treated	6 (100.00)	0 (0.00)	0 (0.00)	6 (35.29)
Treated	8 (72.73)	3 (27.27)	0 (0.00)	11 (64.71)
Any medical condition				
None	4 (80.00)	1 (20.00)	0 (0.00)	5 (29.41)
At least one	10 (83.33)	2 (16.67)	0 (0.00)	12 (70.59)
Type of medical condition				
Chronic lung disease	4 (80.00)	1 (20.00)	0 (0.00)	5 (29.41)
Chronic cardiovascular disease	1 (100.00)	0 (0.00)	0 (0.00)	1 (5.88)
Chronic metabolic disease	0 (0.00)	1 (100.00)	0 (0.00)	1 (5.88)
Immunosuppressive condition	0 (0.00)	1 (100.00)	0 (0.00)	1 (5.88)
Neuromuscular disorder	2 (100.00)	0 (0.00)	0 (0.00)	2 (11.76)
Seizure disorder	2 (100.00)	0 (0.00)	0 (0.00)	2 (11.76)

^{*}Cases may have more than one underlying condition; categories are not mutually exclusive. Not all categories or subcategories shown.

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

During the 2011-2012 influenza season, viruses that circulated in Oregon included A A/California/7/2009-like (A H1N1), A/Perth/16/2009-like (A H3N2), and influenza B (Influenza B viruses are not divided into subtypes, and the public health laboratory does not test for strain). Both influenza A viruses were components of the 2011-12 influenza vaccine for the Northern Hemisphere.

Table 7 shows the frequency of virus types and subtypes detected among hospitalized cases in the Oregon EIP area. Influenza A H3N2 was detected in 61.5% of hospitalizations and 68.1% of influenza A cases. Influenza A 2009 H1N1 was detected in 15.1% of hospitalizations. Less than 10% of hospitalizations were associated with influenza B.

Table 7. Influenza virus types and subtypes among Oregon EIP cases, 2011-2012.

Virus	No.	Percent
Influenza A	185	90.24
H3	126	61.46
2009 H1	31	15.12
Unknown subtype*	28	13.66
Influenza B	20	9.76
Both A and B	0	0.00
Type unknown [†]	0	0.00
Total	205	100

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

The age distribution of hospitalized cases in 2011-2012 varied from 3 previous influenza seasons (Figure 2), although was roughly similar to that age distribution in 2010-1, in which the same influenza viruses circulated. In 2011-2012, 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 any season since 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 2011-2012 and 2010-2011 than in the 2009 pandemic or during the 2008-2009 season.

Deaths. There were 7 deaths among adults hospitalized in 2011-2012 (3.70%), and no deaths among pediatric patients. This percent of deaths among hospitalized patients is comparable to the previous season (2010-2011) of 3%.

Figure 2. Age group-specific rates of influenza hospitalization, comparison by season, 2008-09 to 2011-2012.

