

2012-2013 Influenza Hospitalization Report



Oregon Emerging Infections Program
Acute and Communicable Disease Prevention
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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 2012-2013 influenza season (October 1, 2012 to April 30, 2013).

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, 2012 and April 30, 2013, 527 influenza-related hospitalizations were reported in the EIP area—474 adults and 53 pediatric cases. This represents a crude rate of 32 cases per 100,000 residents of the EIP area, a rate higher than even the 2009-2010 pandemic season rate (30.3 per 100,000).

Table 1 shows the sex, age, ethnicity, and race characteristics of Oregon EIP cases in 2012-2013. The median age of hospitalized cases was 69.4—slightly older than the median age during the 2011-2012 influenza season. Persons 70 years of age or older were the leading age category in influenza hospitalizations (49.0%). Fifty-three percent of cases were female. Fifty-seven percent of cases were reported as white, while blacks—4.6% of hospitalized cases—were the next most frequently reported race (where race was known). Most cases, 65.5%, were reported as non-Hispanic.

Table 1. Characteristics of all Oregon EIP cases, 2012-2013.

Sex	No.	Percent
Male	250	47.4
Female	277	52.6
Age		
<6 months	9	1.5
6-23 months	9	1.7
24-59 months	13	2.5
5-10 years	16	3.0
11-17 years	7	1.3
18-30 years	23	4.4
31-50 years	57	10.8
51-70 years	135	25.6
>70 years	258	49.0
Ethnicity		
Hispanic and Latino	32	6.0
Non-Hispanic	345	65.5
Not specified	150	28.5
Race		
White	302	57.3
Black	24	4.6
Asian/ Hawaiian or Pacific Islander	18	3.4
American Indian/Alaska Native	2	<1.0
Multiple races	3	<1.0
Unknown	178	33.8

Figure 1 shows the distribution of cases during the influenza season. The peak of influenza hospitalizations occurred during MMWR week 4 of 2013 (the week ending 1/26/2013). During the peak week, 83 influenza hospitalizations were reported. The first cases were reported week 42 (the week ending 10/20/2012), and the last cases reported week 15 (the week ending 4/14/2013).

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

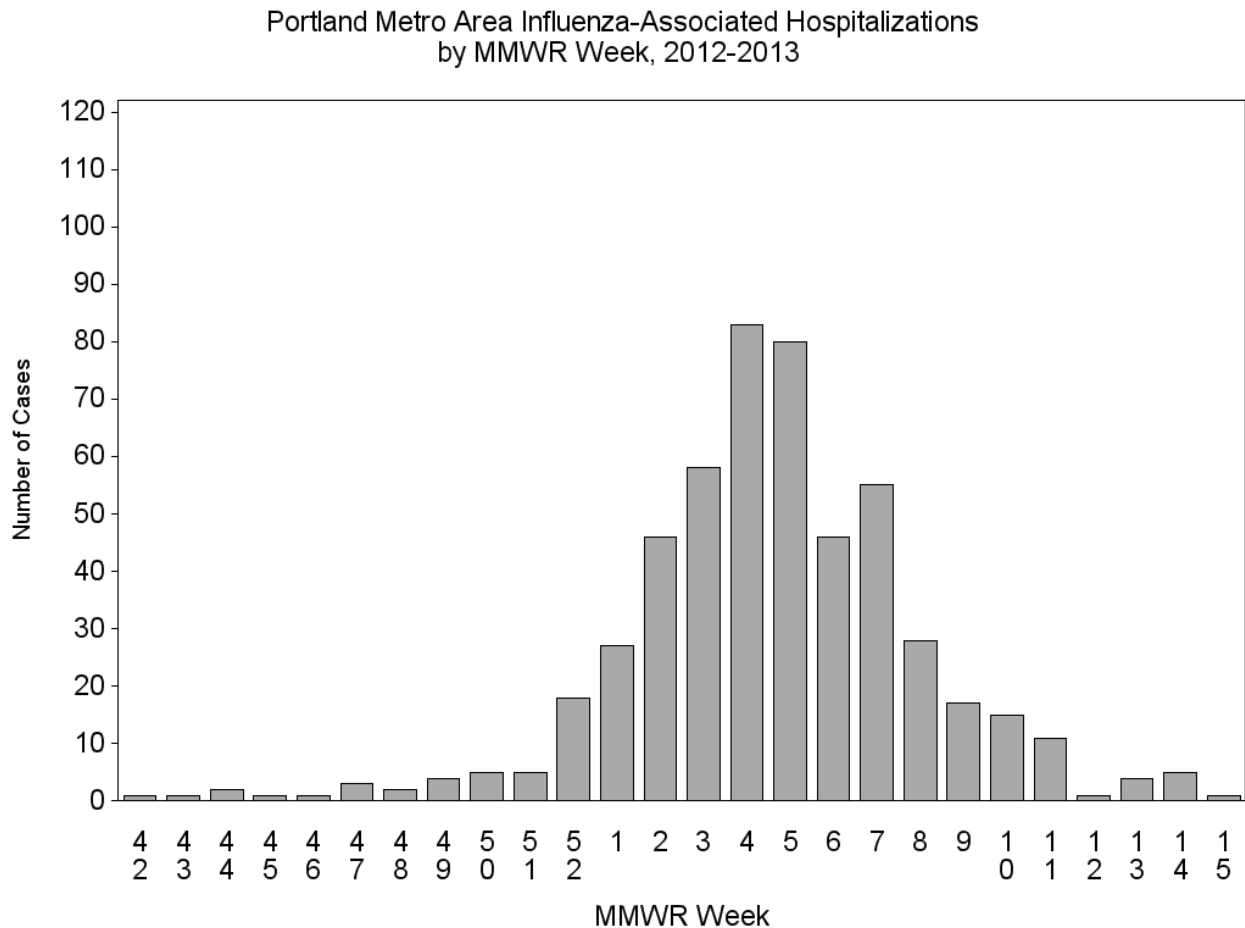


Table 2 shows procedures, conditions, antiviral use, and vaccination status for cases. Nearly all hospitalized cases (94%) underwent a chest x-ray within 24 hours of admission. Fewer than 6% underwent mechanical ventilation. Less than 14% were admitted to an ICU. Most cases had at least one underlying medical condition (97%), with cardiovascular disease and chronic metabolic disease the most frequently reported (both 39%). 55% 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, 2012-2013.

Procedures, conditions, and findings*	No.	Percent
Chest x-ray within 24 hrs.	495	93.9
Mechanical ventilation	30	5.7
ICU	72	13.7
Treated with Antivirals^{&}	414	78.6
Any Underlying Medical Condition**	468	96.6
Condition		
Cardiovascular disease	207	39.3
Chronic metabolic disease	207	39.3
Chronic lung disease	139	26.4
Asthma	125	23.7
Obese***	112	21.3
Renal disease	100	19
Immunosuppressive condition	69	13.1
Cognitive dysfunction	31	5.9
Seizure disorder	19	3.6
Cancer	15	2.9
Pregnant	13	5.1 [†]
Hemoglobinopathy	11	2.1
History of Guillain-Barre Syndrome	1	<1.0
Vaccinated prior to hospitalization		
Yes	290	55.0
No	213	40.4
Unknown	24	4.6

*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-eight percent of hospitalized adults were reported as vaccinated prior to hospitalization. Men and women had similar rates of vaccination. The likelihood of vaccination generally increased with age—65.6% of persons 70 years of age and older were vaccinated prior to hospitalization, compared to the lowest—31.6% among adults 31-50.

Table 3. Case characteristics by vaccination status (vaccinated prior to admission) for adult influenza-associated hospitalizations, 2012-2013.

Sex	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Male	76 (34.4)	130 (58.8)	15 (6.8)	221 (46.6)
Female	101 (39.9)	144 (56.9)	8 (3.2)	253 (53.4)
Age				
18-30 years	9 (39.1)	11 (47.8)	3 (13.0)	23 (4.9)
31-50 years	33 (57.9)	18 (31.6)	6 (10.5)	57 (12.0)
51-70 years	56 (41.5)	75 (55.6)	4 (2.9)	135 (28.5)
>70 years	79 (30.5)	170 (65.6)	10 (3.9)	259 (54.6)
Ethnicity				
Hispanic and Latino	9 (47.4)	8 (42.1)	2 (10.5)	19 (4.0)
Non-Hispanic	124 (39.1)	178 (56.2)	15 (4.7)	317 (66.9)
Not specified	44 (31.9)	88 (63.8)	6 (4.3)	138 (29.1)
Race				
White	100 (35.2)	168 (59.2)	16 (5.6)	284 (59.9)
Black	10 (45.5)	10 (45.5)	2 (9.0)	22 (4.6)
Asian or Pacific Islander	12 (80.0)	3 (20.0)	0 (0.0)	15 (3.2)
American Indian/Alaska Native	0 (0.0)	2 (100.0)	0 (0.0)	2 (0.4)
Multiple races	0 (0.0)	0 (0.0)	1 (100.0)	1 (0.2)
Unknown	55 (36.7)	91 (60.7)	4 (2.7)	150 (31.7)

Whites were more likely to be vaccinated compared to several other races (with the exception of American Indian/Alaska Natives, although small numbers prevent a direct comparison between races). Most adults (93.7%) 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 (55.1%) 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, 2012-2013.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
Chest X-ray within 24 hrs	171 (37.3)	265 (57.9)	22 (4.8)	458 (96.6)
No Chest X-ray within 24 hrs	5 (41.7)	6 (50.0)	1 (8.3)	12 (2.5)
Unknown	1 (25.0)	3 (75.0)	0 (0.0)	4 (0.8)
Mechanical ventilation				
Yes	12 (44.4)	10 (37.0)	5 (18.5)	27 (5.7)
No	162 (36.7)	261 (59.2)	18 (4.1)	441 (93.0)
Unknown	3 (50.0)	3 (50.0)	0 (0.0)	6 (1.3)
ICU				
Yes	24 (36.4)	36 (54.6)	6 (9.1)	66 (13.9)
No	150 (37.3)	235 (58.5)	17 (4.2)	402 (84.8)
Unknown	3 (50.0)	3 (50.0)	0 (0.0)	6 (1.3)
Treated with Antivirals^{&}				
Treated	136 (36.9)	219 (59.4)	14 (3.8)	369 (77.9)
Not treated	41 (39.1)	55 (52.4)	9 (8.6)	105 (22.1)
Any medical condition				
None or unknown	13 (43.3)	13 (43.3)	4 (13.3)	30 (6.3)
At least one	164 (36.9)	261 (58.8)	19 (4.3)	444 (93.7)
Type of medical condition[†]				
Asthma	49 (42.6)	59 (51.3)	7 (6.1)	115 (*4.3)
Cancer	4 (28.6)	9 (64.3)	1 (7.1)	14 (3.0)
Cardiovascular disease	69 (33.7)	131 (63.9)	5 (2.4)	205 (43.2)
Chronic lung disease	42 (30.7)	87 (63.5)	8 (5.8)	137 (28.9)
Chronic metabolic disease	73 (35.3)	127 (61.4)	7 (3.4)	207 (43.7)
Cognitive dysfunction	14 (45.2)	15 (48.4)	2 (6.5)	31 (6.5)
Hemoglobinopathy	3 (30.0)	7 (70.0)	0 (0.0)	10 (2.1)
History of Guillain-Barre Syndrome	1 (100.0)	0 (0.0)	0 (0.0)	1 (0.2)
Immunosuppressive condition	21 (32.8)	37 (57.8)	6 (9.4)	54 (11.4)
Neurologic condition	47 (32.4)	91 (62.8)	7 (4.8)	145 (30.6)
Obese	40 (36.0)	69 (62.2)	2 (1.8)	111 (23.4)
Pregnant	3 (2.9)	9 (6.3)	1 (12.5)	13 (2.7)
Renal disease	23 (23.5)	71 (72.5)	4 (4.1)	98 (20.7)
Seizure disorder	5 (29.4)	12 (70.6)	0 (0.0)	17 (3.6)

*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 adult 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. Most hospitalized children—62% of males and 75% of females—were not vaccinated prior to being hospitalized for influenza. Twenty-four (45%) of the 53 hospitalized children had underlying medical conditions; half of those (50%) were vaccinated.

Table 5. Case characteristics by vaccination status (vaccinated prior to admission) for pediatric influenza-associated hospitalizations, 2012-2013.

Sex	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Male	18 (62.1)	10 (34.5)	1 (3.5)	29 (54.7)
Female	18 (75.0)	6 (25.0)	0 (0.0)	24 (45.3)
Age				
<6 months	8 (100.0)	0 (0.0)	0 (0.0)	8 (15.1)
6-23 months	5 (55.6)	4 (44.4)	0 (0.0)	9 (17.0)
24-59 months	8 (61.5)	4 (30.8)	1 (7.7)	13 (24.5)
5-10 years	10 (62.5)	6 (37.5)	0 (0.0)	16 (30.2)
11-17 years	5 (71.4)	2 (28.6)	0 (0.0)	7 (13.2)
Ethnicity				
Hispanic and Latino	10 (76.9)	3 (23.1)	0 (0.0)	13 (24.5)
Non-Hispanic	18 (64.3)	9 (32.1)	1 (3.6)	28 (52.8)
Not specified	8 (66.7)	4 (33.3)	0 (0.0)	12 (22.6)
Race				
White	10 (55.6)	8 (44.4)	0 (0.0)	18 (34.0)
Black	1 (50.0)	1 (50.0)	0 (0.0)	2 (3.8)
Asian or Pacific Islander	3 (100.0)	0 (0.0)	0 (0.0)	3 (5.6)
American Indian/Alaska Native	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Multiple races	2 (100.0)	0 (0.0)	0 (0.0)	2 (3.8)
Unknown	20 (71.4)	7 (25.0)	1 (3.6)	28 (52.8)

Table 6. Procedures, underlying conditions and antiviral use by vaccination status for pediatric influenza-associated hospitalizations, 2012-2013.

	Vaccine Status			Total
	Unvaccinated No. (%)	Vaccinated No. (%)	Unknown No. (%)	
Chest X-ray				
Chest X-ray within 24 hrs	24 (64.9)	12 (32.4)	1 (2.7)	37 (69.8)
No Chest X-ray within 24 hrs	12 (75.0)	4 (25.0)	0 (0.0)	16 (30.2)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Mechanical ventilation				
Yes	2 (66.7)	1 (33.3)	0 (0.0)	3 (5.8)
No	34 (69.4)	15 (30.6)	0 (0.0)	49 (94.2)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
ICU				
Yes	4 (66.7)	2 (33.3)	0 (0.0)	6 (11.5)
No	32 (69.7)	14 (30.4)	0 (0.0)	46 (88.5)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Treated with Antivirals^{&}				
Treated	32 (71.1)	12 (26.7)	1 (2.2)	45 (84.9)
Not treated	4 (50.0)	4 (50.0)	0 (0.0)	8 (15.1)
Any medical condition				
None or unknown	25 (86.2)	4 (13.8)	0 (0.0)	29 (54.7)
At least one	11 (45.8)	12 (50.0)	1 (4.2)	24 (45.3)
Type of medical condition[†]				
Asthma	3 (30.0)	7 (70.0)	0 (0.0)	10 (18.9)
Chronic lung disease	1 (50.0)	1 (50.0)	0 (0.0)	2 (3.8)
Cardiovascular disease	1 (50.0)	1 (50.0)	0 (0.0)	2 (3.8)
Chronic metabolic disease	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Renal disease	1 (50.0)	1 (50.0)	0 (0.0)	2 (3.8)
Cancer	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)
Immunosuppressive condition	1 (20.0)	4 (80.0)	0 (0.0)	5 (9.4)
Neurologic condition	3 (42.9)	3 (42.9)	1 (14.3)	7 (13.2)
Seizure disorder	1 (50.0)	1 (50.0)	0 (0.0)	2 (3.8)
Hemoglobinopathy	0 (0.0)	1 (100.0)	0 (0.0)	1 (1.9)

*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 2012-2013 influenza season, viruses that circulated in Oregon included A/California/7/2009-like (A H1N1), A/Victoria/361/2011-like (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 in circulation in 2012-2013 were components of the 2012-13 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 57.3% of all hospitalizations, although H3N2 was identified in 96% of the specimens that were subtyped (303/315). Influenza A (2009 H1N1) was detected in 2.3% of hospitalizations. Just 12% 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	464	88.0
H3	303	57.5
2009 H1	12	2.3
Unknown subtype [*]	149	28.3
Influenza B	63	12.0
Both A and B	0	0.00
Type unknown ⁺	0	0.00
Total	527	100

⁺type unknown: influenza type not reported in medical records.

^{*}Specimen not subtyped.

The age distribution of hospitalized cases in 2012-2013 varied from the 4 previous influenza seasons (Figure 2). In 2012-2013, the highest rate of hospitalization occurred among persons 65 and older; this was the case for all previous seasons (2011-2012, 2010-2011) with the exception of 2009-2010 (pandemic year) and 2008-2009, where the highest rates of hospitalization occurred among children 0-4 years of age. Children less than 5 years of age saw a rate of hospitalization substantially increased over previous seasons—16.2 per 100,000 during 2012-2013.

Deaths. There were 17 deaths among adults hospitalized in 2012-2013, which was 3.2% of all hospitalizations, and no deaths among pediatric patients. This percent of deaths among hospitalized patients is comparable to the previous season (2011-2012) of 3.7%. Data on deaths includes only those that died while hospitalized.

Figure 2. Age group-specific rates of influenza hospitalization, comparison by season, 2008-09 to 2012-2013.

