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Introduction

Influenza is a viral respiratory infection that causes significant morbidity and mortality in the United States every year. The 2012-2013 influenza season was moderately severe. Influenza activity peaked in late December and high rates of influenza-like illness, hospitalization and mortality were seen (1). Influenza A H3N2 was the predominant circulating virus however Influenza B viruses were also commonly seen. Significant attention was paid to the high rates of hospitalization and death and low vaccine effectiveness (VE) estimates, particularly among adults ≥ 65 years of age (2).

In the United States, influenza surveillance includes a combination of laboratory surveillance, monitoring of outpatient influenza-like illness (ILI), pneumonia and influenza mortality indices, and surveillance for influenza hospitalizations. These data provide a comprehensive picture of national and regional influenza activity. However, understanding the epidemiology of influenza at a county level can be important for a local public health agency. Identifying unique local trends in influenza activity, as well as groups at risk for serious outcomes of influenza, can provide communities with the opportunity to develop focused public health messaging and outreach activities.

Washtenaw County is located in Southeast Michigan and has a population of just over 350,000 residents. The cities of Ann Arbor and Ypsilanti are the major urban centers within the county and are home to two large universities. Washtenaw County Public Health (WCPH) has performed surveillance for hospitalizations due to influenza among its residents since 2010.

Figure 1. State of Michigan and Washtenaw County



Source: Wikipedia

Aims

- To characterize the epidemiology and clinical outcomes of laboratory-confirmed influenza hospitalizations in county residents.
- To establish influenza hospitalization rates (IHRs) for the overall county population and by age group and race.
- To evaluate influenza vaccination coverage among residents hospitalized with influenza infection.

Methods

Reporting:

- Enhanced passive surveillance.
- Voluntary reporting, except pediatric influenza deaths, facility outbreaks, and suspected novel influenza which are mandated by the Michigan Public Health Code.

Case definition:

- Washtenaw County resident hospitalized with lab evidence of influenza infection by RT-PCR, antigen test or viral culture.

Data collection:

- Standardized influenza surveillance form completed in the Michigan Disease Surveillance System (MDSS), a web-based communicable disease reporting system.
- Demographic, clinical data obtained from medical records and patient and/or family interview
- Influenza vaccination data obtained from The Michigan Care Improvement Registry (MCIR), the statewide immunization registry, medical record review and patient/family interview.

Data analysis:

- Data were analyzed using EpiInfo 7.0.
- IHRs calculated using 2010 census data.

Results

- 199 hospitalized influenza cases reported, 49% occurred during week 3 of 2013.

Fig. 2. Cases by week and influenza type, 2012-13

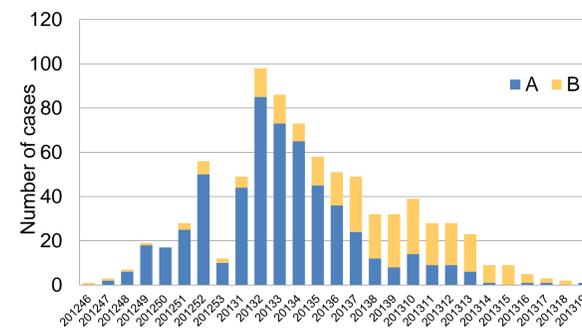


Table 1. High-risk characteristics by age, 2012-13

	Adult (n=184)	Pediatric (n=15)
High risk condition	92%	87%
Chronic lung disease	36%	13%
Asthma	18%	60%
Cardiovascular disease	47%	0%
Metabolic disorder	43%	13%
Obesity	35%	0%
Neurologic condition	18%	13%
Immune suppression	17%	20%
Kidney disease	23%	7%

Results

Demographics, clinical outcomes and vaccination status

- Mean age: 63 years. Significant difference in mean age by race. White: 65 years, Black: 55 years ($p=0.01$).
- 8% were LTCF residents.
- All deaths occurred in persons > 50 yrs of age.
- 25% of deaths occurred in LTCF residents
- No difference in proportion vaccinated by influenza type.
- Cases ≥ 65 years of age, reporting white race or at high-risk were more likely to have been vaccinated vs. referent groups.
- No significant difference in clinical outcome by vaccination status.

Table 2. Demographic and clinical characteristics by season, 2010-13

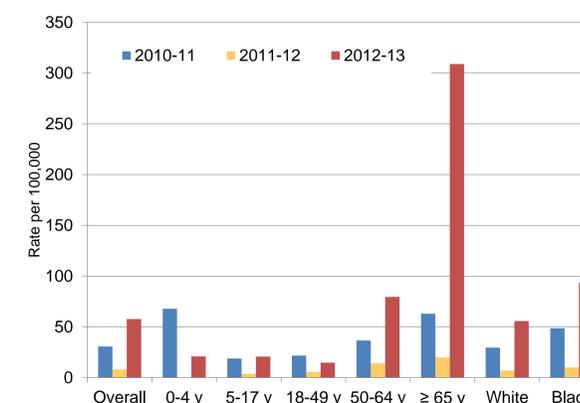
	2010-11 (n=106)		2011-12 (n=28)		2012-13 (n=199)
	n(%)	p-value*	n(%)	p-value*	n(%)
Male	52(49.1)	0.96	10(35.7)	0.20	97(48.7)
≤ 18 years	23(21.7)	<0.01	2(7.1)	0.94	15(7.5)
18-49 years	38(35.9)	<0.01	10(35.7)	<0.01	26(13.1)
50-64 years	23(21.7)	0.50	9(32.1)	0.42	50(25.1)
65+ years	22(20.8)	<0.01	7(25.0)	<0.01	108(54.3)
Influenza A	85(80.2)	0.11	26(92.9)	0.02	143(71.9)
High-risk	83(78.3)	<0.01	26(92.9)	0.80	182(91.5)
Vaccinated	39(36.8)	0.02	16(57.1)	0.49	100(50.3)
ICU	19(17.9)	0.85	4(14.3)	0.71	34(17.1)
Ventilated	10(9.4)	0.27	2(7.1)	0.82	12(6.0)
Died	4(3.8)	0.92	1(3.6)	0.91	8(4.0)

* As compared to 2012-13 season

Comparison to previous influenza seasons

- IHR was significantly higher in 2012-13
- Cases in 2012-13 were more likely to be ≥ 65 years of age
- A higher proportion of 2012-13 cases were high-risk or received influenza vaccine as compared to 2010-11
- No significant difference in sex, race, clinical outcome by year

Fig. 3. Influenza hospitalization rates, by age, race and season, 2010-13



Conclusions

In 2012-13, influenza had a significant impact on persons ≥ 65 years of age or with high-risk conditions in contrast to the younger, healthier persons hospitalized in recent seasons. The predominance of influenza A H3N2 during 2012-13 season instead of influenza A pdmH1N1 may have contributed.

Serious outcomes were seen in vaccinated and unvaccinated persons. Vaccinated cases were older, and were more likely to be high-risk. VE tends to be lower in these groups. Influenza should be suspected in patients hospitalized with febrile respiratory illness regardless of vaccination status.

Racial disparities in hospitalization rates were seen. Black patients were younger than white patients, and less likely to be vaccinated, but there was no difference in the distribution of high-risk conditions by race. These factors should be further explored.

25% of influenza deaths were in LTCF residents. Outreach to LTCF regarding the need for staff and resident influenza vaccination and prompt reporting of outbreaks is being conducted. While local influenza surveillance data can be useful in targeting outreach efforts, case follow-up can be demanding at times of peak influenza activity and must be prioritized among other public health needs.

These data are likely an underestimate of true influenza morbidity as reporting is passive and testing practices may have differed by age group and season. Influenza subtype and strain data was not available. Since this is an observational study of influenza cases only, no conclusions on VE can be drawn.

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References

- CDC. Influenza Activity — United States, 2012–13 Season and Composition of the 2013–14 Influenza Vaccine. MMWR:2013;62(23):473-479
- CDC. Interim Adjusted Estimates of Seasonal Influenza Vaccine Effectiveness — United States, February 2013. MMWR:2013;62(07):119-123