

# 2016-17 Influenza Season - National Perspective

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2017 Texas DSHS Influenza Surveillance Workshop

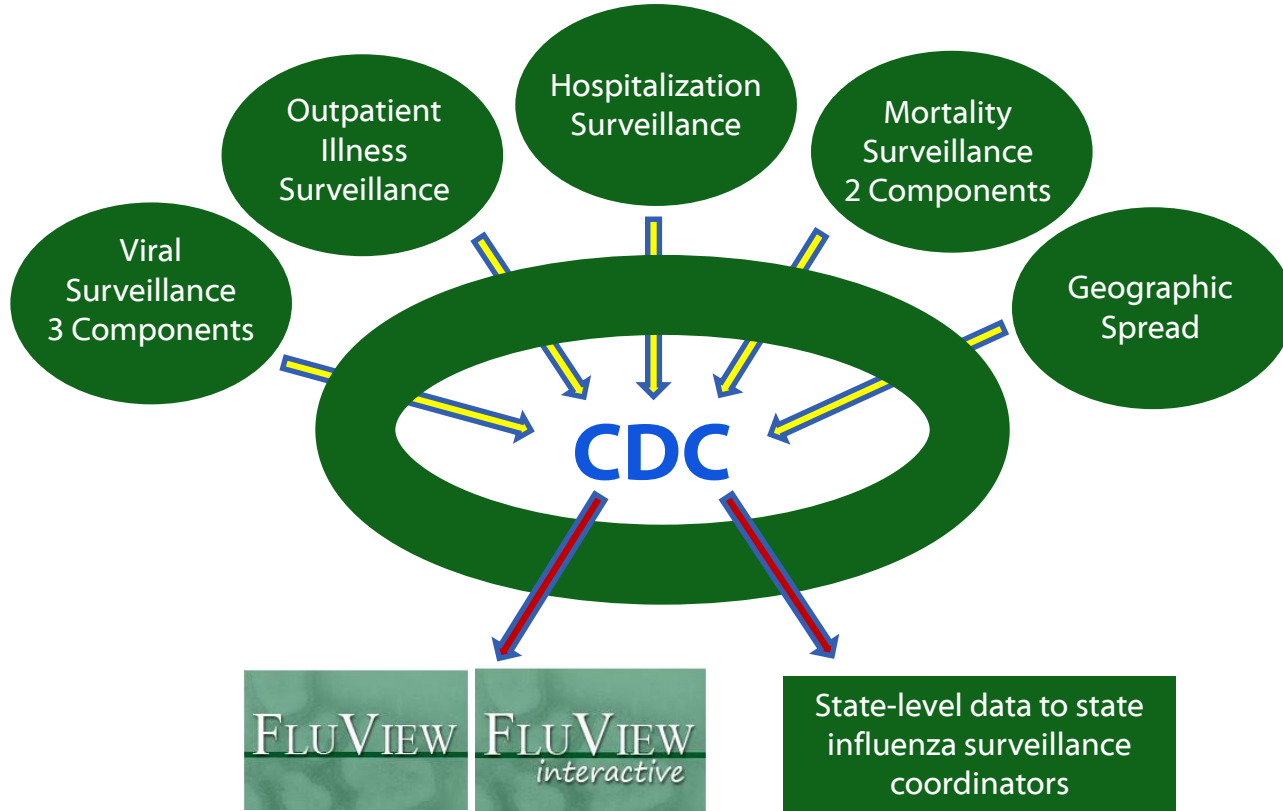
August 15, 2017

# Outline

- Seasonal surveillance summary
- Novel influenza A virus infections
- Vaccine effectiveness



# U.S. Influenza Surveillance System



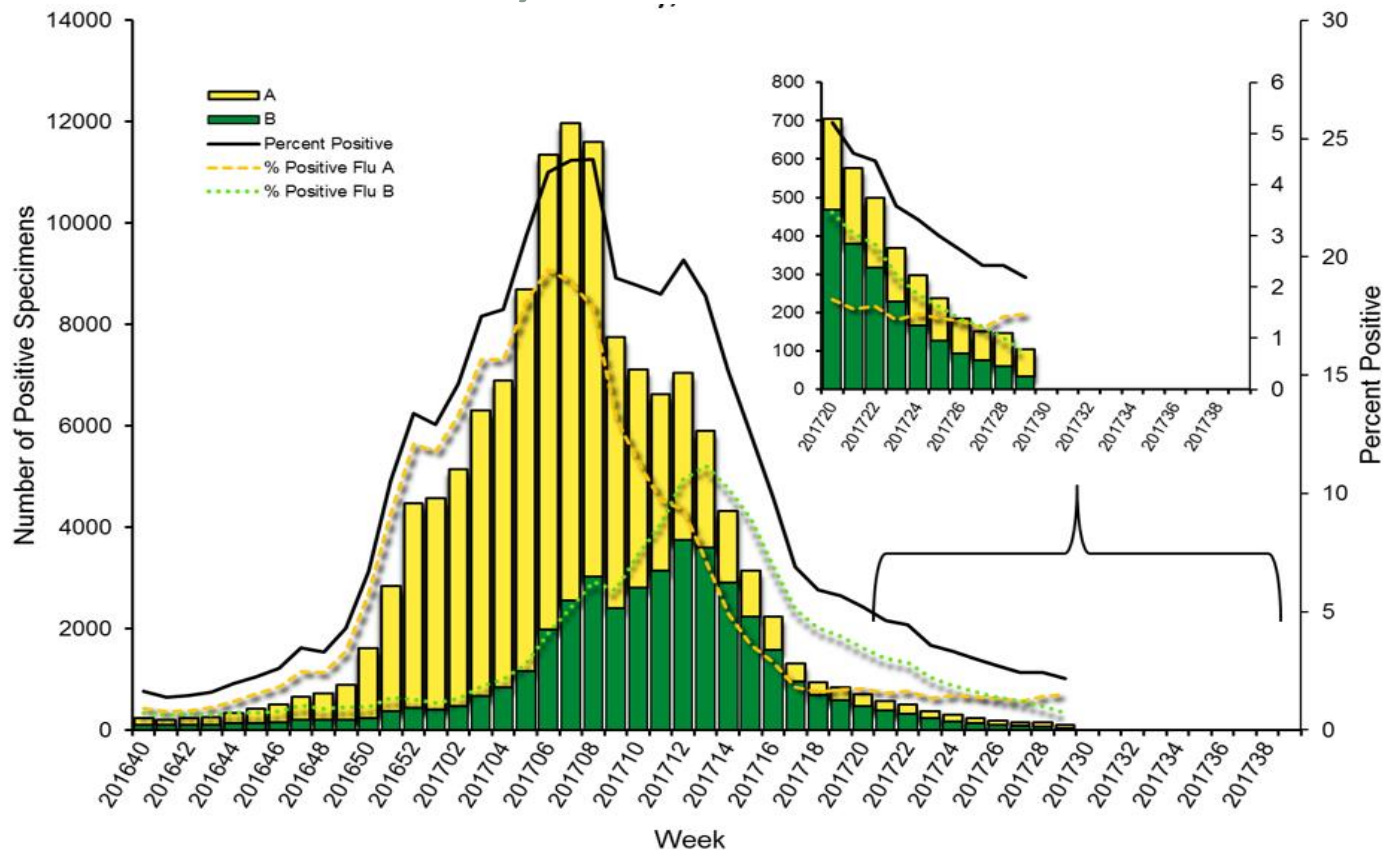
# U.S. Influenza Surveillance Reports



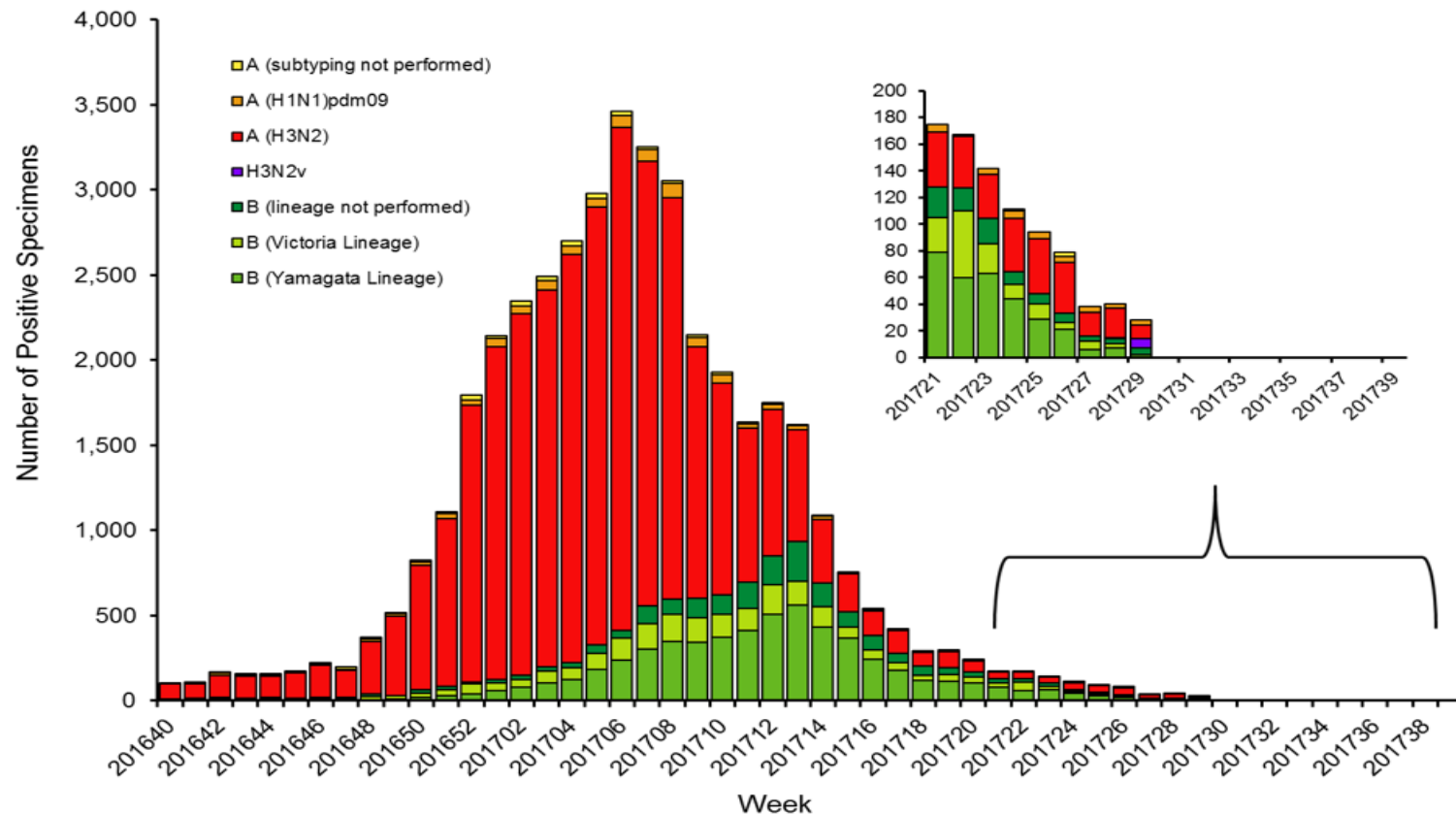
<https://www.cdc.gov/flu/weekly/fluactivitysurv.htm>

# Seasonal Influenza Surveillance Summary

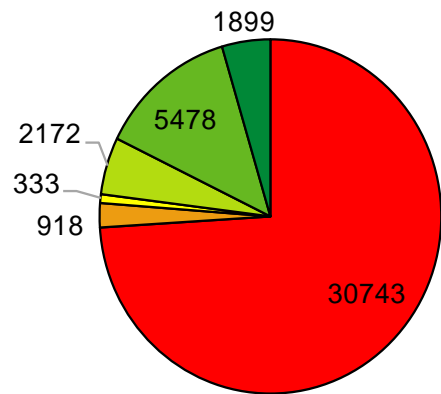
# Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories, 2016-2017 Season



# Influenza Positive Tests Reported to CDC by U.S. Public Health Laboratories, 2016-2017 Season

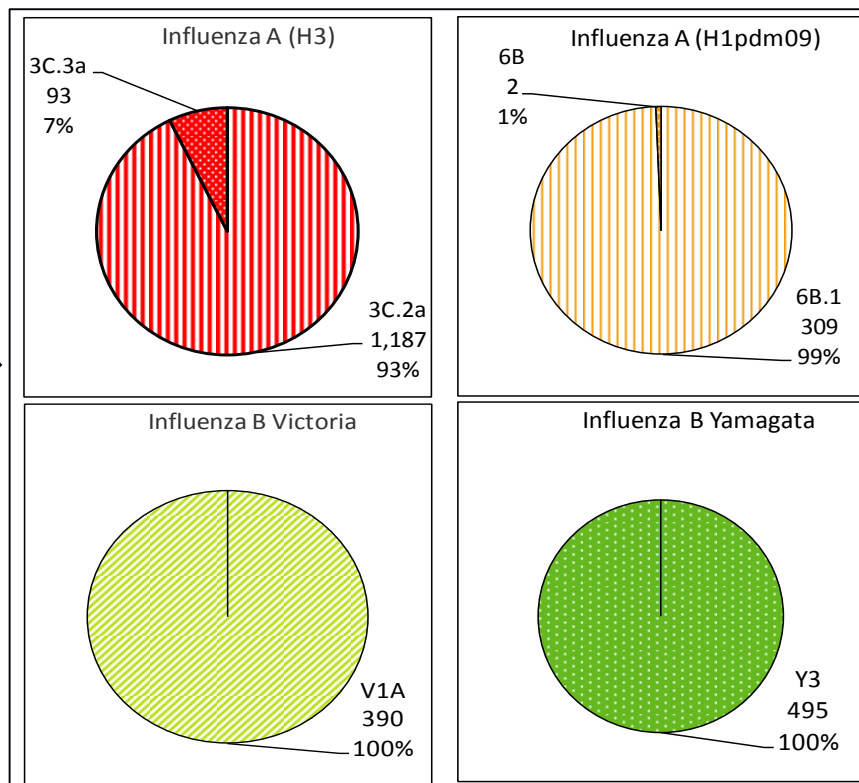


# Influenza Positive Specimens Reported by U.S. Public Health Laboratories, 2016-2017 Season



- Influenza A (H3)
- Influenza A (H1pdm09)
- Influenza A (subtype unknown)
- Influenza B Victoria
- Influenza B Yamagata
- Influenza B (lineage not determined)

## Sequence Results, by Genetic Group, of Specimens Submitted to CDC by U.S. Public Health Laboratories, 2016-2017 Season





# Antigenic Characterization of U.S. Influenza Viruses Collected October 1, 2016 to Present

- A (H1N1)pdm09
  - 294 of 296 (99.3%) were antigenically characterized as A/California/07/2009-like, the H1N1 component of the 2016-17 vaccine
- A (H3N2)
  - 730 of 772 (94.9%) were antigenically characterized as A/Hong Kong/4801/2014-like, the H3N2 component of the 2016-17 vaccine
- B/Victoria lineage
  - 283 of 327 (86.5%) were antigenically characterized as B/Brisbane/60/2008-like, which is included in quadrivalent and trivalent vaccines for the 2016-17 season
- B/Yamagata lineage
  - All 429 were antigenically characterized as B/Phuket/3073/2013-like, an influenza B virus included in the quadrivalent influenza vaccines for the 2016-17 season

# “Right Sizing” Virologic Surveillance (1)

## ■ Situational Awareness

- Beginning/end of season, prevalence/spread of viruses throughout the year
- % of specimens from ILI patients that are positive for influenza
- State level goals based on non-prescreened samples
- Testing at clinical or public health labs

State Population	Average Population	Start of season # of non-screened ILI samples	Peak season # of non-screened ILI samples
< 2 Million	1,094,706	118	292
2-5 Million	3,530,463	132	316
5-10 Million	7,193,033	135	322
10-20 Million	15,214,169	137	325
CA	38,041,430	138	327

## National Numbers (weeks 40-27)

974,711 specimens tested  
130,033 (13.3%) positive  
# tested Peak Week: 49,673

# “Right Sizing” Virologic Surveillance (2)

## ■ Novel Event Detection

- Detect a rare/novel influenza virus among influenza positive surveillance specimens at a low enough threshold for effective intervention and control measures to be implemented.
- National goal with states contributing proportional to their population
- Testing has to be performed in the public health lab

### National Goals

	Threshold	Minimum # pos.	# Weeks Goal Met
Peak	1/700	2095	9
Low	1/200	598	9
Summer	1/4	11	



### State Contributions

State Population	Average Population	Detection Threshold (using flu positives only)		
		1/700	1/200	1/4
< 2 Million	1,094,706	8	3	1
2-5 Million	3,530,463	24	7	1
5-10 Million	7,193,033	48	14	1
10-20 Million	15,214,169	101	29	1
CA	38,041,430	251	72	2

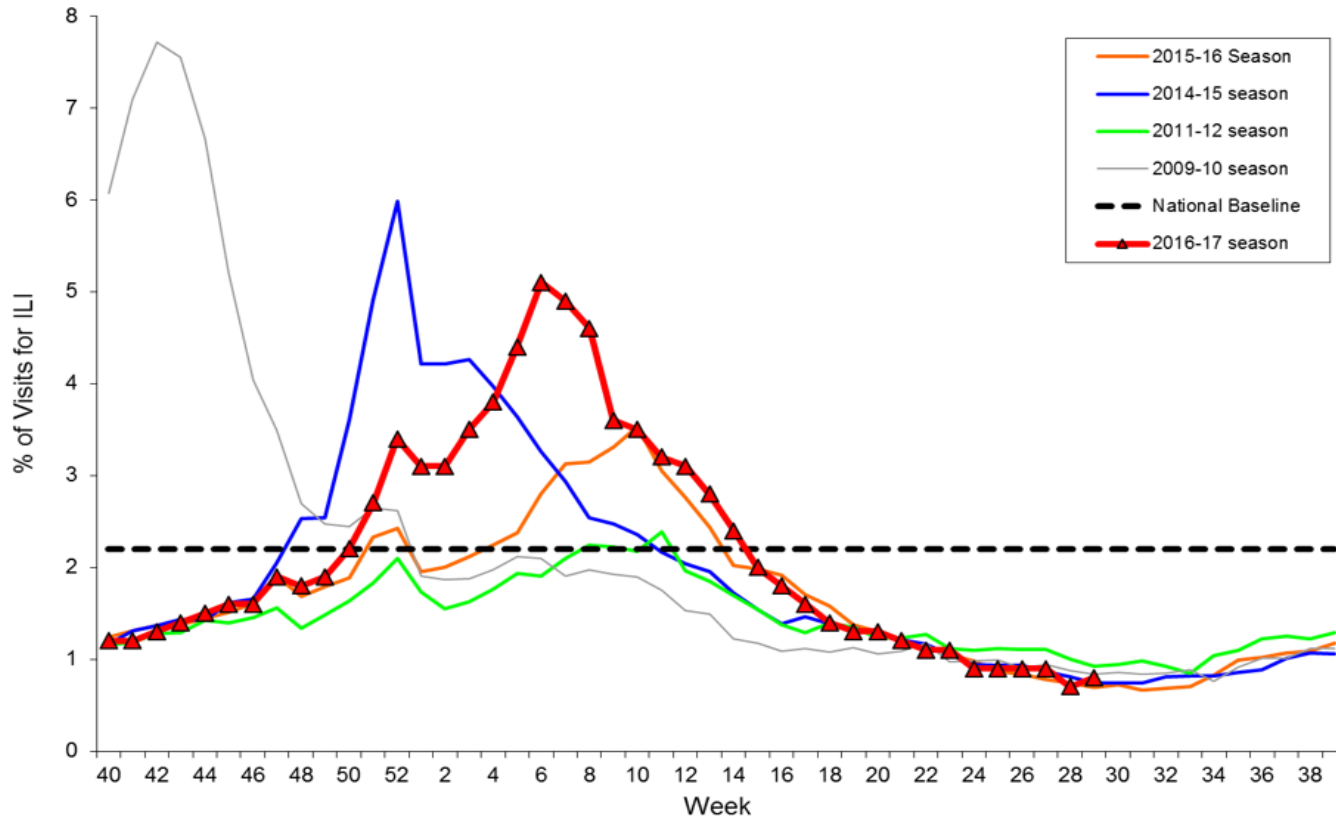
38 states met  
1/700 goal at  
least 1 week

# “Right Sizing” Virologic Surveillance (3)

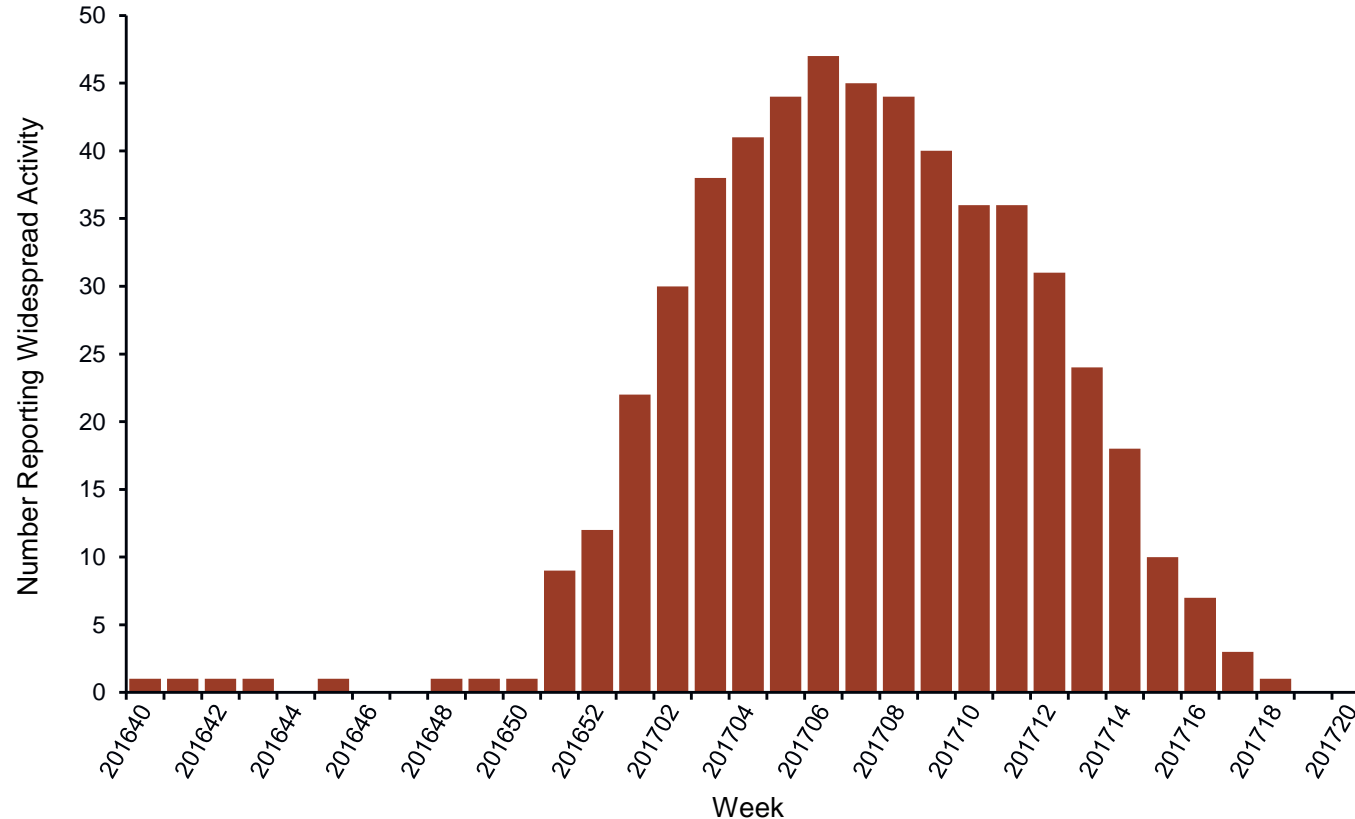
- Vaccine Strain Selection and Antiviral Resistance Detection
  - Detecting drift variants/antiviral resistance within each A subtype or B lineage
  - National goals: detect  $\geq 1$  drift variant or resistant virus if prevalence within subtype/lineage is  $\geq 3\%$  per month (vaccine strain selection) or  $\geq 5\%$  per month (antiviral resistance), respectively
  - Requires public health laboratories to submit to CDC 99 (vaccine strain selection) or 59 (antiviral resistance detection) influenza positives of each subtype/lineage per month

Month	A(H1N1)		A (H3N2)		B	
	Reported	Received	Reported	Received	Reported	Received
October 2016	44	21	417	115	55	31
November 2016	42	25	915	168	106	48
December 2016	90	41	3,701	225	277	95
January 2017	196	65	8,321	240	665	149
February 2017	265	89	9,890	226	1,797	190
March 2017	171	61	4,751	226	3,376	280
April 2017	35	14	762	88	1,674	170
May 2017	9	1	196	14	369	44

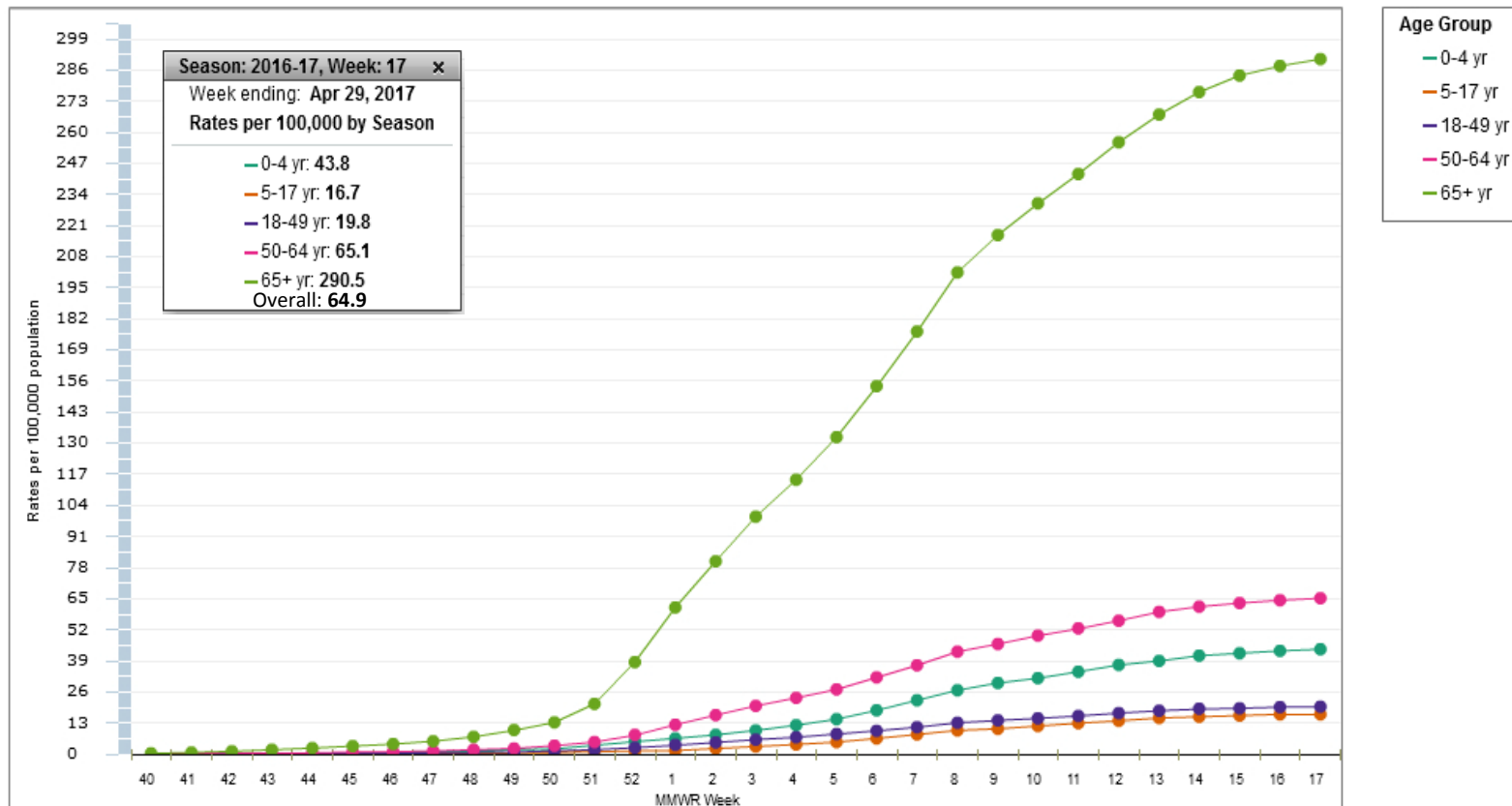
# Percentage of Visits for Influenza-like Illness (ILI), 2016-2017 and Selected Previous Seasons



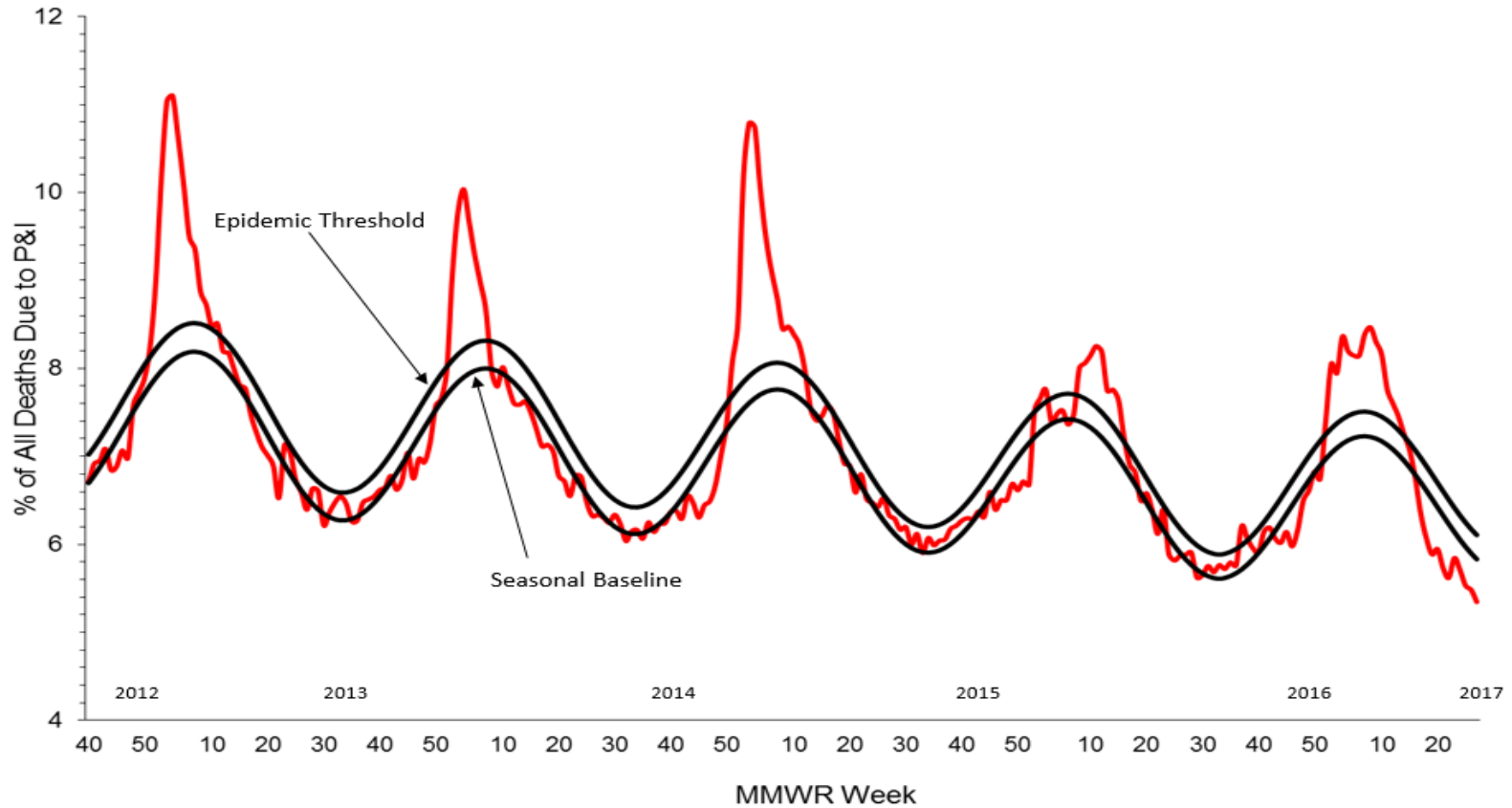
# Geographic Spread of Influenza Activity, 2016-2017 Season



# Laboratory-Confirmed Influenza-Associated Hospitalizations, Cumulative, October 1, 2016 – April 30, 2017



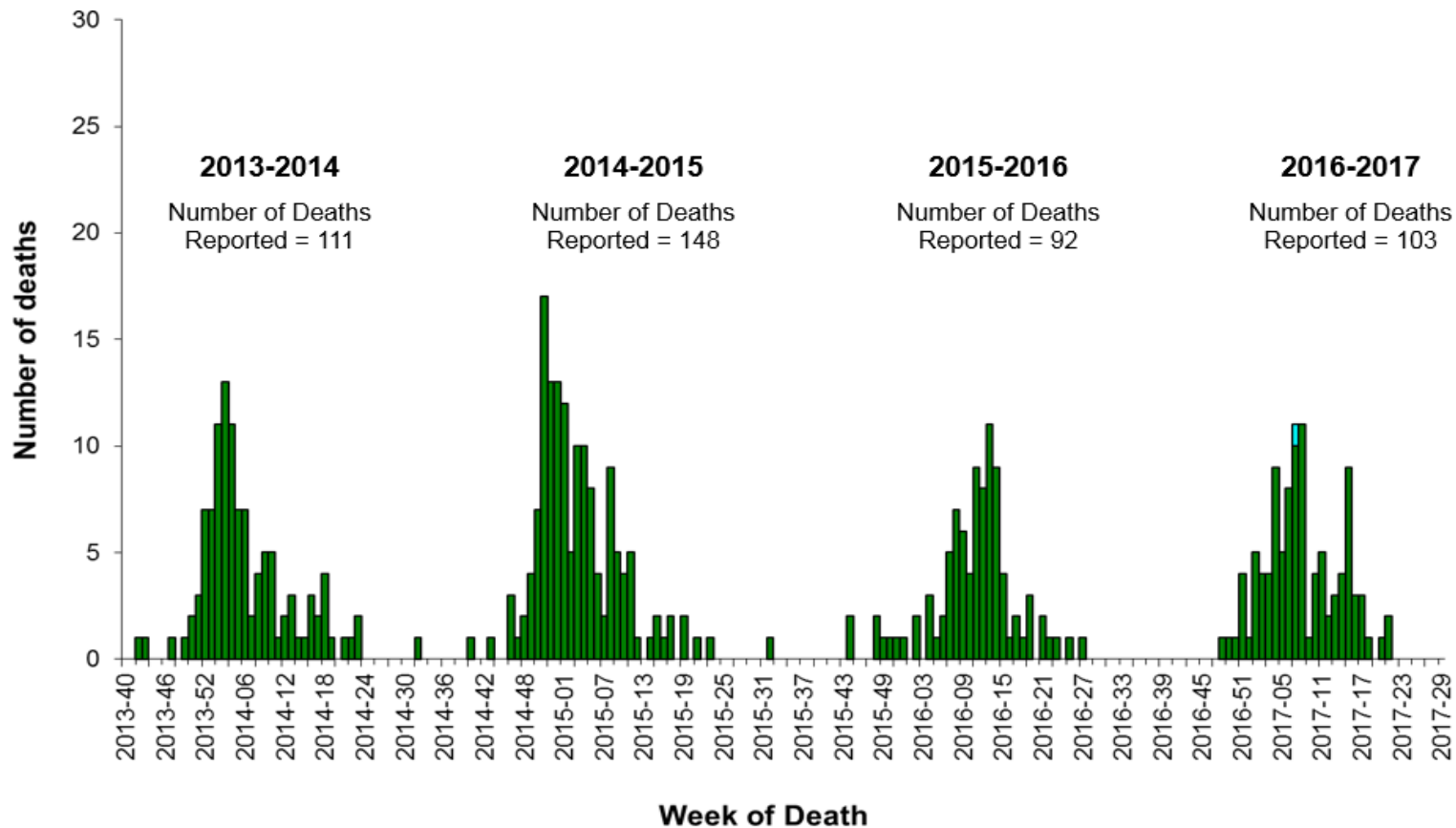
# Pneumonia and Influenza Mortality NCHS Mortality Surveillance System, September 30, 2012 – July 8, 2017





# Influenza-Associated Pediatric Mortality

## 2013-2014 to 2016-2017 Season



# **Novel Influenza A Virus Infections**

# Novel Influenza A Virus Infection: United States, 2016-17 Season <sup>(1)</sup>

- Human infection with an influenza A virus that is different from currently circulating human seasonal viruses
- 14 reported to CDC during 2016-17 season\*
- Influenza A (H7N2) – New York City
  - Not hospitalized, fully recovered
  - Close, prolonged, unprotected exposure to sick cats infected with H7N2
  - No human-to-human transmission
  - First H7N2 infection in humans in the U.S. since 2003
  - First known human infection with an influenza virus likely acquired through exposure to a cat

\* As of July 22, 2017

# Novel Influenza A Virus Infection: United States, 2016-17 Season

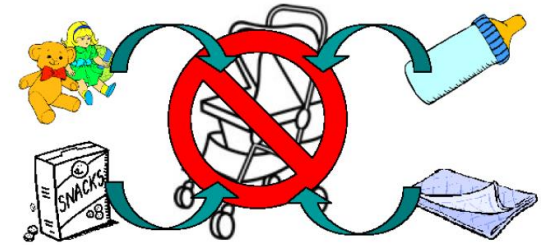
- 13 were variant virus infections
  - One influenza A (H1N2)v – Iowa
  - 12 influenza A (H3N2)v – Texas (1), Ohio (11)
  - Not hospitalized, fully recovered
  - Close contact with swine in week prior to illness onset
  - No human-to-human transmission

# CDC's Prevention Recommendations for People Attending Fairs

- People at high risk (<5 or 65+ years old, underlying conditions)
  - Avoid pigs and swine barns
- Non-high risk
  - Avoid eating, drinking and smoking in animal areas
  - Don't take toys, pacifiers, bottles, strollers etc. into animal areas
  - Wash hands often including before exiting
  - Minimize contact with any pigs
  - Avoid close contact with ill pigs
    - Take protective measures (PPE, hand washing) if you must come in contact with them
  - If you have a pig – call a vet if you suspect illness
  - Avoid contact with pigs if you have flu symptoms
    - If unavoidable then wear PPE



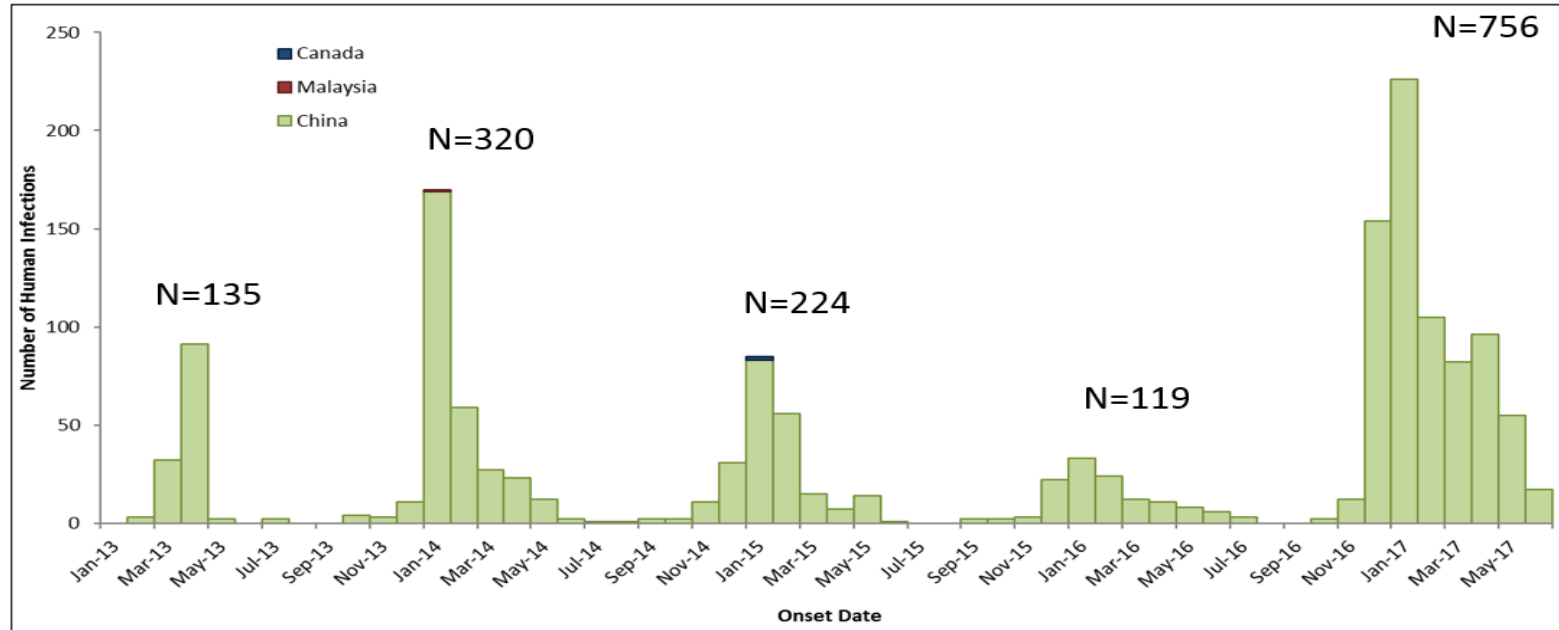
For your health and safety, please stow strollers here before entering



Please also store your child's toys, food, drinks, and blankets in the stroller

# Human H7N9 Infections in China

- Annual epidemics since 2013
- Most infections occurred after exposure to poultry
- No evidence of sustained person-to-person transmission
- Isolated reports of cases in other countries among travelers returning from China



# Recommendations for Clinicians and Public Health

- Clinicians
  - Consider the possibility of novel influenza A virus infection in persons with
    - ILI or ARI and recent contact with poultry or swine
    - OR—
    - Severe ARI after travel to areas where avian influenza viruses have been detected
  - Collect specimen if novel influenza A virus infection is suspected
  - Notify public health
- Public health
  - Arrange for specimen shipment
  - Perform testing
  - Notify CDC of any unsubtypeable influenza A or a presumptive novel virus
  - Collect epidemiologic and clinical data

# Influenza Vaccine Effectiveness



# U.S. Influenza Vaccine Effectiveness Network: Sites

**Kaiser Permanente  
Washington Health  
Research Institute**



**Marshfield Clinic  
Research Institute**



**University of  
Michigan**



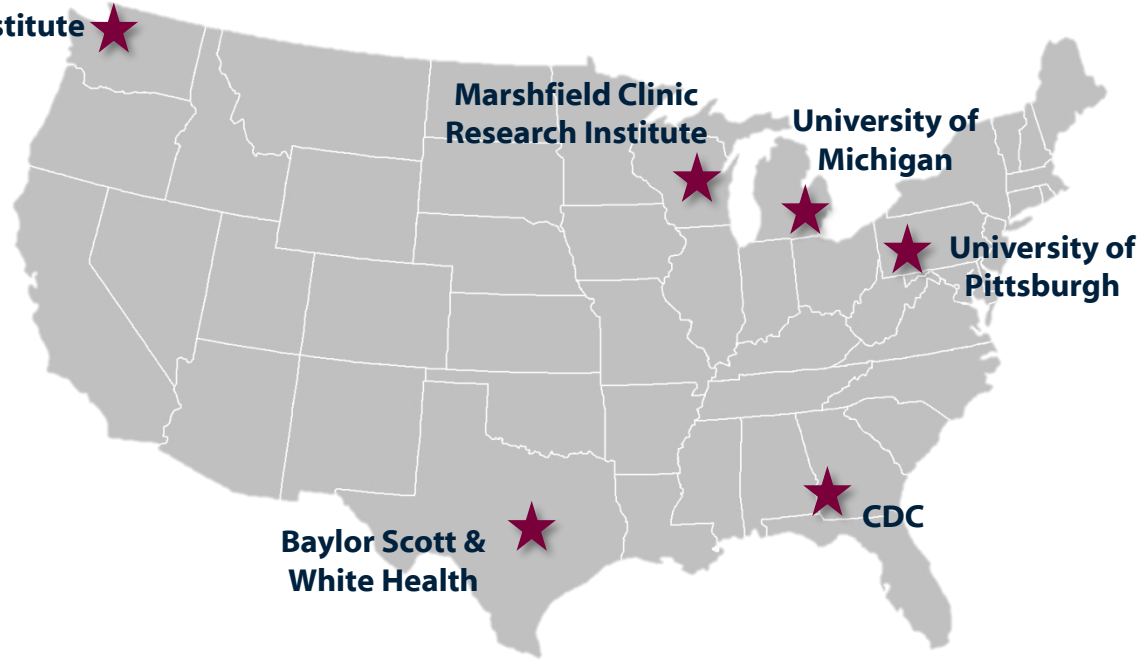
**University of  
Pittsburgh**



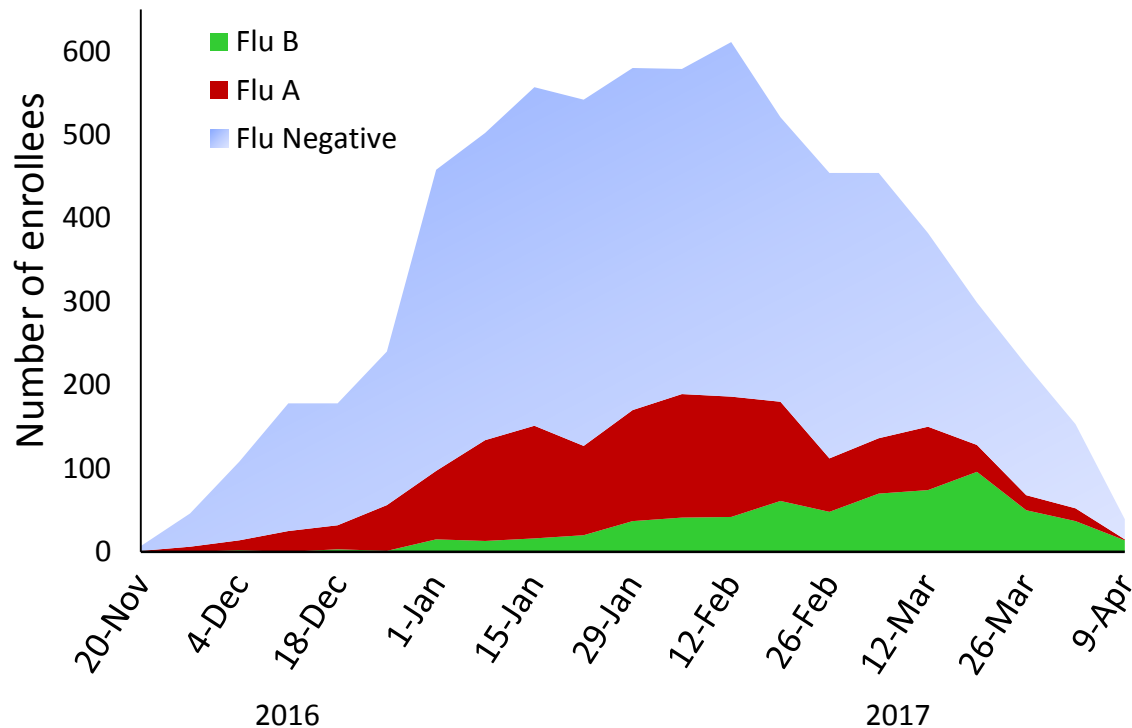
**Baylor Scott &  
White Health**



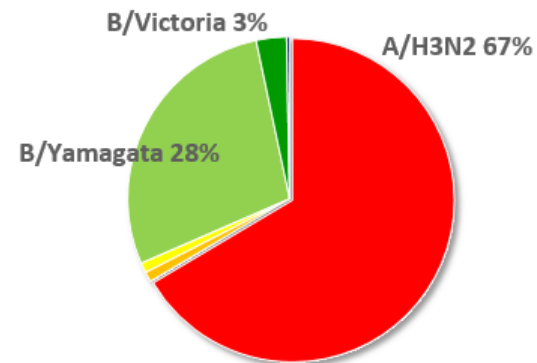
**CDC**



# U.S. Influenza Vaccine Effectiveness Network: Enrollment, 2016–17 (N=7205)



Cases by subtype (N=2052)\*



\* Cases in analytic dataset (after exclusions)

# U.S. Influenza Vaccine Effectiveness Network: Vaccine Effectiveness, 2016–17

	Influenza positive		Influenza negative		Vaccine Effectiveness			
					Unadjusted		Adjusted*	
	N vaccinated/Total (%)		N vaccinated/Total (%)		VE %	95% CI	VE %	95% CI
<b>Any influenza</b>	883/2052	(43)	2761/5153	(54)	35	(27 to 41)	<b>42</b>	<b>(35 to 48)</b>
<b>A/H3N2</b>	619/1349	(46)	2761/5153	(54)	27	(17 to 35)	<b>34</b>	<b>(24 to 42)</b>
<b>A/H1pdm09</b>	8/26	(31)	2761/5153	(54)	61	(11 to 83)	<b>54</b>	<b>(-11 to 81)</b>
<b>B</b>	238/650	(37)	2761/5153	(54)	50	(41 to 58)	<b>56</b>	<b>(47 to 64)</b>

\* Multivariate logistic regression models adjusted for site, age, sex, race/ethnicity, self-rated general health status, days from illness onset to enrollment, and calendar time of illness onset

# Estimated Number of Influenza Illness Averted with Vaccination

	<b>Averted Illnesses</b>	<b>Averted Medical Visits</b>	<b>Averted Hospitalizations</b>	<b>Averted P&amp;I Deaths</b>
2010-11 to 2015-16	1.6 - 6.7 million	793,000 – 3 million	39,300 – 86,700	1,230 – 3,430
2012-13*	5.6 million	2.7 million	61,500	1,820

\*An H3N2 predominant season with vaccine effectiveness similar to what was estimated for 2016-17.

# Summary

# Summary of 2016-2017 Season

- Activity was moderate with severity indicators within range of what has been observed during previous influenza A (H3N2) predominant seasons.
- Peak activity occurred nationally in mid-February but there were regional differences.
  - Western Regions (HHS regions 8, 9 and 10) peaked in late December through mid-January
  - Remainder of country (HHS regions 1-7) peaked in mid to late February
- Influenza A(H3N2) viruses predominated overall but influenza B viruses have been reported more frequently than influenza A viruses since late March.
- The majority of circulating viruses were similar to those contained in the 2016-17 vaccine.
- Vaccination reduced the overall risk for influenza-associated medical visits by 42%.
- Year round vigilance is needed for the possibility of novel influenza A virus infection.

# Questions?

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

