2017-18 Influenza Update

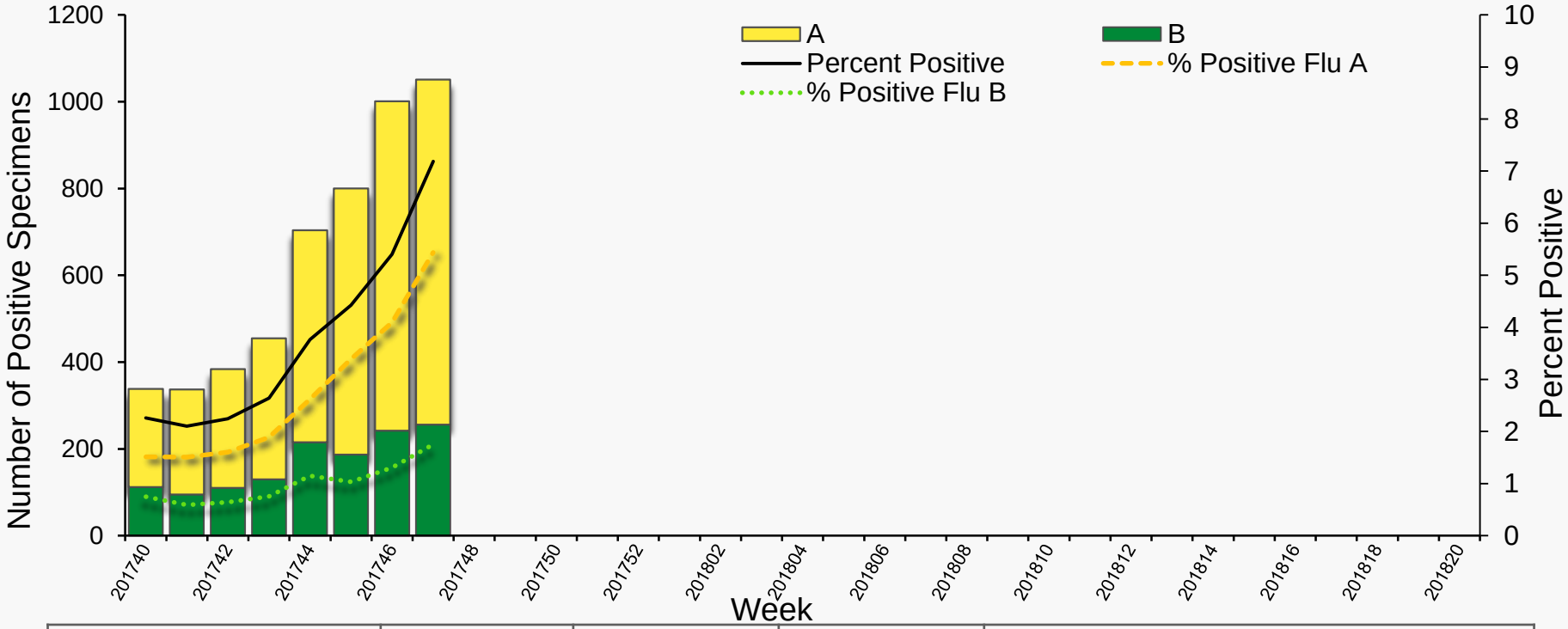
Alicia Fry

Influenza Division, CDC

Summit call

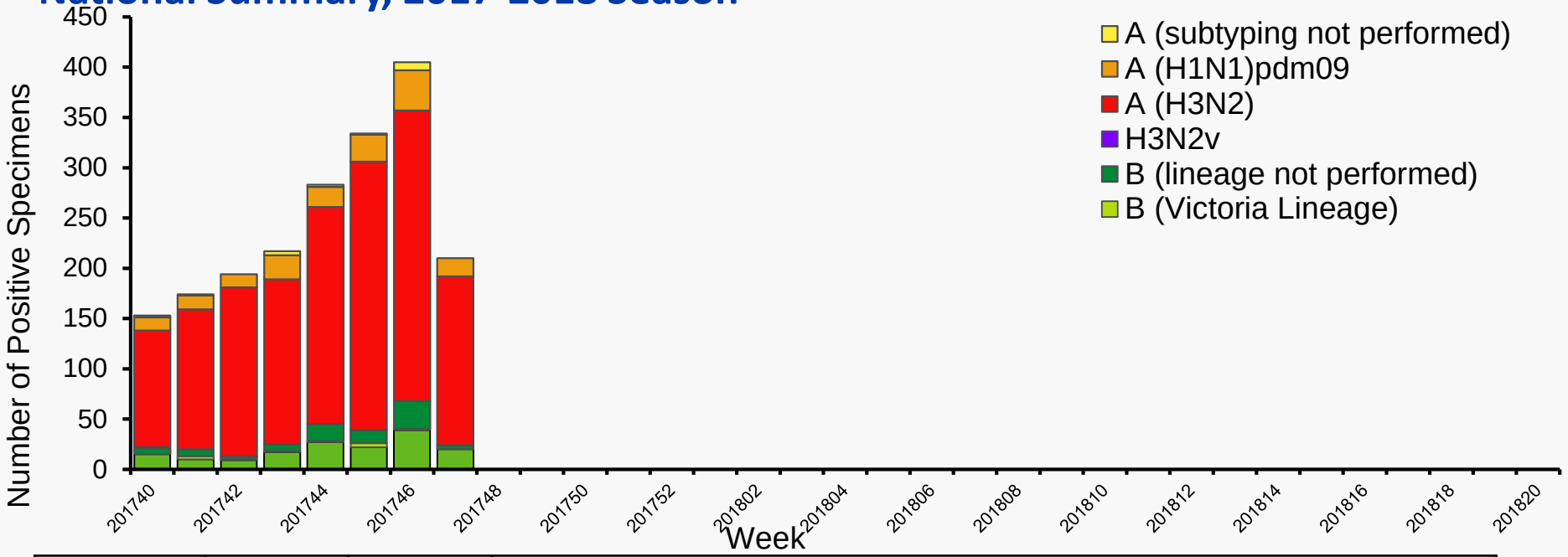
Dec 7, 2017

Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories, National Summary, 2017-2018 Season



	No. of specimens tested	No. positive specimens	% Positive	Positive specimens by type	
				Influenza A	Influenza B
Week 47	14,626	1,051	7.19%	795	256
Cumulative since Week 40	135,202	5,070	3.75%	3,723	1,347

Influenza Positive Tests Reported to CDC by U.S. Public Health Laboratories, National Summary, 2017-2018 Season

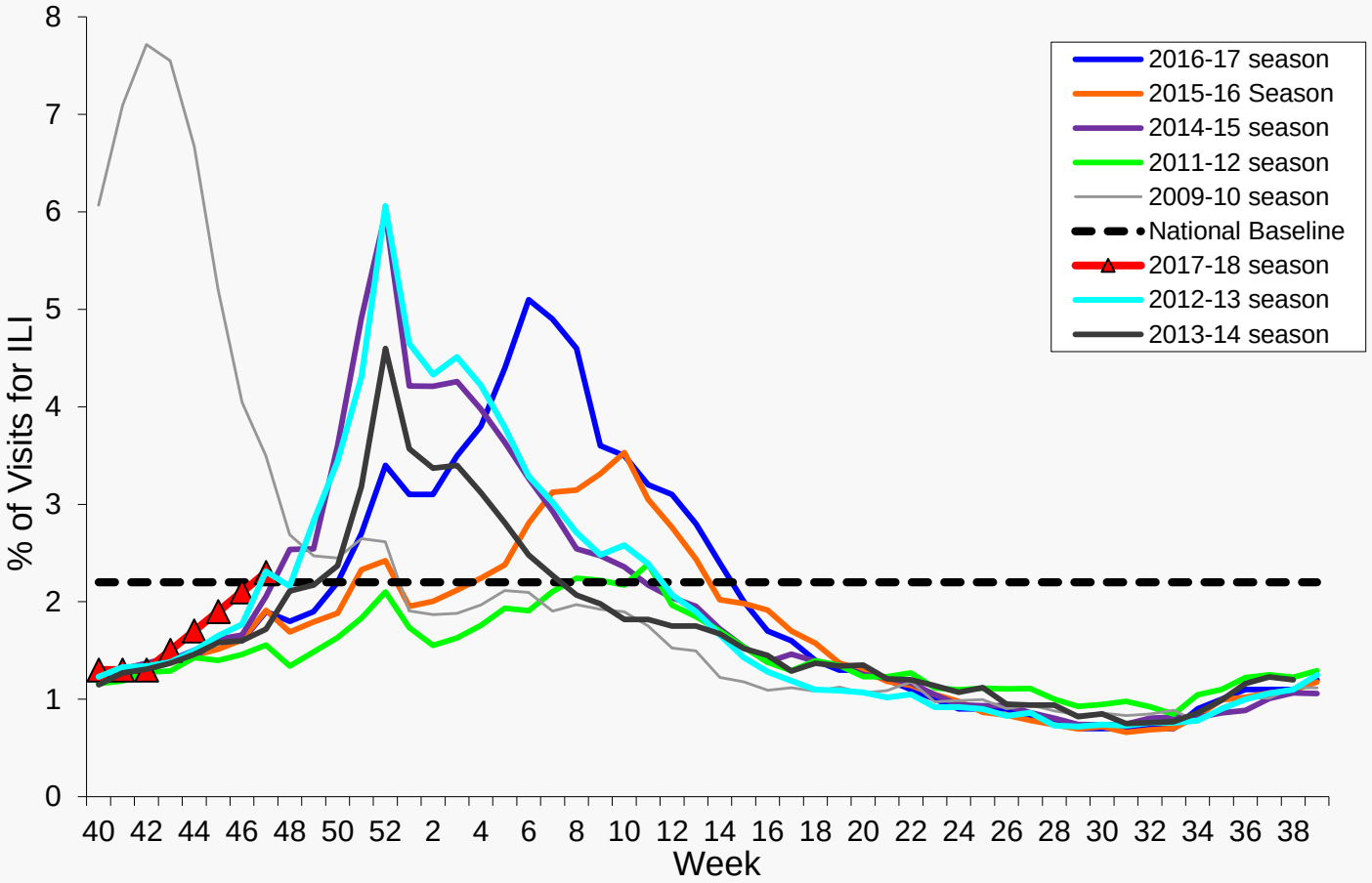


	No. of specimens tested	No. positive specimens	Positive specimens by type						
			A (Subtyping not performed)	A (H1N1) pdm09	A (H3)	A (H3N2v)	B (Lineage not performed)	B Victoria lineage	B Yamagata lineage
Week 47	642	210	0	18	168	0	4	0	20
Cumulative since Week 40	8,778	1,970	18	169	1,527	1	85	11	159

Antigenic and Genetic Characterization, Oct 2 – Nov 25, 2017

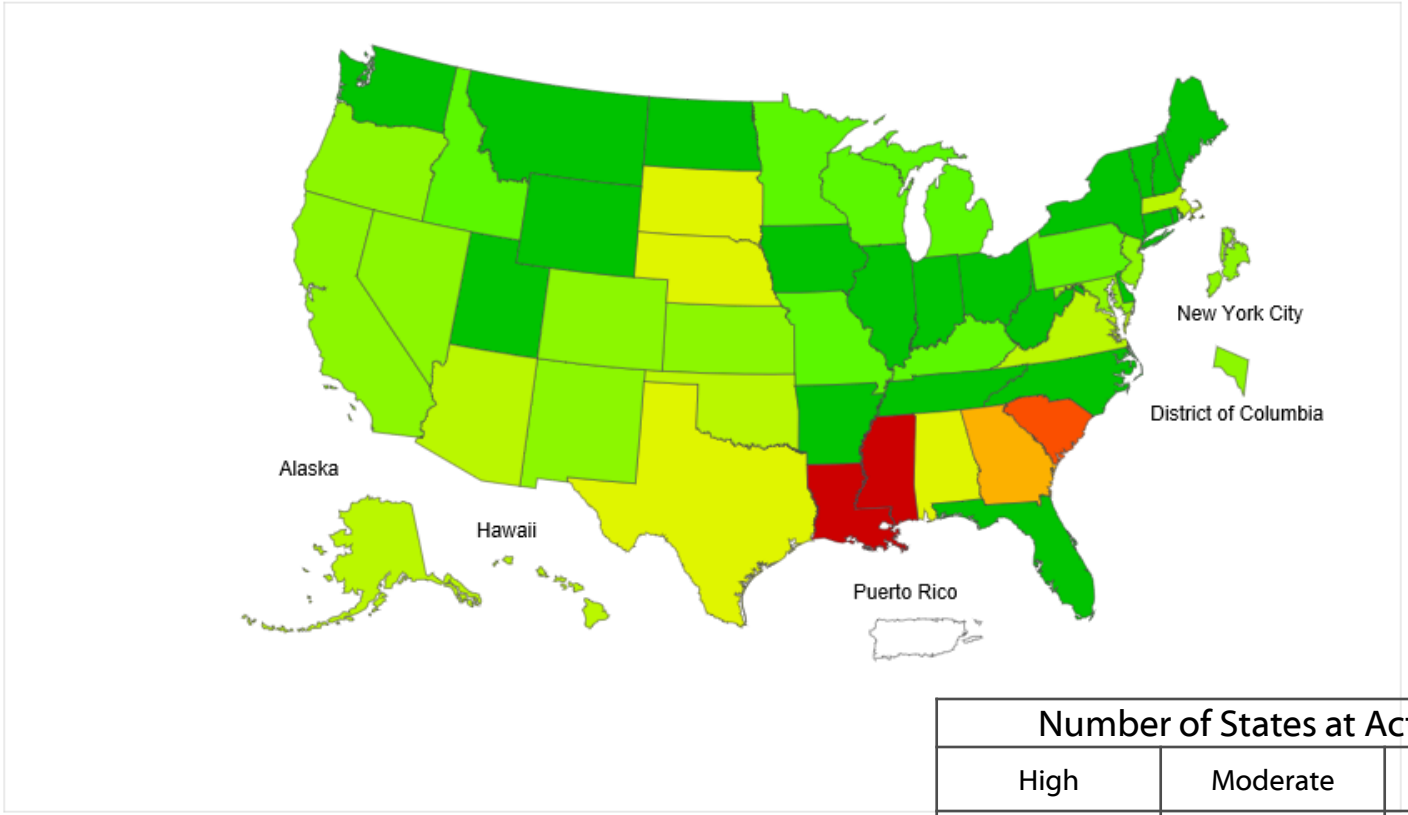
- **277 viruses submitted (38 H1NI, 187 H3N2, and 52 B viruses)**
- **A(H1N1)**
  - All 38 viruses belong to subclade 6B.1 and are antigenically similar to cell propagated vaccine virus
- **A(H3N2)**
  - 187 sequenced – HA belongs to clade 3C.2a or subclade 3C.2a1
  - 64 viruses were antigenically characterized and 63 (98%) well inhibited by antisera against cell propagated virus [Hence: No significant antigenic drift]
  - 45 (70%) well inhibited by antiserum against egg propagated virus
- **B viruses – almost all B/Yamagata (2 B/Victoria)**
  - 14 B/Yam viruses tested were antigenically similar to cell propagated vaccine virus

Percentage of Visits for Influenza-like Illness (ILI), 2017-2018 and Selected Previous Seasons



Influenza-Like Illness (ILI) Activity Level Indicator Determined by Data Reported to ILINet

2017-18 Influenza Season Week 47 ending Nov 25, 2017

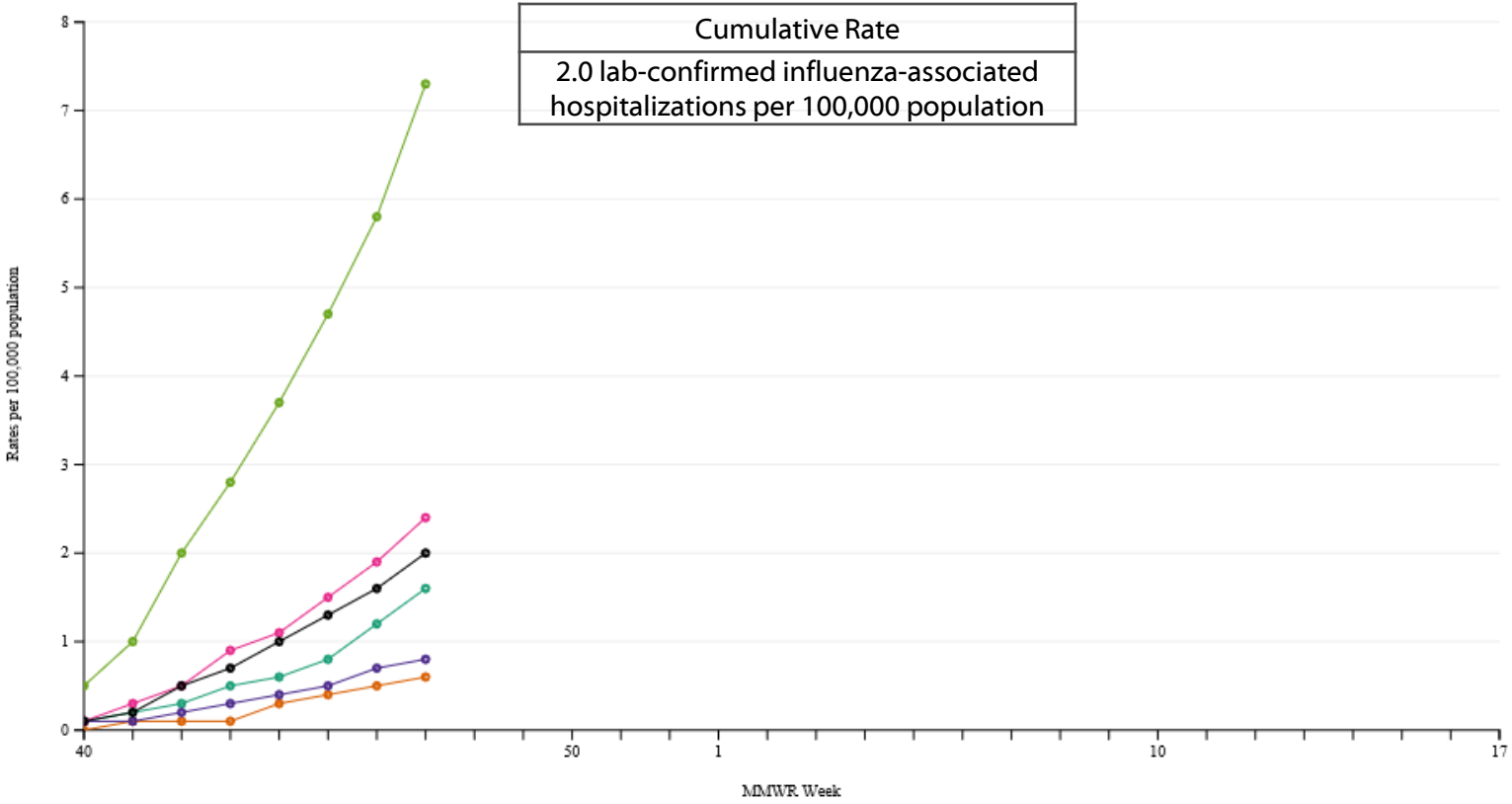


Number of States at Activity Level- Week 47			
High	Moderate	Low	Minimal
3 states	1 state	10 states	DC, NYC & 36 states

Laboratory-Confirmed Influenza Hospitalizations

Preliminary cumulative rates as of Nov 25, 2017

Cumulative Rate
2.0 lab-confirmed influenza-associated hospitalizations per 100,000 population



Age Selection

Overall

All Age Groups

0-4 yr

5-17 yr

18-49 yr

50-64 yr

65+ yr

FLUVIEW

Laboratory-Confirmed Influenza Hospitalizations

Preliminary cumulative rates as of Nov 25, 2017

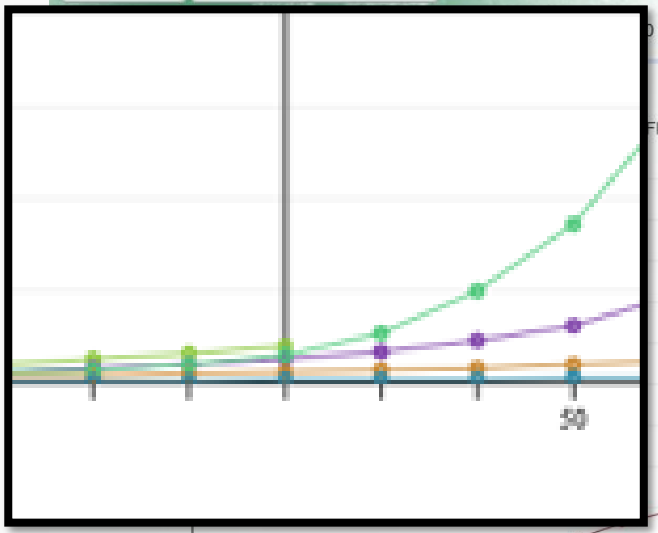
Display By ▾ | Select a Surveillance Area ▾

Group By: ○ Flu Season ◉ Age Group

Dow

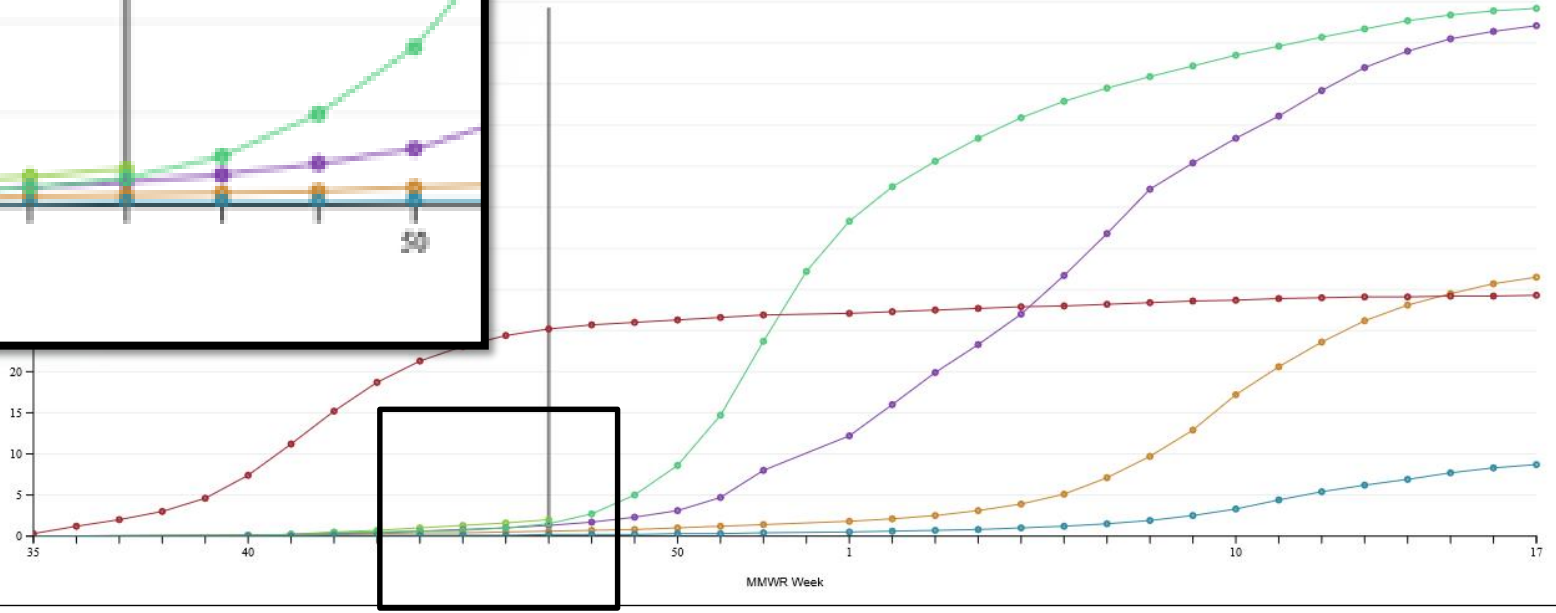
50 1 10 17 >>

Weeks



FluSurv-NET :: Entire Network :: Overall Age Group :: Cumulative Rate

Alt key + Click and drag to create rectangle to zoom/Double Clicks to reset zoom



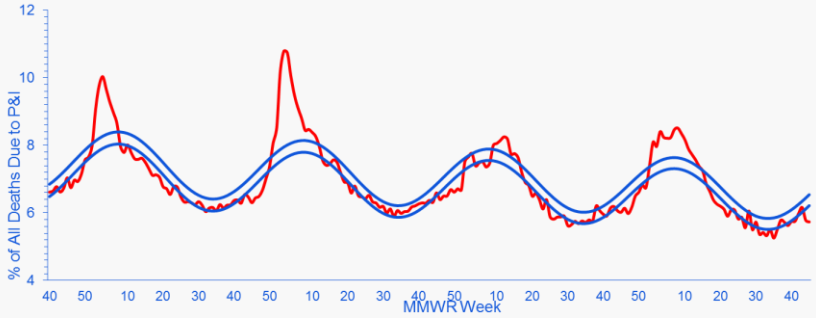
Age group: Overall, Week: 47

Rates per 100,000 by Age Group

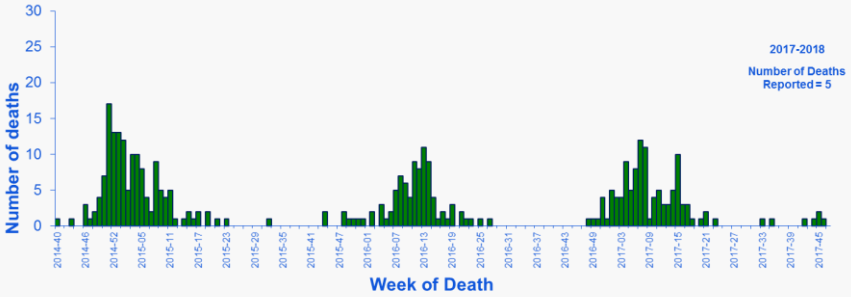
2017-18 **2** 2016-17 **1.3** 2015-16 **0.6** 2014-15 **1.5** 2011-12 **0.2** 2009-10 **25.2**

Morality Surveillance: 2016-2017 and Previous Seasons

- **Pneumonia and Influenza Mortality, National Center for Health Statistics**



- **Deaths in Children with Laboratory Confirmed Influenza**



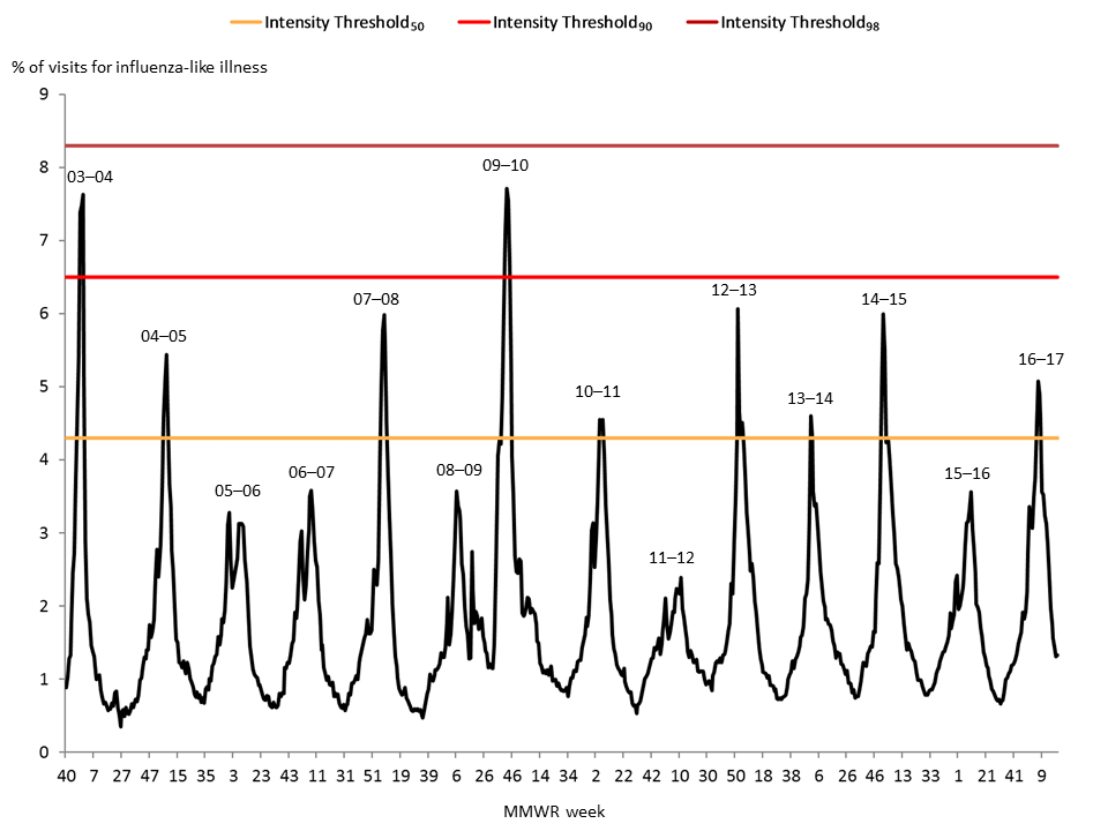
Review of 2016-17

Burden of seasonal influenza

Season	Illnesses	Medical Visits	Hospitalizations
2010--2011	21,100,000	9,960,000	282,000
2011--2012	9,230,000	4,300,000	139,000
2012--2013	35,600,000	16,600,000	593,000
2013--2014	28,400,000	12,600,000	322,000
2014--2015	34,300,000	16,200,000	707,000
2015--2016	24,600,000	11,100,000	308,000
2016--2017	31,100,000	14,500,000	602,000

https://www.cdc.gov/flu/about/disease/burden.htm

Severity of 2016-17 season compared to other seasons



very high

high

moderate

mild

2016-17 was of moderate severity

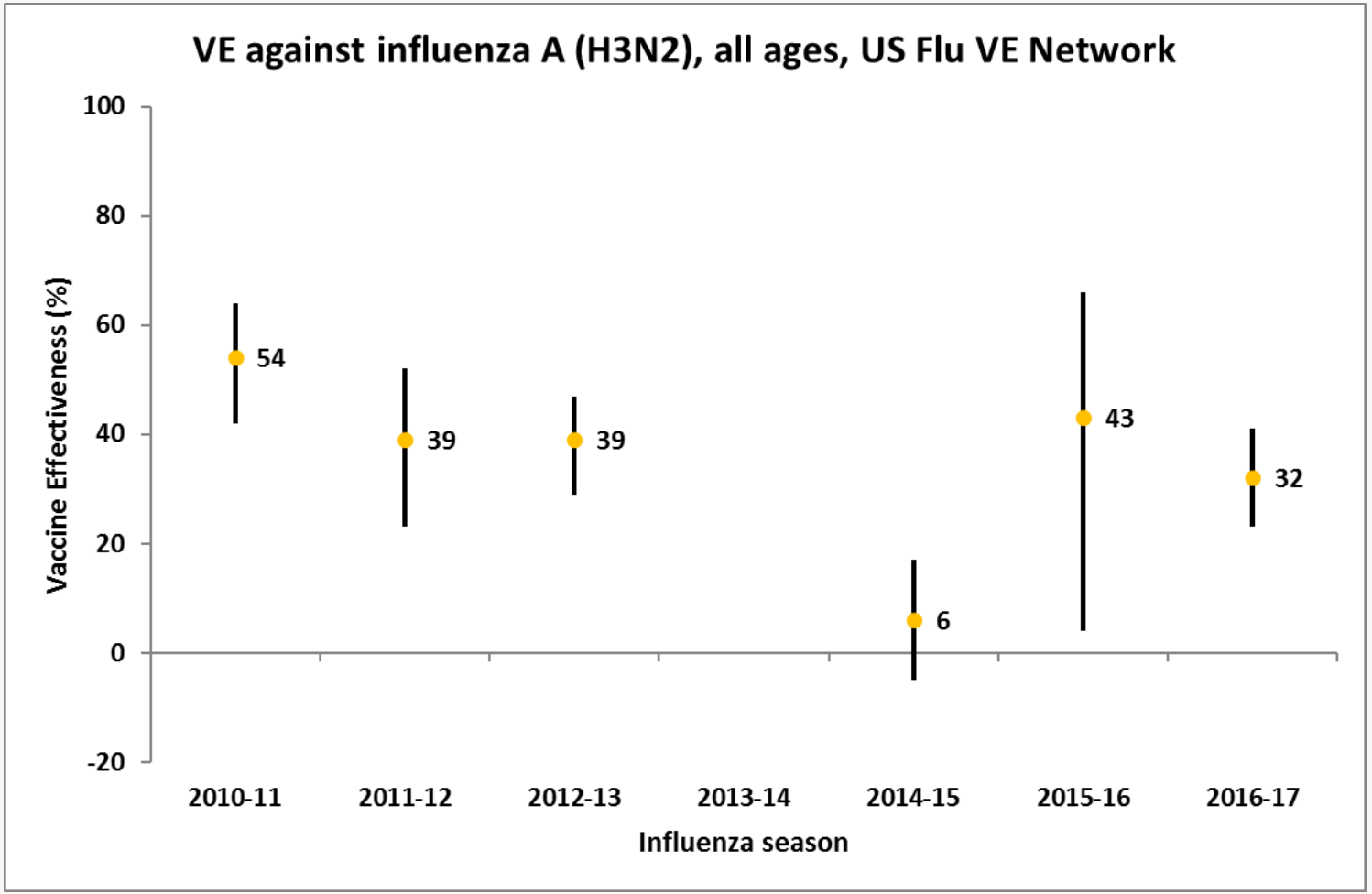
(similar to 2014-15 and 2012-13)

Biggerstaff, et al AJE

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
Any influenza	883/2052	(43)	2761/5153	(54)	35	(27 to 41)	**42**	**(35 to 48)**
A/H3N2	619/1349	(46)	2761/5153	(54)	27	(17 to 35)	**34**	**(24 to 42)**
A/H1pdm09	8/26	(31)	2761/5153	(54)	61	(11 to 83)	**54**	**(-11 to 81)**
B	238/650	(37)	2761/5153	(54)	50	(41 to 58)	**56**	**(47 to 64)**

* 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


VE against influenza A (H3N2), all ages, US Flu VE Network
Vaccine Effectiveness (%)
100
80
60
40
20
0
-20
54
39
39
6
43
32
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
Influenza season

Meta-analysis of TND observational studies conducted in ambulatory care settings 2004-2015

- Multi-year pooled vaccine effectiveness against influenza B viruses was 54%;
- Multi-year pooled vaccine effectiveness against influenza A(H1N1)pdm09 viruses was 61%;
- Multi-year pooled vaccine effectiveness against H3N2 viruses was 33%.

Belongia, et al Lancet ID

Estimated Number of Influenza Illness Averted with Vaccination

	Averted Illnesses	Averted Medical Visits	Averted Hospital-izations	Averted P&I Deaths
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.

2016-17 VE estimates from other countries

Southern Hemisphere (2017)

- Interim estimates:
  - Australia: All viruses: VE=33% (17, 46) ; H3N2 VE=10% (-16, 31)

Northern Hemisphere (2016-17)

- Final estimates
  - UK: all viruses: VE=39.8% (23, 53); H3N2 VE=32% (10, 48)
  - Europe hospital network/older adults (65yrs+): H3N2 VE=17% (1, 31)
- Interim estimates
  - Canada: All viruses: H3N2 VE=42% (18, 59)
  - Europe (IMOVE): H3N2 VE=38% (21, 51)

Sullivan, Eurosurveillance; Pebody, Eurosurveillance; Rondy, Eurosurveillance Skowronski Eurosurveillance; Kissling Eurosurveillance

Summary

- In the United States, flu activity began to increase in early November and continued to increase through November.
  - So far, influenza A(H3N2) viruses have been predominant in the United States but it is too early to know what will happen this season
  - No evidence for antigenic drift of circulating viruses compared to cell-propagated vaccine viruses (the number of viruses characterized is small)
  - A small percentage of H3N2 viruses were not well inhibited by antisera against egg-propagated viruses
- In the past, H3N2-predominant seasons have been associated with greater severity, especially among young children and older adults.

Summary

- Vaccine effectiveness (VE) against H3N2 viruses has typically been lower than against influenza H1N1 and influenza B viruses.
  - Last year VE against H3N2 was 32% in the US VE Network (consistent with previous seasons and most other published estimates)
  - Reasons VE against H3N2 are lower than H1N1 and B are likely multifactorial but egg adaptation changes in vaccine viruses likely play a role
    - Compared to H1N1 and B, egg adaptation changes in H3N2 are more complex and likely to have antigenic implications
- This season's flu vaccine includes the same H3N2 vaccine component as last season. Based on current data, CDC believes US estimates from last season are likely to be the best predictor of what might happen if H3N2 viruses continue to predominate without antigenic drift
- Vaccination is still the best way to prevent infection
  - Thousands of hospitals are averted by vaccines even in H3N2 seasons

Influenza Vaccine Update

2017-18 ACIP Influenza Statement--Overview

- **Published in MMWR August 25, 2017***
- **New Format**
  - MMWR document focuses on recommendations and selected references; contains figure and tables
  - Background Document with additional references and a Summary of recommendations available on ACIP web pages
  - Core recommendation remains the same: annual influenza vaccination is recommended for all persons aged ≥6 months who do not have contraindications

*MMWR 2017;66(No. RR-2):1–20.

2017-18 ACIP Influenza Statement--Overview

- **Principal changes and updates for 2017-18**
  - Influenza vaccine composition for 2017-18
  - Several new licensures/licensure changes
  - Updated recommendations for pregnant women
  - Change in age recommendations for Afluria (IIV3)
  - Extension of the recommendation that LAIV not be used

2017-18 Influenza Vaccine Composition

- **Trivalent vaccines:**
  - an A/Michigan/45/2015 (H1N1)pdm09-like virus (updated);
  - an A/Hong Kong/4801/2014 (H3N2)-like virus; and
  - a B/Brisbane/60/2008-like virus.

- **Quadrivalent vaccines:**
  - The above three viruses, and
  - a B/Phuket/3073/2013-like virus.

New Licensures—Afluria Quadrivalent

- **Standard-dose IIV4 (Seqirus)**
- **Licensed in August 2016,**
  - Initially for persons aged ≥18 years
  - Now for persons aged ≥5 years
- **Intramuscular**
  - Like Afluria, can be administered via jet injector (the Pharmajet Stratis), but only for those aged 18 through 64 years
- **Trivalent formulation of Afluria also available this season**
  - Both Afluria and Afluria Quadrivalent are licensed for ≥5 years

New Licensures—Flublok Quadrivalent

- RIV4 (Protein Sciences)
- Licensed in October 2016 for persons aged ≥18 years, though not available until the 2017-18 season
- Hemagglutinin produced in insect cell line using a viral vector
- Egg-free
- Previous trivalent formulation of Flublok (RIV3) also expected to be available

Change in Licensure—FluLaval Quadrivalent

- **Standard-dose IIV4 (GSK)**
- **Previously licensed for ages ≥3 years; since November 2016 licensed for ≥6 months**
  - One of only two influenza vaccines approved for children 6 through 35 months of age
- **Dose volume is same as that for all ages (0.5mL)**
  - Previously 6 through 35 month-olds recommended to receive smaller doses of influenza vaccines than older persons
  - Recommendation based on increased reactogenicity of older, whole-virus vaccines
  - Split virus vaccines less reactogenic in this age group
  - FluLaval Quadrivalent 0.5mL safety comparable to 0.25mL Fluzone Quadrivalent

Things to Consider with FluLaval Quadrivalent

- **Potential for confusion**
  - The one other product licensed for 6-through 35 month olds is 0.25mL Fluzone—dose volumes are different for this age group.
  - ***Dose volume*** is distinct from ***number of doses*** needed:
    - A child aged 6 months through 8 years who needs 2 doses—
    - (for example, if a first-time vaccinee)—
    - and who gets 0.5mL FluLaval Quadrivalent for a first dose—
    - *Still* needs a second dose of influenza vaccine, ≥4 weeks later

Influenza Vaccination of Pregnant Women

- **Influenza vaccination recommended by ACIP for women who will be pregnant during influenza season since 2004**
  - Increased risk for severe influenza illness in pregnant women, particularly during second and third trimesters;
- **Previous language stated pregnant women should receive inactivated influenza vaccine (IIV)**
- **For 2017-18, pregnant women may receive any licensed, recommended, age-appropriate influenza vaccine**
  - IIV or RIV
  - LAIV not recommended in any population for 2017-18, and should not be used in pregnancy in any case (because it is a live virus vaccine)

Age Recommendation for Afluria (IIV3)

- **Afluria is licensed by FDA for persons aged ≥5 years.**
- **From 2010-11 through 2016-17 ACIP recommended only for ≥9 years**
  - Febrile seizures/reactions in Australia during 2010 season
- **February 2017: ACIP reviewed manufacturer data concerning investigation and resulting manufacturing changes**
  - Putative root cause: lipid and RNA complexes following splitting of A(H1N1)pdm09 and B viruses
  - A(H1N1)pdm09 and B viruses split with lower concentration of detergent (taurodeoxycholate, or TDOC) than A(H3N2)--(0.9% and 0.5% vs. 1.5%)
  - Reactogenicity diminished Increasing TDOC concentration to 1.5% for all three viruses
- **For 2017-18, ACIP recommends Afluria for ≥5 years**

LAIV Recommendations for 2017-18

- **LAIV4 not recommended for use during the 2017-18 season**
  - Recommendation extended from 2016-17 season
  - Due to concerns regarding low effectiveness against influenza A(H1N1)pdm09 viruses during 2013-14 and 2015-16
  - ACIP will consider new data concerning LAIV as it becomes available

Things That are Unchanged for 2017-18

- **There are many vaccine options, no preferential recommendation**
- **Dosing algorithm for children aged 6 months through 8 years**
  - Similar to past two seasons
- **Timing of vaccination**
  - Before end of October
- **Egg allergy algorithm**
  - No longer printed in the MMWR
  - Available on the CDC Web Pages at: http://www.cdc.gov/flu/protect/vaccine/egg-allergies.htm

Thank You!

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

Acknowledgements

Lisa Grohskopf
Lynnette Brammer
Alicia Budd
Brendan Flannery
Carrie Reed
Vivian Duggar
Doug Jordan
Erin Burns
Jerry Tokar
Jackie Katz