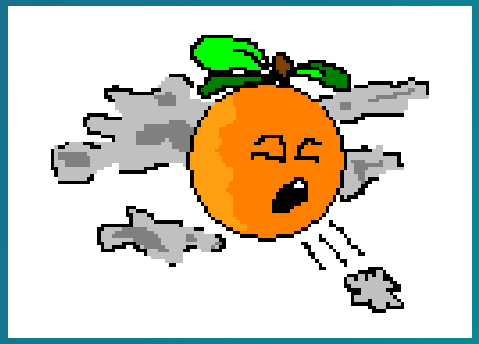
What's New in Chasing Flu

2018



January 10, 2018

Michele Cheung, MD MPH, FAAP
Deputy Medical Director, Epidemiology
Physician Specialist, Infectious Disease Preparedness,
Health Disaster Management

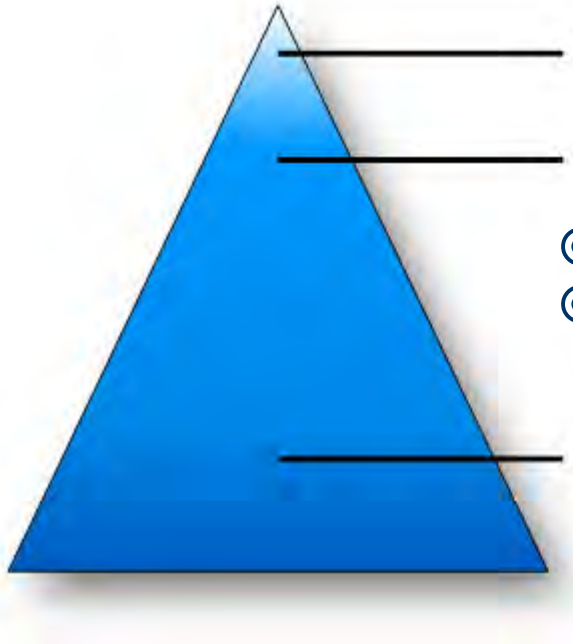
Objectives

Participants will be able to:

- Describe trends in recent influenza activity
- Summarize available tools to fight and prevent influenza
- Review progress to a universal influenza vaccine
- Identify elements of pandemic planning

Annual Impact of Seasonal Influenza

- Influenza is not a reportable disease, but causes substantial morbidity and mortality



Deaths: 12,000 – 56,000

Hospitalizations: 140,000 – 710,000

- About 50% in those >64 years
- Risk of hospitalization for children <2 years similar to elderly

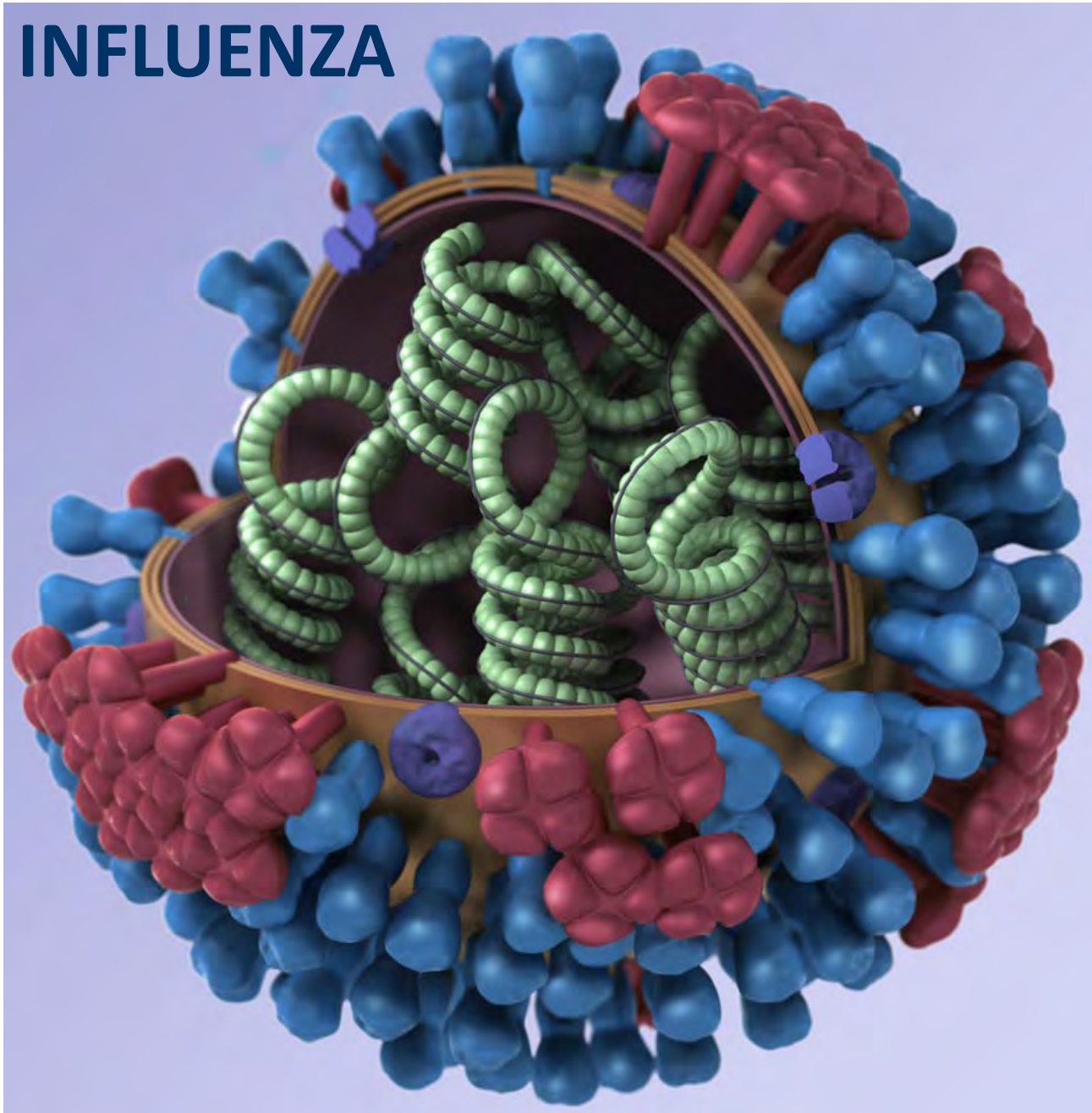
Cases: 9,200,000 – 35,600,000

- 2.5-20% of population ill
  - Highest rates in children (up to >30%)

- Substantial economic impact (~$87.1 billion annually)
  - Includes medical costs, projected lost earnings due to illness and loss of life

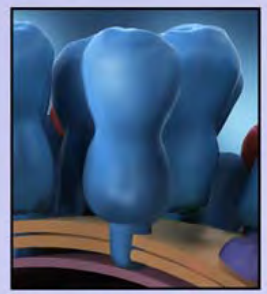
http://www.cdc.gov/flu/about/disease/burden.htm; http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm; Vaccine. 2007 Jun 28;25(27):5086-96. Epub 2007 Apr 20.

INFLUENZA



www.cdc.gov/flu

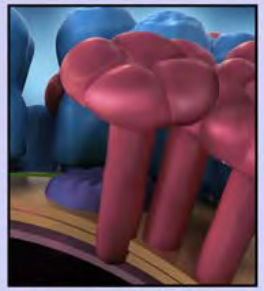
(H)



Hemagglutinin

binding of virus to target cell; entry (fusion of membrane) into cell

(N)



Neuraminidase

viral penetration and release; virulence

M2 Ion Channel

Only on type A; ion channel; replication

RNP

Influenza Type A

- moderate to severe illness in humans & animals (birds, swine, horses)
- affects all age groups
- frequent genetic mutations
- subtyped based on H and N
- all subtypes of type A can affect birds; H1 and H3 affect pigs

Influenza Virus Type B

- Usually less severe illness
- Affects only humans, primarily children
- Not subtyped
- Two lineages – Victoria and Yamagata

Hemagglutinin subtype

Influenza type

Year of isolation

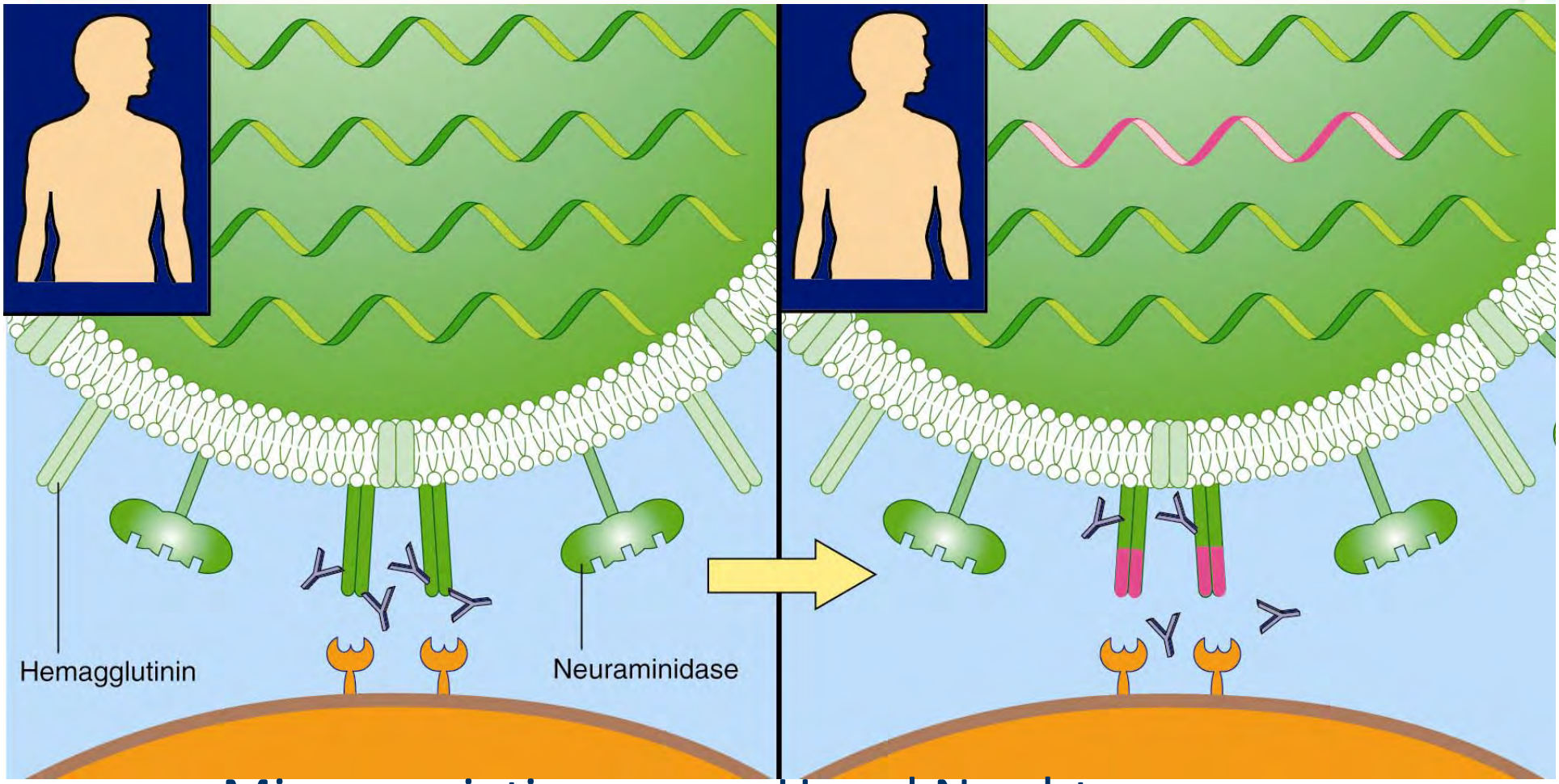
A/California/07/2009 (H1N1)

Geographic source

Isolate number

Neuraminidase subtype

Annual Epidemics -- Drift



Minor variation; same H and N subtypes

Causes annual epidemics (“seasonal flu”)

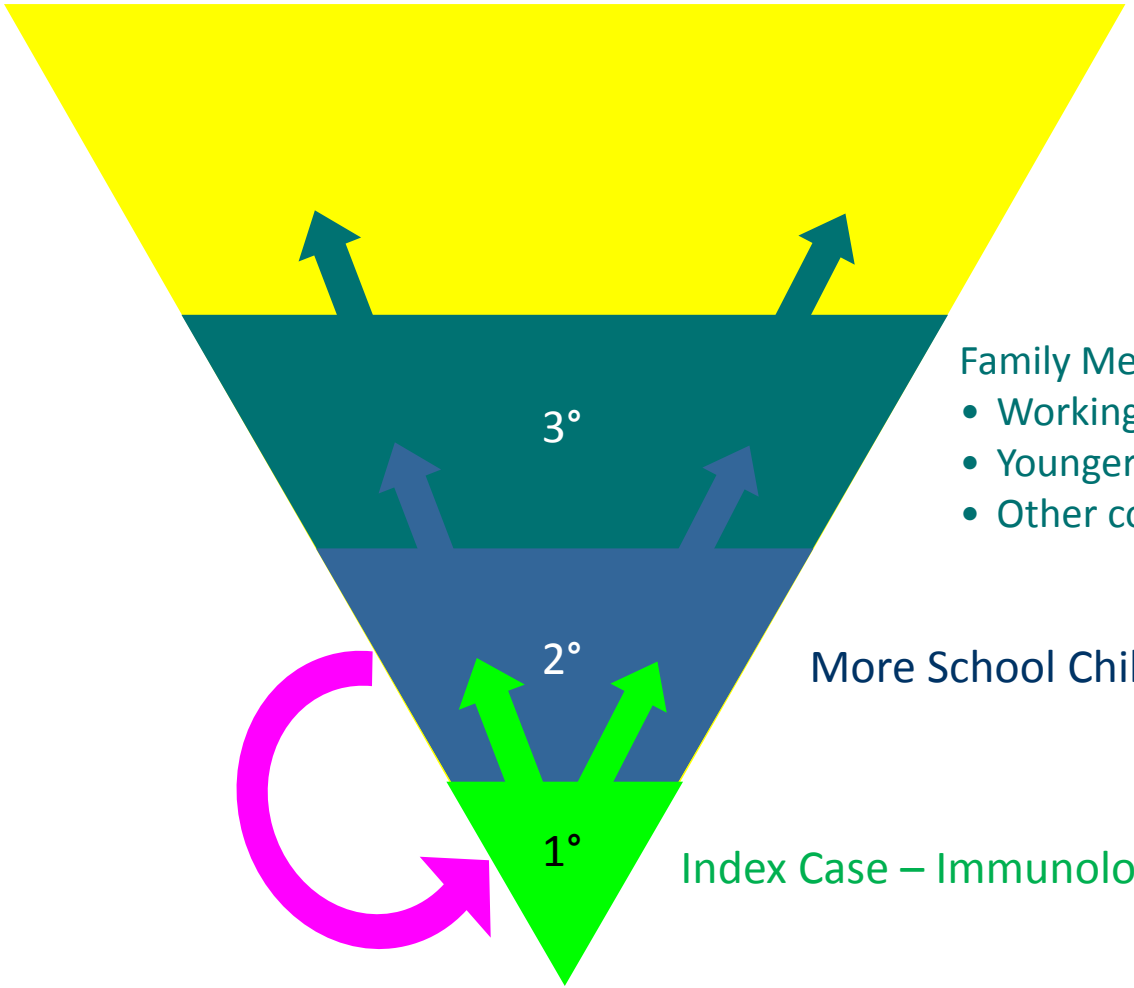
Transmission of Influenza

http://www.virology.ws/2009/04/29/influenza-virus-transmission/

Transmission of Seasonal Influenza

- Person-to-person
- Mainly through large respiratory droplets
- Direct contact with respiratory secretions
- Incubation period 1-4 days
- Infectious from 1 day before to 5 days after symptom onset
- Children and immunocompromised hosts shed virus for longer period

Transmission of Influenza



Community at Large
- Persons at increased risk of complications
- Community-dwelling elderly
- Social contacts of 1°, 2°, and 3° cases

Family Members of School Children
- Working adults (parents)
- Younger siblings
- Other contacts

More School Children Infected

Index Case – Immunologically Naïve Schoolchild

Elveback LR et al. *Am J Epidemiol.* 1976;103:152-165.

Symptoms of Influenza

***Flu-like symptoms typically include:**

- A 100°F or higher fever or feeling feverish/chills
  AND one or more:
- Cough
- Sore throat
- Headaches and/or body aches
- Difficulty breathing or shortness of breath
- Fatigue
- A runny or stuffy nose

- Vomiting and diarrhea may also occur, especially in children

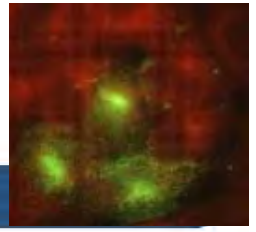
Influenza Virus Testing Methods

Method[1]	Types Detected	Acceptable Specimens[2]	Test Time	CLIA Waived[3]
Rapid Influenza Diagnostic Tests[4] (antigen detection)	A and B	NP[5] swab, aspirate or wash, nasal swab, aspirate or wash, throat swab	<15 min.	Yes/No
Rapid Molecular Assay [influenza viral RNA or nucleic acid detection]	A and B	NP[5] swab, nasal swab	<20 minutes[6]	Yes/No[6]
Immunofluorescence, Direct (DFA) or Indirect (IFA) Florescent Antibody Staining [antigen detection]	A and B	NP[4] swab or wash, bronchial wash, nasal or endotracheal aspirate	1-4 hours	No
RT-PCR[7] (singleplex and multiplex; real-time and other RNA-based) and other molecular assays [influenza viral RNA or nucleic acid detection]	A and B	NP[5] swab, throat swab, NP[5] or bronchial wash, nasal or endotracheal aspirate, sputum	Varies (1 to 8 hours, varies by the assay)	No
Rapid cell culture (shell vials; cell mixtures; yields live virus)	A and B	NP[5] swab, throat swab, NP[5] or bronchial wash, nasal or endotracheal aspirate, sputum; (specimens placed in VTM[8])	1-3 days	No
Viral tissue cell culture (conventional; yields live virus)	A and B	NP[5] swab, throat swab, NP[5] or bronchial wash, nasal or endotracheal aspirate, sputum (specimens placed in VTM8)	3-10 days	No

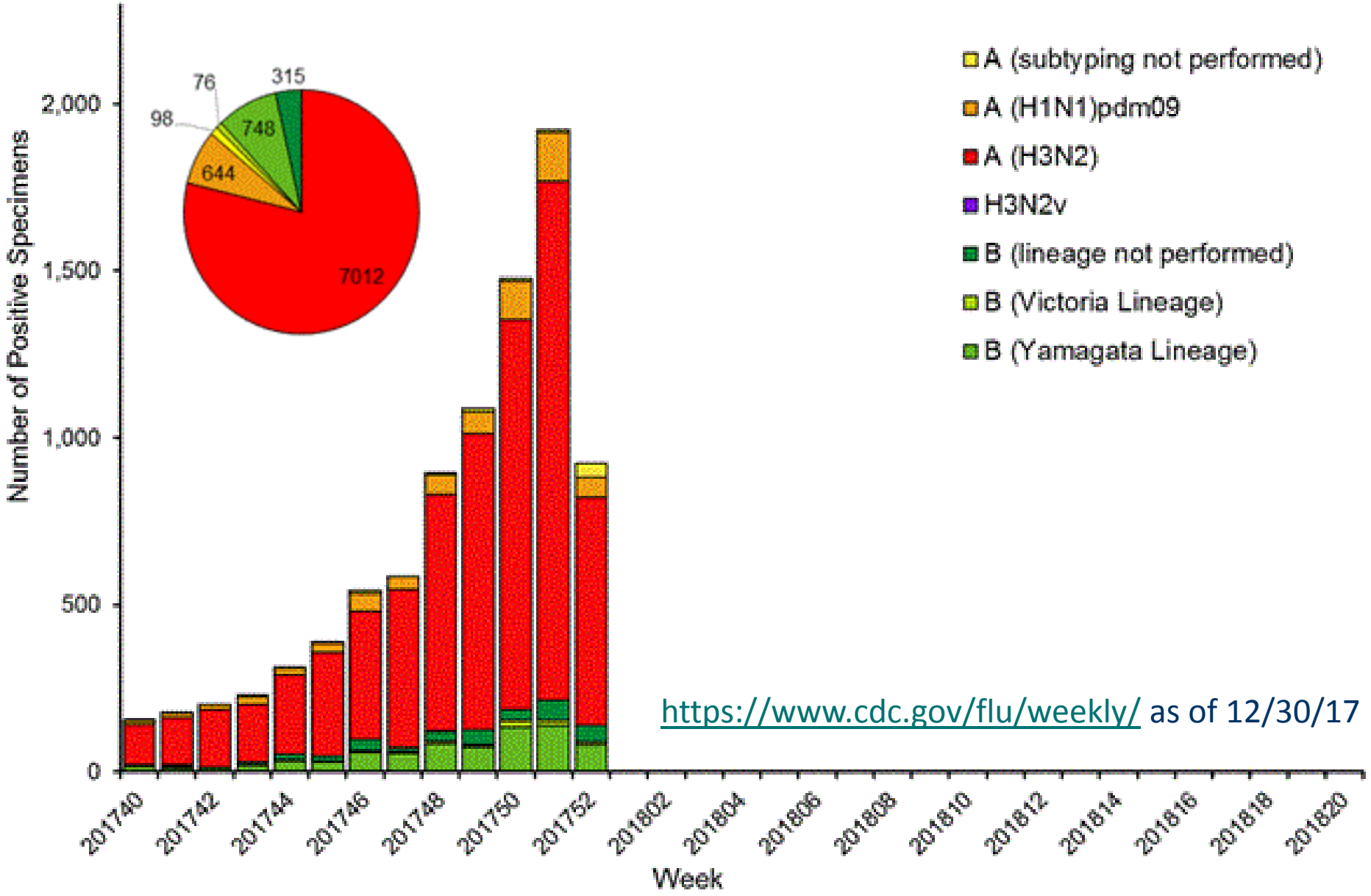
https://www.cdc.gov/flu/professionals/diagnosis/table-testing-methods.htm

Diagnosis

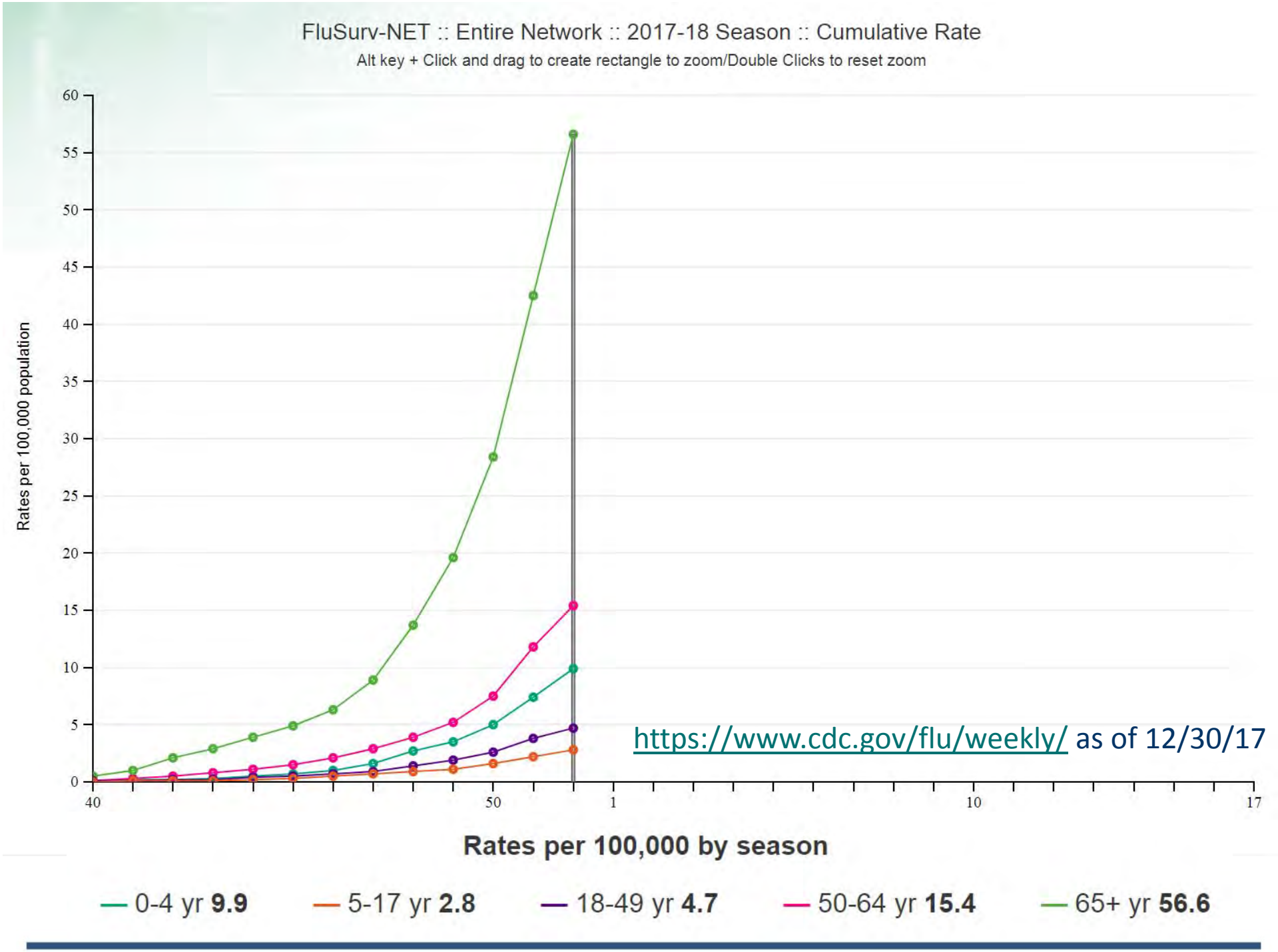
- Rapid influenza antigen tests and Immunofluorescence (DFA or IFA):
  - False negatives
    - RIDT sensitivities 50-70% c/w PCR or culture
  - False positives also (less common)
    - RIDT specificities 90-95%
  - Confirm with PCR
- Polymerase Chain Reaction (PCR)
  - PCR for influenza A and influenza B
  - Can subtype A H1 and A H3
- Do not delay antiviral treatment for test results
- Negative rapid antigen or FA test does not rule out influenza



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



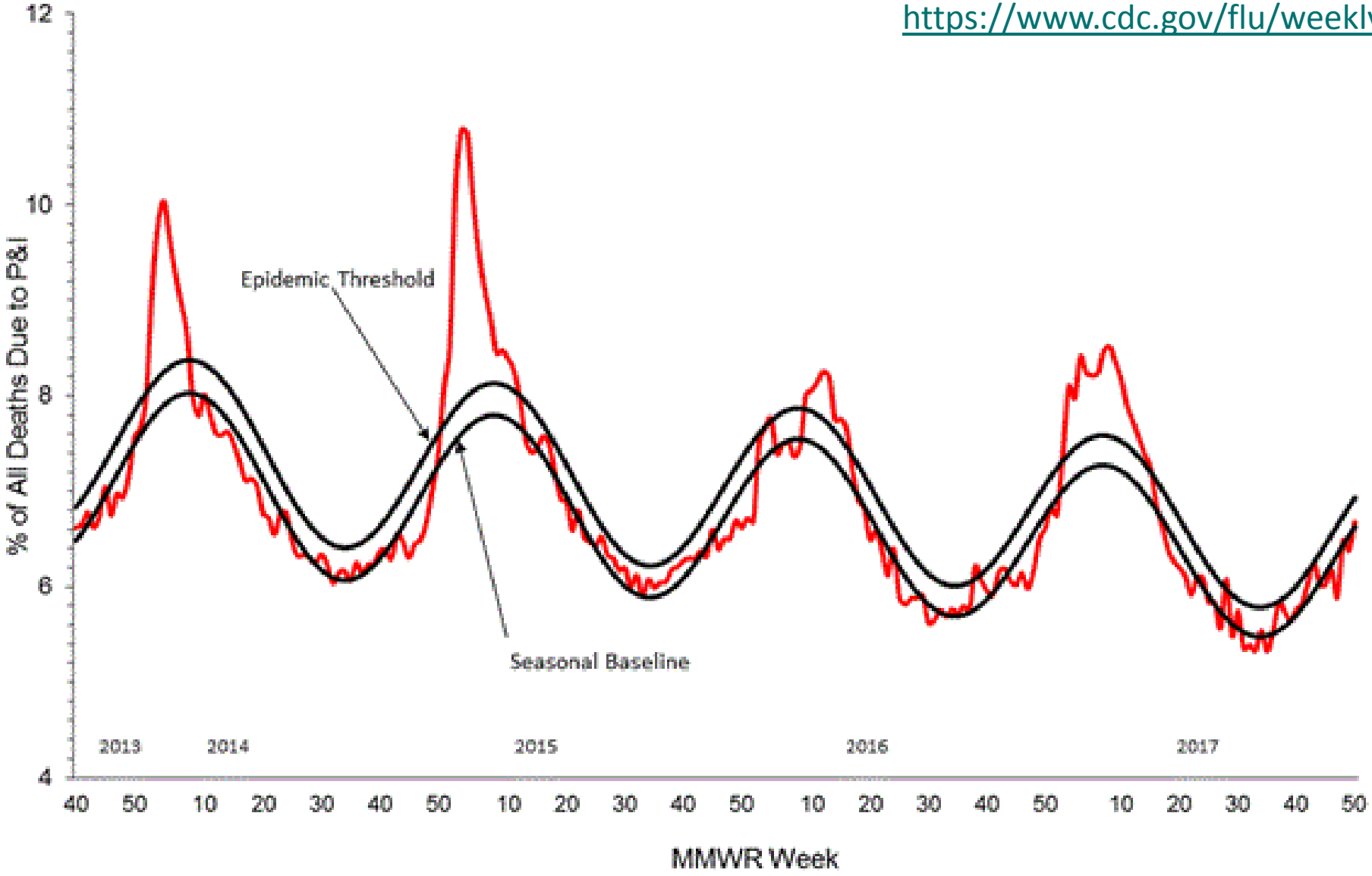
https://www.cdc.gov/flu/weekly/ as of 12/30/17


FluSurv-NET :: Entire Network :: 2017-18 Season :: Cumulative Rate
Alt key + Click and drag to create rectangle to zoom/Double Clicks to reset zoom
Rates per 100,000 population
60
55
50
45
40
35
30
25
20
15
10
5
0
40
50
1
10
17
https://www.cdc.gov/flu/weekly/ as of 12/30/17
Rates per 100,000 by season
0-4 yr 9.9
5-17 yr 2.8
18-49 yr 4.7
50-64 yr 15.4
65+ yr 56.6

Pneumonia and Influenza Mortality from the National Center for Health Statistics Mortality Surveillance System

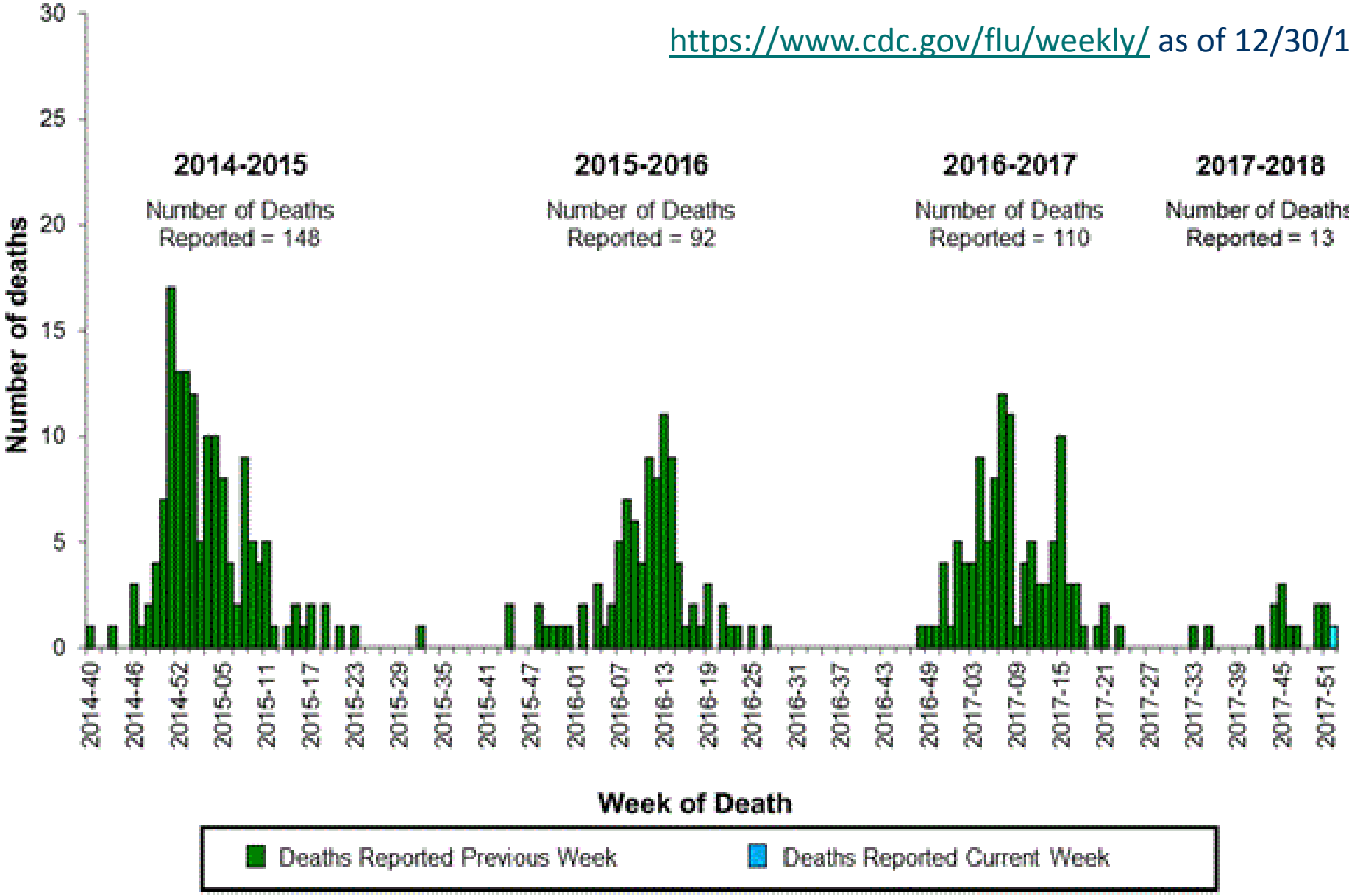
Data through the week ending December 16, 2017, as of January 4

https://www.cdc.gov/flu/weekly/



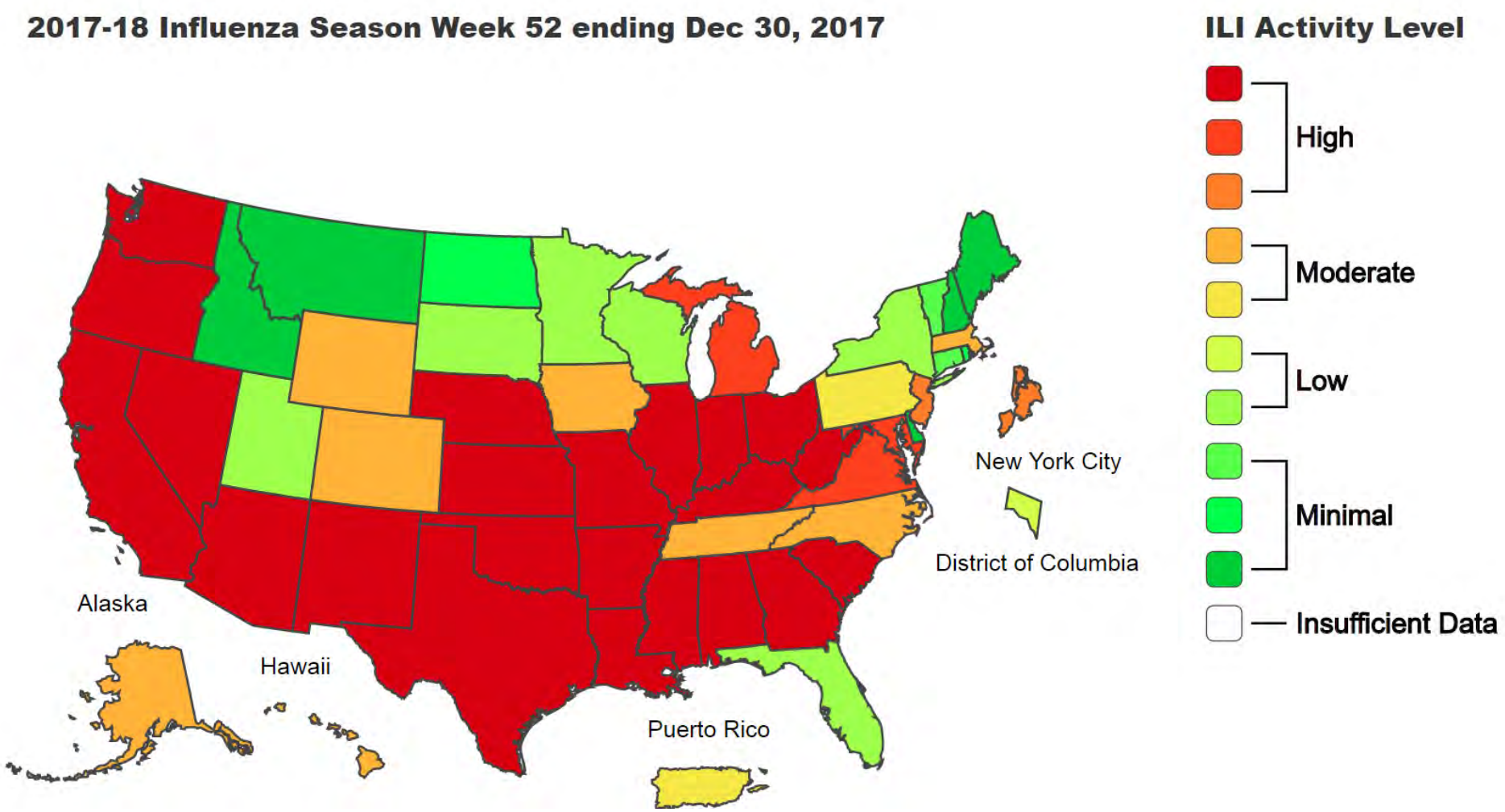
Number of Influenza-Associated Pediatric Deaths by Week of Death: 2014-2015 season to present

https://www.cdc.gov/flu/weekly/ as of 12/30/17



A Weekly Influenza Surveillance Report Prepared by the Influenza Division

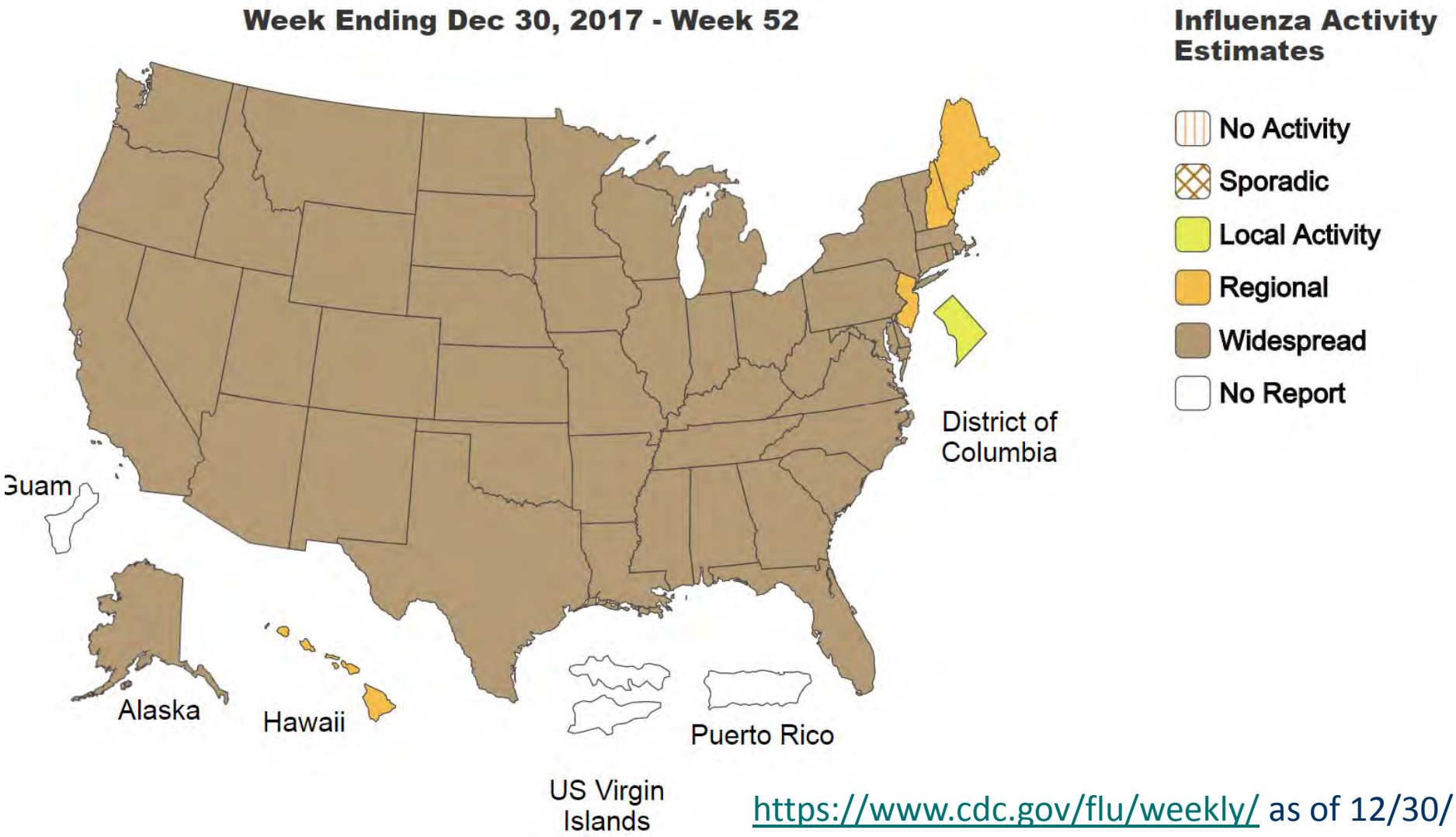
Influenza-Like Illness (ILI) Activity Level Indicator Determined by Data Reported to ILINet



https://www.cdc.gov/flu/weekly/ as of 12/30/17

A Weekly Influenza Surveillance Report Prepared by the Influenza Division

Weekly Influenza Activity Estimates Reported by State and Territorial Epidemiologists*



https://www.cdc.gov/flu/weekly/ as of 12/30/17

Highlights (Week 52: December 24-30, 2017)

Statewide Activity

No Activity | Sporadic | Local | Regional | **Widespread**

Regions with Elevated Activity

- **Deaths:** 10 (Age 0-64) **27 total to date**
- **Outbreaks:** 39 **73 total to date**
- **Laboratory:** 40.9% positive
- **Outpatient ILI:** Above expected levels
- **Hospitalizations:** Above expected levels

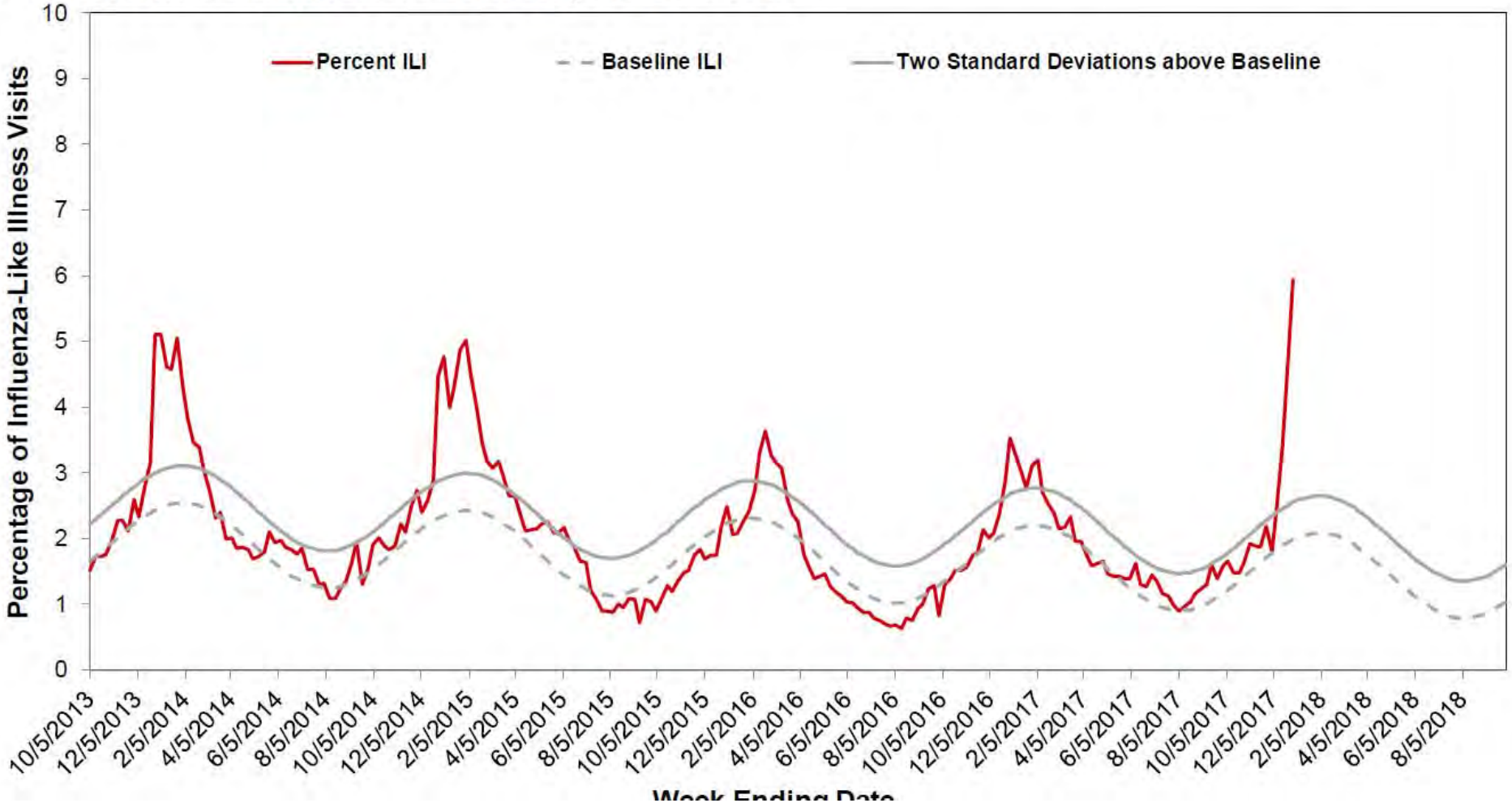
Click on images and links for more information

Key messages:

- Influenza is widely circulating in California.
- Influenza A (H3N2) viruses are predominating this season.
- It's not too late to get vaccinated – the best protection against this potentially serious disease.
- Take action to stop the spread of flu: wash hands often, cover coughs and sneezes, and stay home when sick.

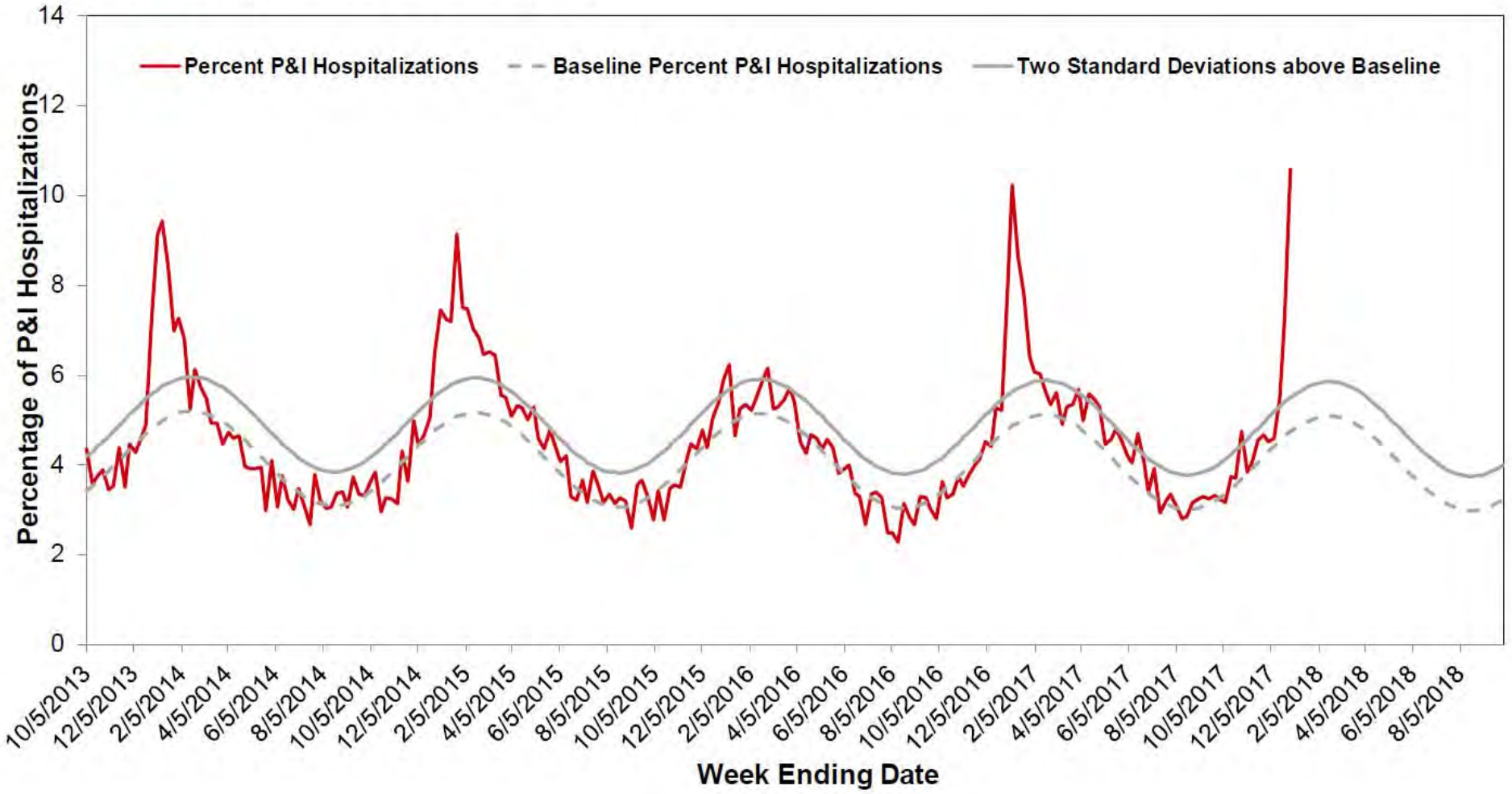
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

Figure 1. Percentage of Influenza-like Illness Visits Among Patients Seen by California Sentinel Providers, 2013–2018



https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

Figure 2. Percentage of P&I Hospitalizations in Kaiser Permanente Northern California Hospitals, 2013–2018



https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

Figure 6. Number of Laboratory-Confirmed Influenza-Associated Fatalities in Persons <65 Years of Age by Week of Onset, 2016–2018

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

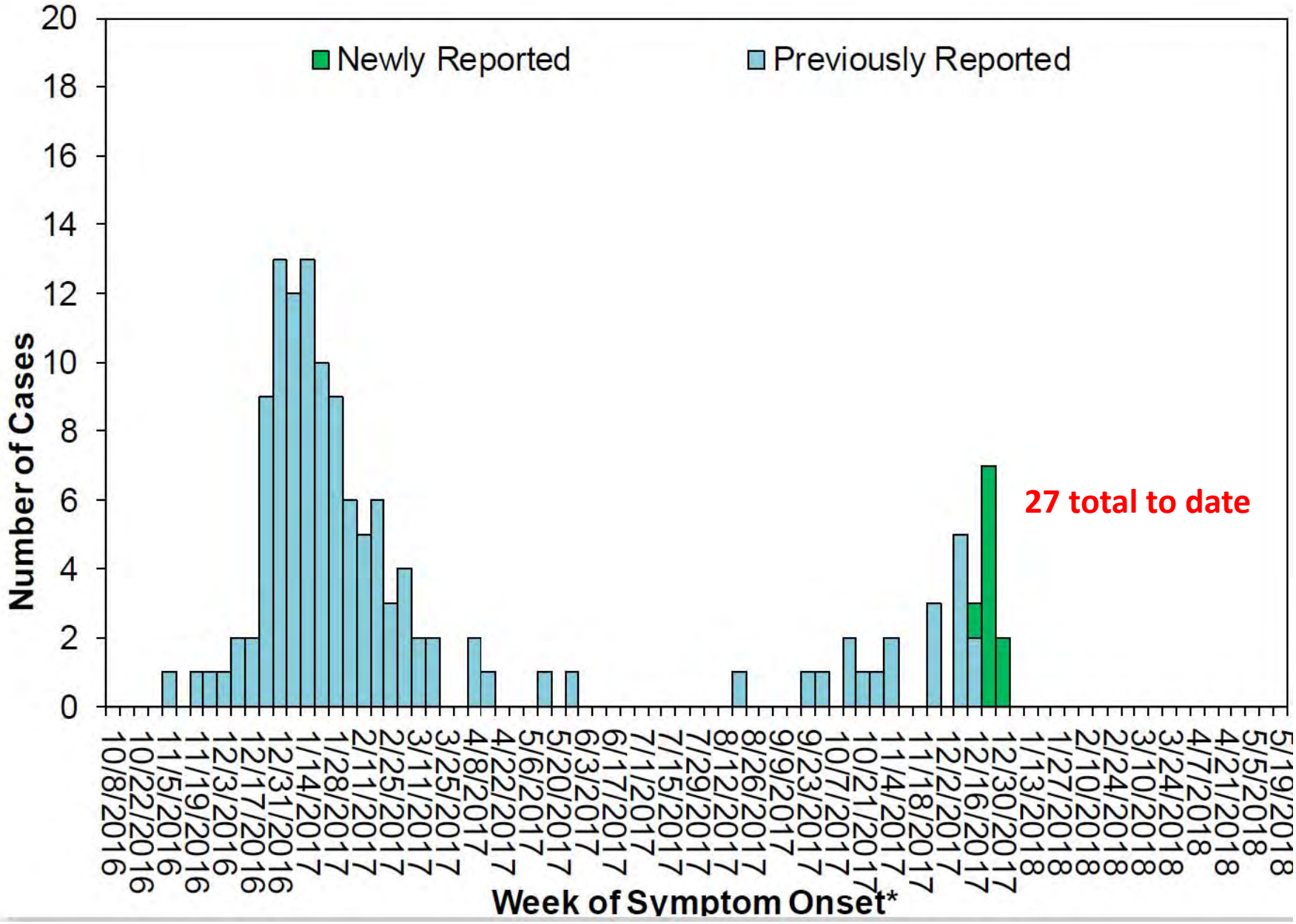
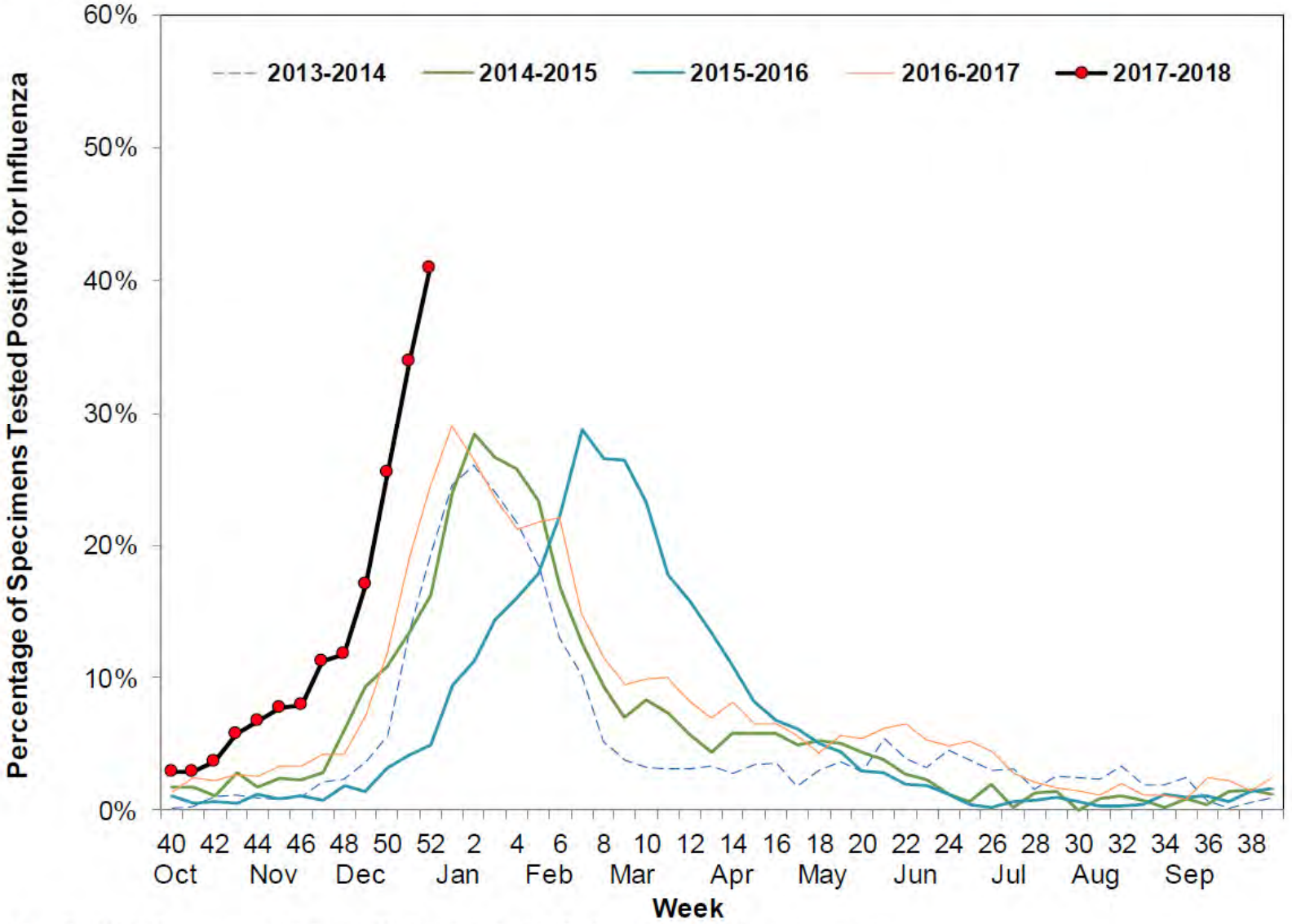


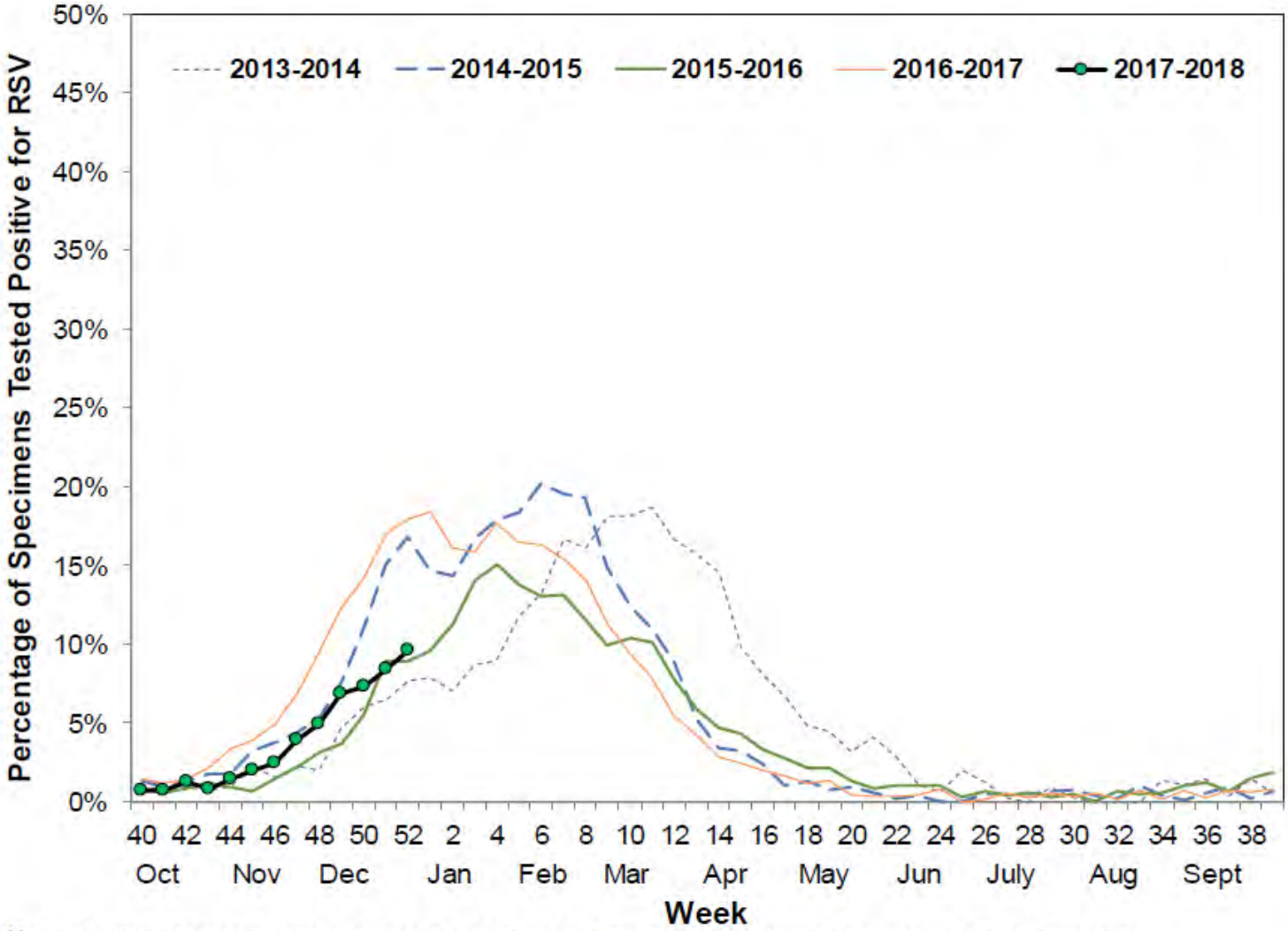
Figure 4. Percentage of Influenza Detections at Clinical Sentinel Laboratories, 2013–2018



Note: The 2014–15 season contains a week 53. Data have been shifted so that week 1 aligns across years.

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

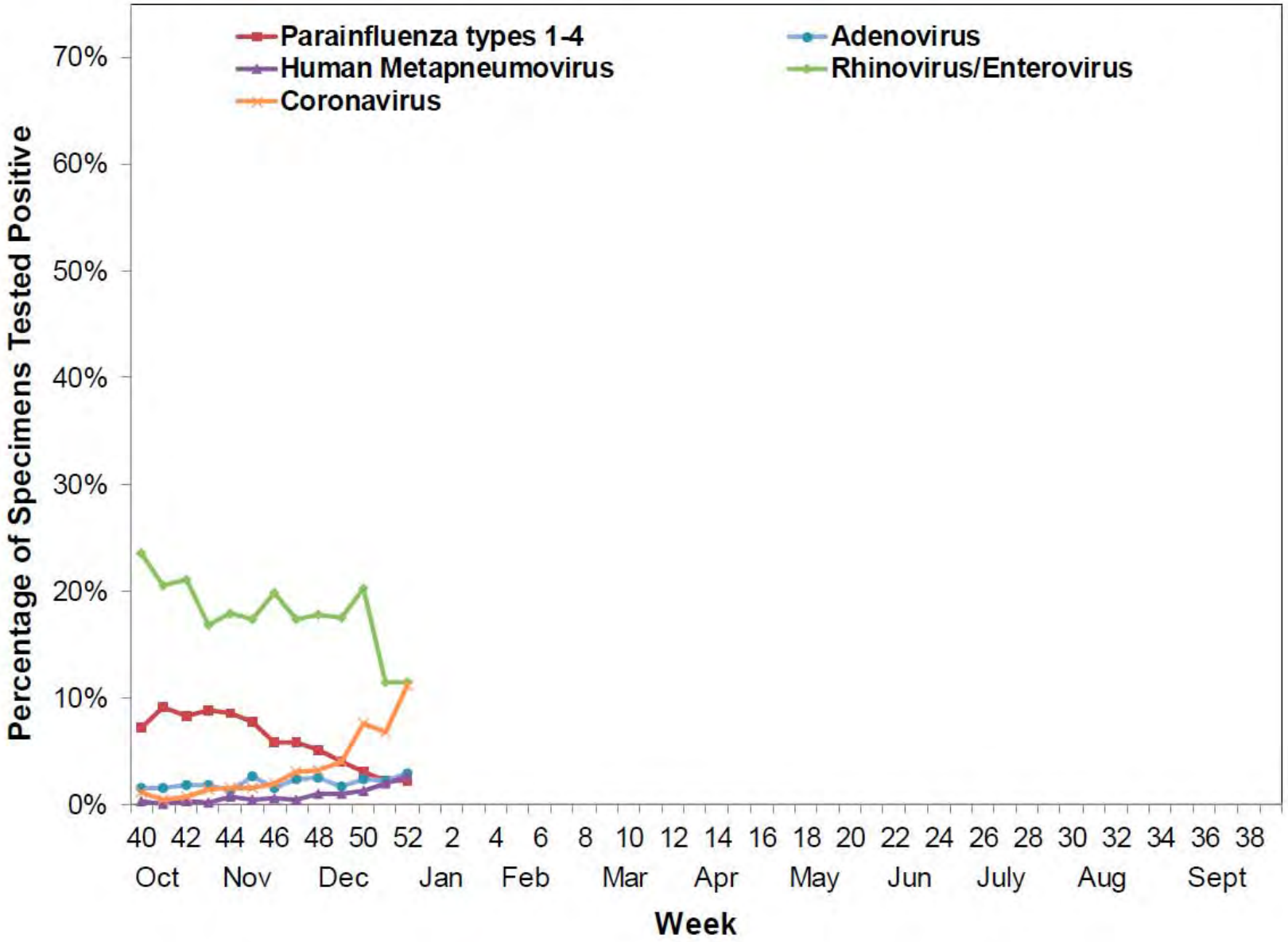
Figure 10. Percentage of RSV Detections at Clinical Sentinel Laboratories, 2013–2018



Note: The 2014–15 season contains a week 53. Prior years' data have been shifted so that week 1 aligns across years.

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

Figure 11. Percentage of Other Respiratory Pathogen Detections at Clinical Sentinel Laboratories, 2017–2018



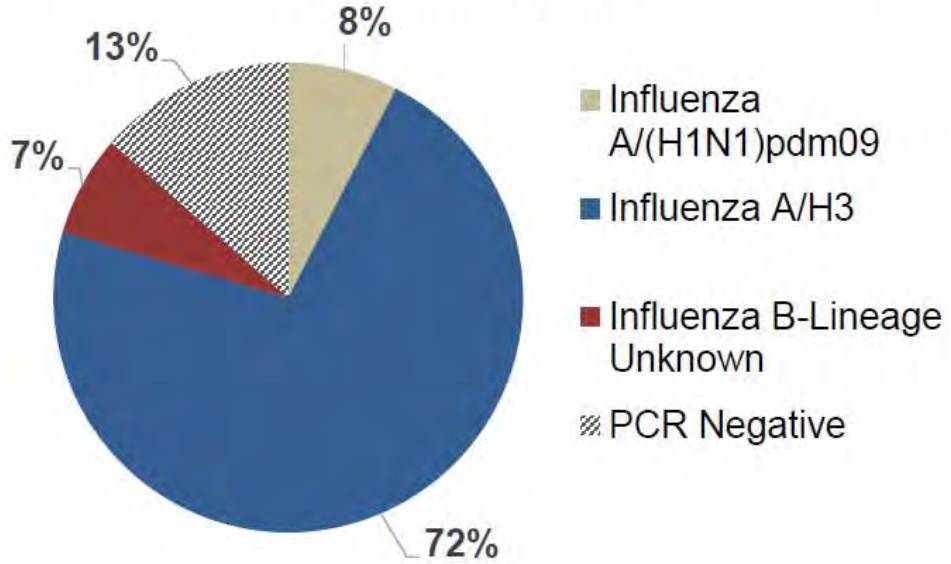
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

Orange County Health Care Agency
Epidemiology and Assessment

Season Totals as of 12/30/17

1,575	Total Cases
11 PICU 16 ICU	ICU Cases (0-64 yrs)
1 child 3 adults	Deaths (0-64 yrs)
20 Suspect 4 Confirmed	Respiratory Outbreaks

Specimen Testing Results by Polymerase Chain Reaction - Orange County Public Health Laboratory (N = 311)



Influenza Surveillance Indicators	Current Season 2017-18 Week 51	Current Season 2017-18 Week 52	Current Season 2017-18 Season Total[1]	ISP 2016-17 Week 52	ISP 2016-17 Season Total[1]	5-Year* Average Week 52	5-Year* Average Season Total[1]
All influenza detections reported (rapid or PCR)	472	637	1,575	207	503	88	218
Percent of outpatient visits for ILI[2]	3.13	10.53		5.08		4.07	
Percent of deaths w/ pneumonia and/or influenza	10.38	10.53		6.65		9.20	
Number of influenza-related deaths reported[3]	0	2	4	0	0	0	0

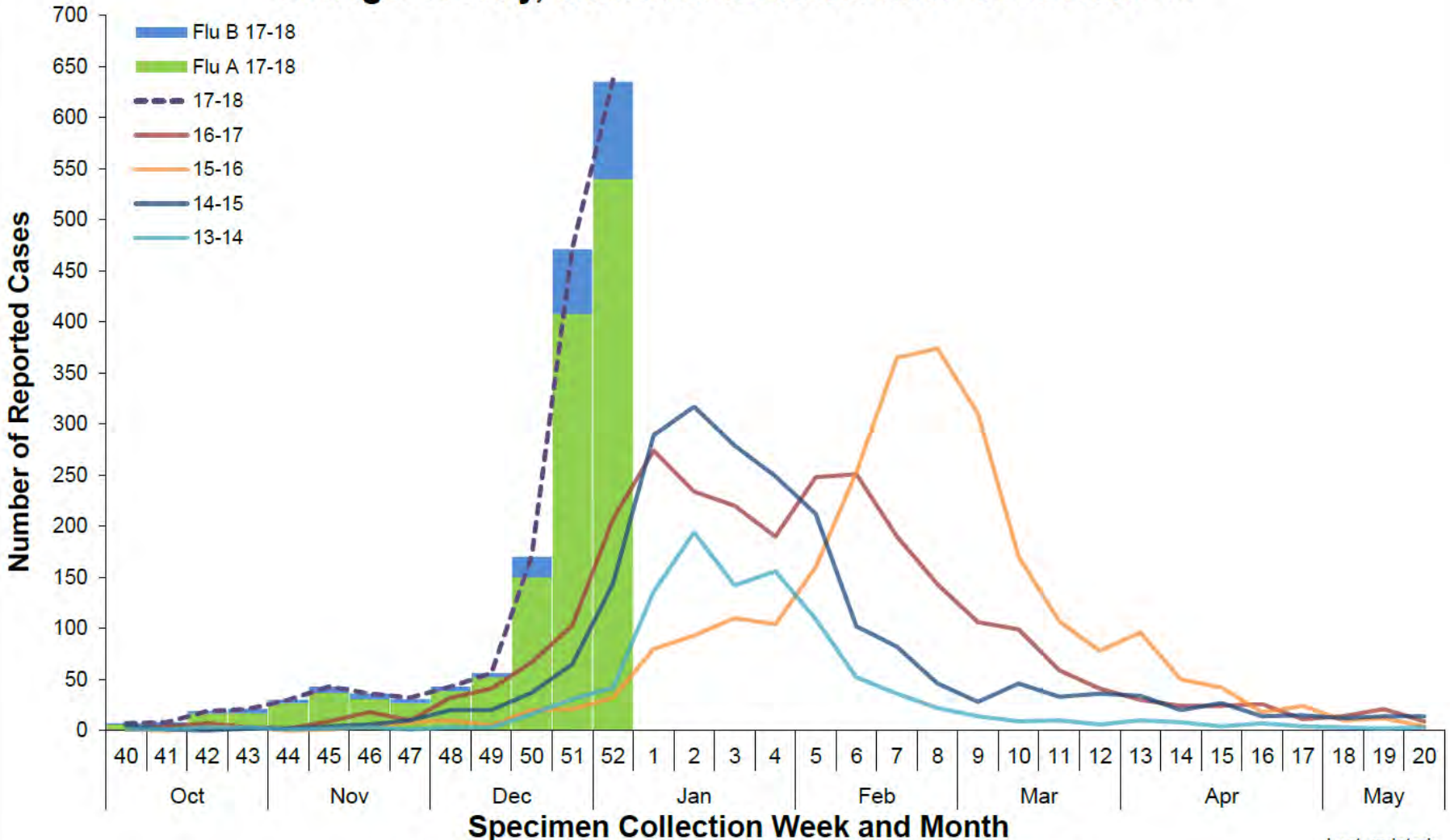
*5-Year average is calculated using data from 2012-13 through 2016-17 influenza seasons.

[1] Season Totals are through week 52.

[2] ILI = Influenza-like Illness (data voluntarily reported by enrolled sentinel providers).

[3] Only includes influenza-related deaths under age 65 years.

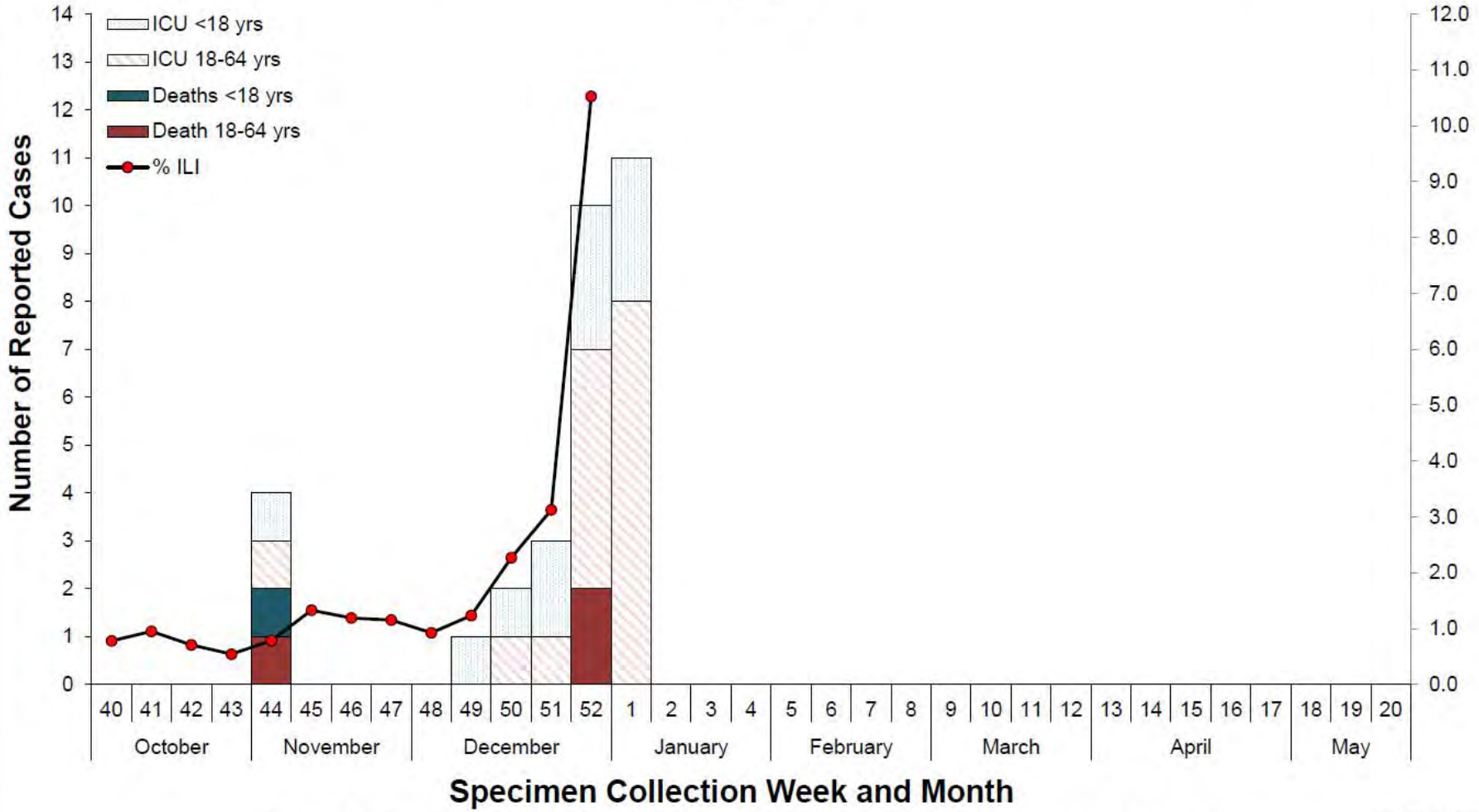
Reported Influenza Cases by Disease Week and Season, Orange County, Influenza Seasons 2013-14 to 2017-18



Note: Except for severe cases, influenza is voluntarily reported in Orange County and data may not represent all cases. Data is subject to change due to a delay in reporting.

Last updated: 1/5/18

Severe Influenza Cases by Age Group and Percent of Outpatient Visits Due to Influenza-Like Illness, Orange County, Influenza Season 2017-18

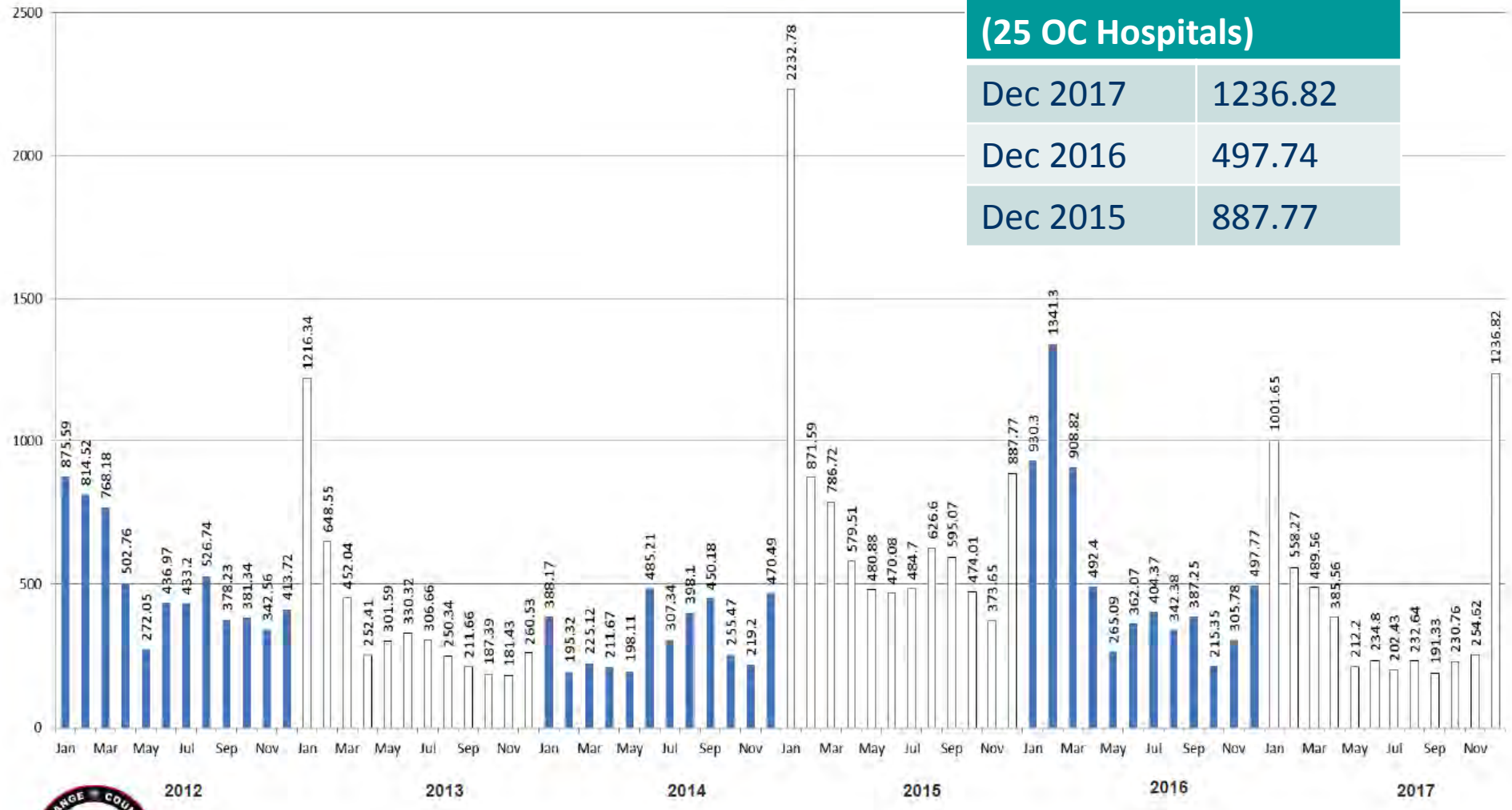


Note: Due to delays in reporting, some severe cases during this time period may not have been reported yet. Severe cases are defined as cases under the age of 65 years admitted to the intensive care unit or reported as a death.

Last Updated: 1/4/18

Emergency Receiving Center Diversion- 2012-2017

Total Hours of Diversion (25 OC Hospitals)	
Dec 2017	1236.82
Dec 2016	497.74
Dec 2015	887.77



http://www.healthdisasteroc.org/ems/system_reports/health_care_facilities


TAKE ACTION TO PREVENT THE FLU.
Flu activity is widespread in most of the U.S. Take action to prevent flu!


CDC SAYS:
"TAKE 3" ACTIONS TO FIGHT THE FLU
1 Vaccinate
2 Stop Germs
3 Antiviral Drugs

www.cdc.gov

Annual Flu Vaccine Recommendations

- Everyone over 6 months of age
  - Especially those at high risk for severe illness and complications
    - Children <5 years, esp <2 yrs
    - Pregnant women
    - Persons aged ≥65 years
    - Adults and children with certain chronic medical problems, including asthma, diabetes
  - Especially those most likely to transmit to high risk

Seasonal Influenza Virus Vaccine

- Updated yearly to protect against anticipated strains
- 2 type A (H1N1 and H3N2) and 1-2 type B
- Multiple products on market

Photos courtesy of Dr. Janice Louie, CDPH

Influenza Vaccine Composition 2017-2018

- A/Michigan/45/2015 (H1N1)pdm09-like virus - *new*
- A/Hong Kong/4801/2014 (H3N2)-like virus - *unchanged*
- B/Brisbane/60/2008-like virus *(Victoria lineage; unchanged)*
- Quadrivalent only: B/Phuket/3073/2013-like virus - *(Yamagata lineage – unchanged)*

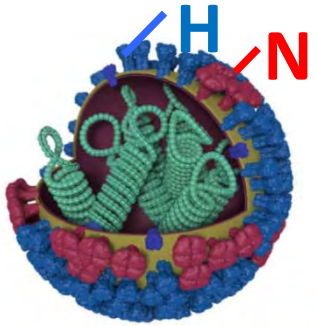


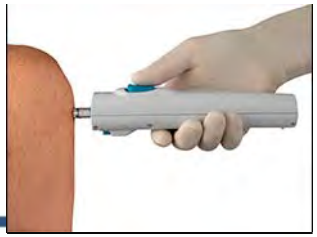
TABLE 1. Influenza vaccines — United States, 2017–18 influenza season*

Trade name	Manufacturer	Presentation	Age indication	Mercury (from thimerosal, µg/0.5 mL)	Latex	Route
Inactivated influenza vaccines, quadrivalent (IIV4s), standard-dose†						
Afluria Quadrivalent	Seqirus	0.5 mL prefilled syringe	≥18 years	NR	No	IM§
		5.0 mL multidose vial	≥18 years (by needle/syringe) 18 through 64 years (by jet injector)	24.5	No	IM
Fluarix Quadrivalent	GlaxoSmithKline	0.5 mL prefilled syringe	≥3 years	NR	No	IM
FluLaval Quadrivalent	ID Biomedical Corp. of Quebec (distributed by GlaxoSmithKline)	0.5 mL prefilled syringe	≥6 months	NR	No	IM
		5.0 mL multidose vial	≥6 months	<1	No	IM
Fluzone Quadrivalent	Sanofi Pasteur	0.25 mL prefilled syringe	6 through 35 months	NR	No	IM
		0.5 mL prefilled syringe	≥3 years	NR	No	IM
		0.5 mL single-dose vial	≥3 years	NR	No	IM
		5.0 mL multidose vial	≥6 months	25	No	IM
Inactivated influenza vaccine, quadrivalent (ccIIV4), standard-dose,† cell culture based						
Flucelvax Quadrivalent	Seqirus	0.5 mL prefilled syringe	≥4 years	NR	No	IM
		5.0 mL multidose vial	≥4 years	25	No	IM
Inactivated influenza vaccine, quadrivalent, IIV4, standard-dose, intradermal¶						
Fluzone Intradermal Quadrivalent	Sanofi Pasteur	0.1 mL single-dose prefilled microinjection system	18 through 64 years	NR	No	ID**
Inactivated Influenza Vaccines, trivalent (IIV3s), standard-dose†						
Afluria	Seqirus	0.5 mL prefilled syringe	≥5 years	NR	No	IM
		5.0 mL multidose vial	≥5 years (by needle/syringe) 18 through 64 years (by jet injector)	24.5	No	IM
Fluvirin	Seqirus	0.5 mL prefilled syringe	≥4 years	≤1	Yes††	IM
		5.0 mL multidose vial	≥4 years	25	No	IM
Adjuvanted inactivated influenza vaccine, trivalent (aIIV3),† standard-dose						
Fluad	Seqirus	0.5 mL prefilled syringe	≥65 years	NR	Yes††	IM
Inactivated Influenza Vaccine, trivalent (IIV3), high-dose§§						
Fluzone High-Dose	Sanofi Pasteur	0.5 mL prefilled syringe	≥65 years	NR	No	IM
Recombinant Influenza Vaccine, quadrivalent (RIV4)¶¶						
Flublok Quadrivalent	Protein Sciences	0.5 mL prefilled syringe	≥18 years	NR	No	IM
Recombinant Influenza Vaccine, trivalent (RIV3)¶¶						
Flublok	Protein Sciences	0.5 mL single-dose vial	≥18 years	NR	No	IM
Live Attenuated Influenza Vaccine, quadrivalent (LAIV4)* (not recommended for use during the 2017–18 season)**						
FluMist Quadrivalent	MedImmune	0.2 mL single-dose prefilled intranasal sprayer	2 through 49 years	NR	No	NAS

https://www.cdc.gov/mmwr/volumes/66/rr/pdfs/rr6602.pdf

Types of Influenza Vaccine

- **Inactivated Influenza Vaccine, Trivalent / Quadrivalent** (IIV3 / IIV4) – "**Flu shot**"
  - Vaccine viruses grown in eggs
  - Viruses killed; antigen purified
  - Intramuscular (IM) route
    - Single-dose pre-filled syringe
    - Multidose vial *(contains preservative)*
  - Intradermal (ID) form also made *(IIV4)* for 18-64 y.o.
  - Needle-free jet injector *(IIV3 and IIV4)* for 18-64 y.o.



Other Types of Influenza Vaccine

- **Other Inactivated Influenza Vaccines**
  - High-Dose *(IIV3)* IM *(for ≥ 65 years old)*
  - Cell culture-based *(ccIIV4)* IM – viruses grown in mammalian cells
  - Adjuvanted *(aIIV3 and aIIV4)* IM *(for ≥ 65 years old)*
    - Added substance to help stimulate body's immune response to the vaccine
- **Recombinant Influenza Vaccine** *(RIV3 and RIV4)*
  - Influenza antigen (HA) mixed with portion of another virus, grown in insect cells
  - Only 100% egg-free vaccine in U.S.
  - For ≥ 18 years old

Other Types of Influenza Vaccine

- **Live Attenuated Influenza Vaccine, O**
  (LAIV4) – "**FluMist**"
  - Live, weakened virus
  - Sprayed into th
  - 2-49 v
    ions with certain m
    egnant or immunocompromised

NOT RECOMMENDED FOR USE IN 2017-2018 SEASON AGAIN!!

Precautions & Contraindications

CONTRAINDICATIONS:

https://www.cdc.gov/mmwr/volumes/66/rr/rr6602a1.htm

Should **not** be given to persons with:

- History of severe allergic reaction after previous dose of influenza vaccine or to any component of the vaccine

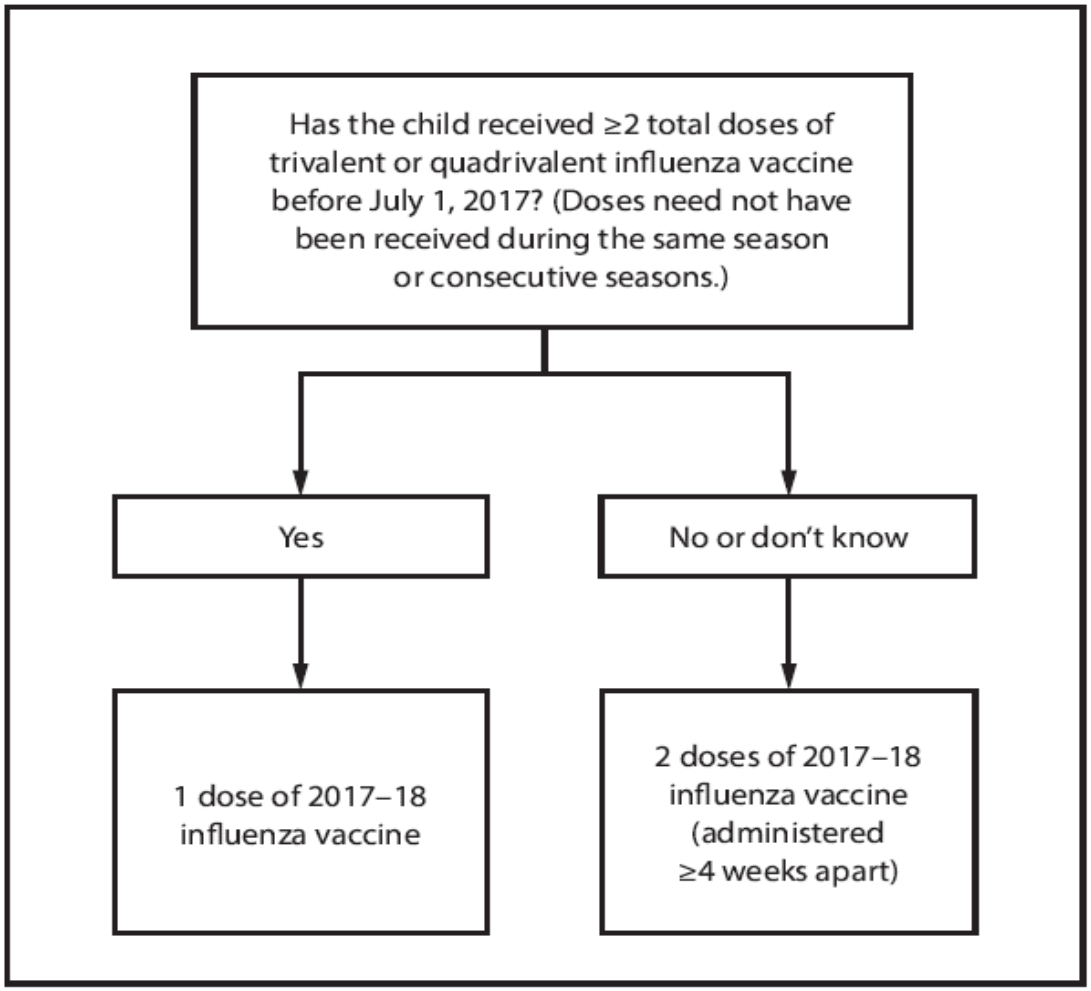
PRECAUTIONS:

- History of Guillain-Barré Syndrome within 6 weeks of previous influenza vaccine
- Moderate to severe illness, with or without fever

No longer listed as Precautions, but Special Consideration:

- Hives from eggs no longer a precaution – can receive any licensed product for age
- History of reactions to egg involving symptoms **other than hives***, such as angioedema, respiratory distress, lightheadedness, or recurrent emesis; or who needed epi
  - Can receive any licensed product for age. Should be administered in a medical setting under supervision of health care provider able to recognize and manage severe allergic conditions
  - No period of postvaccination observation period is recommended specifically for egg-allergic persons. However, ACIP recommends that vaccine providers consider observing patients for 15 minutes following administration of any vaccine to decrease the risk for injury should syncope occur

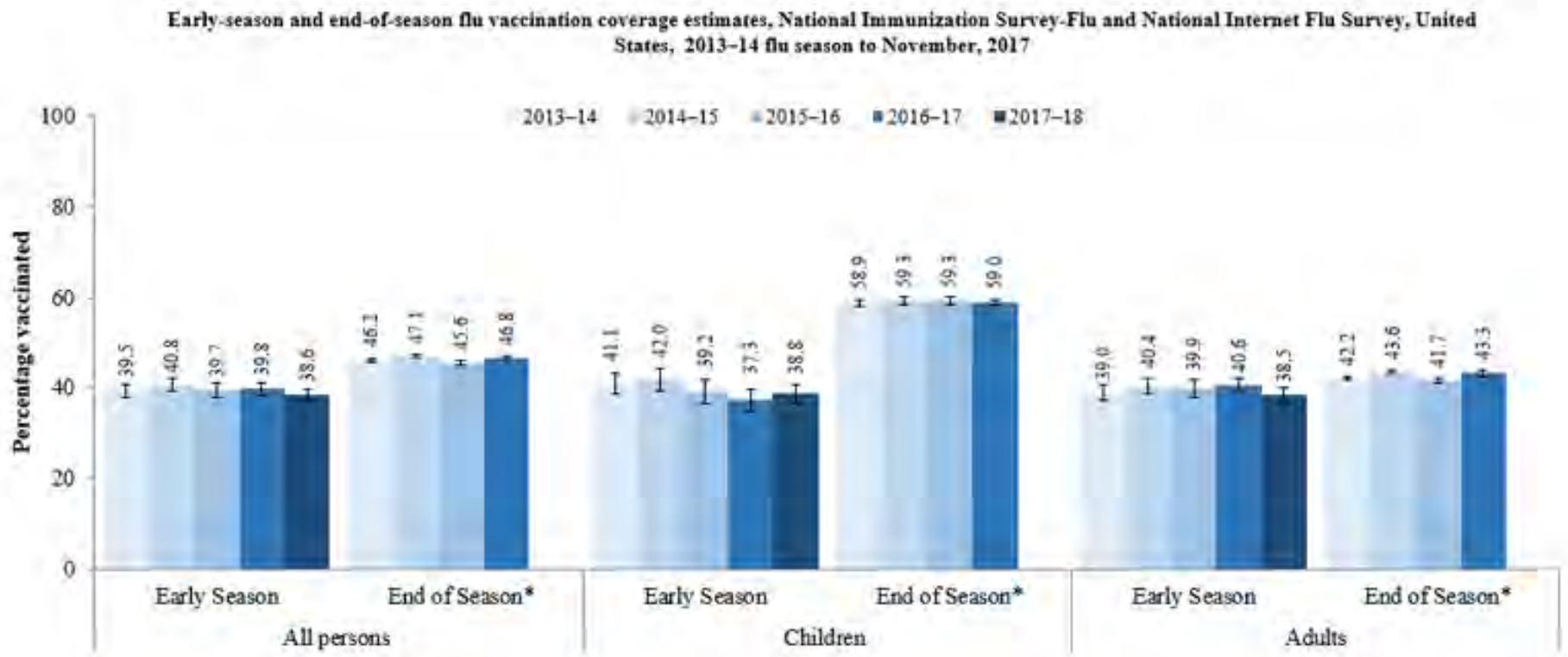
Children 6 mos - 8 year olds



*

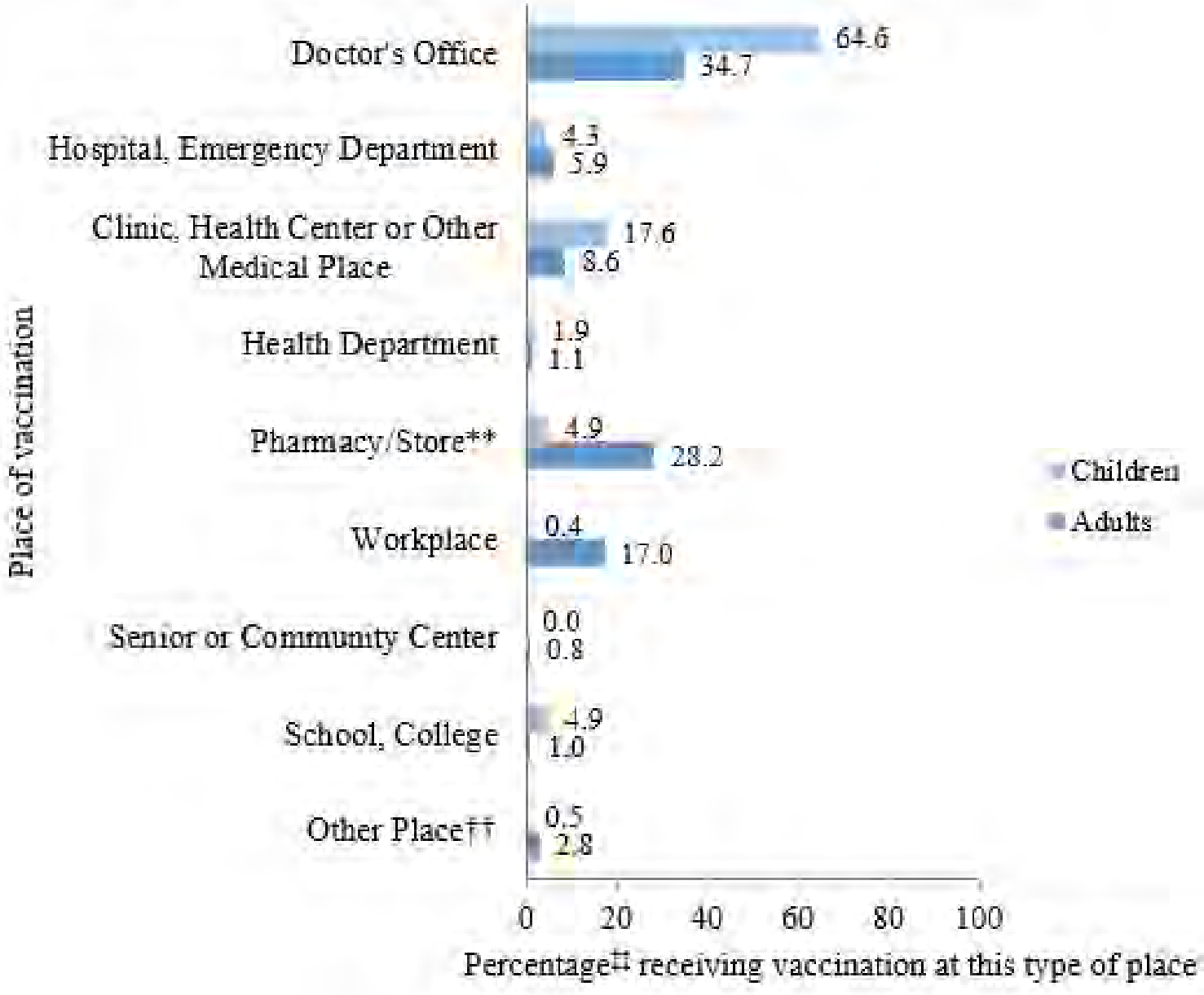
Recommendations of the Advisory Committee on Immunization Practices (ACIP), United States, 2017-18 Influenza Season, *MMWR Recommendations and Reports* 2017:66(2);9 available at http://www.cdc.gov/mmwr

Early season vaccination coverage



https://www.cdc.gov/flu/fluvaxview/nifs-estimates-nov2017.htm

Place of flu vaccination for children and adults, National Immunization Survey-Flu and National Internet Flu Survey, United States, early 2017–18 flu season



You can make a difference

- A provider recommendation to get a flu vaccination is an important factor in a patient's decision to get vaccinated. Vaccination providers and immunization programs should ensure patients receive recommendations for flu vaccination and expand access to vaccination services.
  - Work sites can collaborate with vaccination providers and immunization programs to promote flu vaccination and even offer vaccination at work.
  - All providers should routinely assess the flu vaccination status of their patients at every clinical encounter, strongly recommend, and offer flu vaccination.
  - Providers who do not stock flu vaccine should refer their patients to a provider who offers flu vaccination and confirm that patients received a flu vaccination.
  - Standing orders and provider reminders are systems that can prove useful to encourage vaccination in health care settings.

Flu vaccine during pregnancy

- CDC recommends pregnant women get a flu shot during any trimester of pregnancy
  - Influenza more likely to cause severe illness in pregnant women
  - Vaccination also protects the baby
- Influenza vaccine is safe in pregnancy
  - Millions of flu shots have been given during pregnancy; several studies conducted by CDC support the safety of flu vaccine during pregnancy – no increase risk of miscarriage
- Recently published small study suggests that women in early pregnancy with consecutive flu shots 2010-2011 and 2011-2012 had increased risk of miscarriage in 28 days after receiving the second vaccine
  - Small study; cannot quantify risk. Ongoing investigation looking at pregnant women 2012-2013 and 2014-2015 seasons pending results.
  - "Possible safety signal" associated with flu vaccination of pregnant women
- No change in recommendations from CDC or ACIP – pregnant women should get flu vaccine during any trimester

Results of CDC's 2016-2017 Internet panel survey of pregnant women

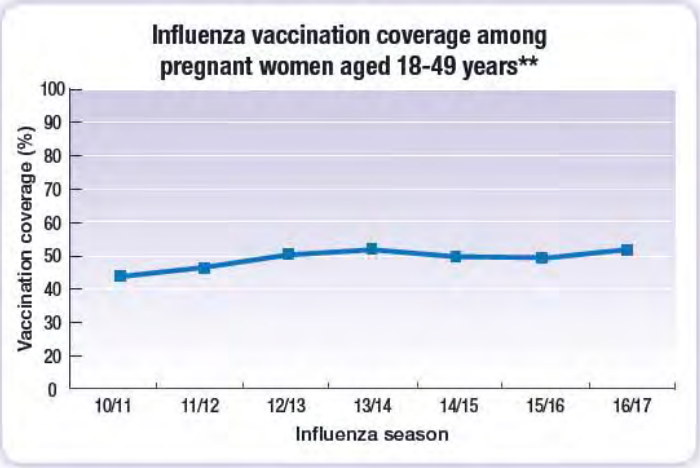
Half of pregnant women protect themselves and their babies against flu. Time to bump it up!

With only half of pregnant moms getting their flu shot, too many remain unprotected.

Flu shots help protect pregnant women and their babies from potentially serious flu illness during and after pregnancy.

During the 2016-2017 flu season, an estimated 50%* of pregnant women in the U.S. protected themselves and their babies from flu by getting a flu shot. While this is a significant improvement since the years before the 2009 pandemic, about half of pregnant women and their babies, still remain unprotected from influenza.

We can do better. All pregnant women need flu shots to protect themselves and their babies.



If you're pregnant, a flu shot:

- is recommended at any time during your pregnancy
- can reduce your risk of getting sick from flu
- can protect your baby from flu for several months after birth

Pregnant women also need a whooping cough (Tdap) shot. Talk to your doctor.

Get vaccinated to protect yourself and your baby.

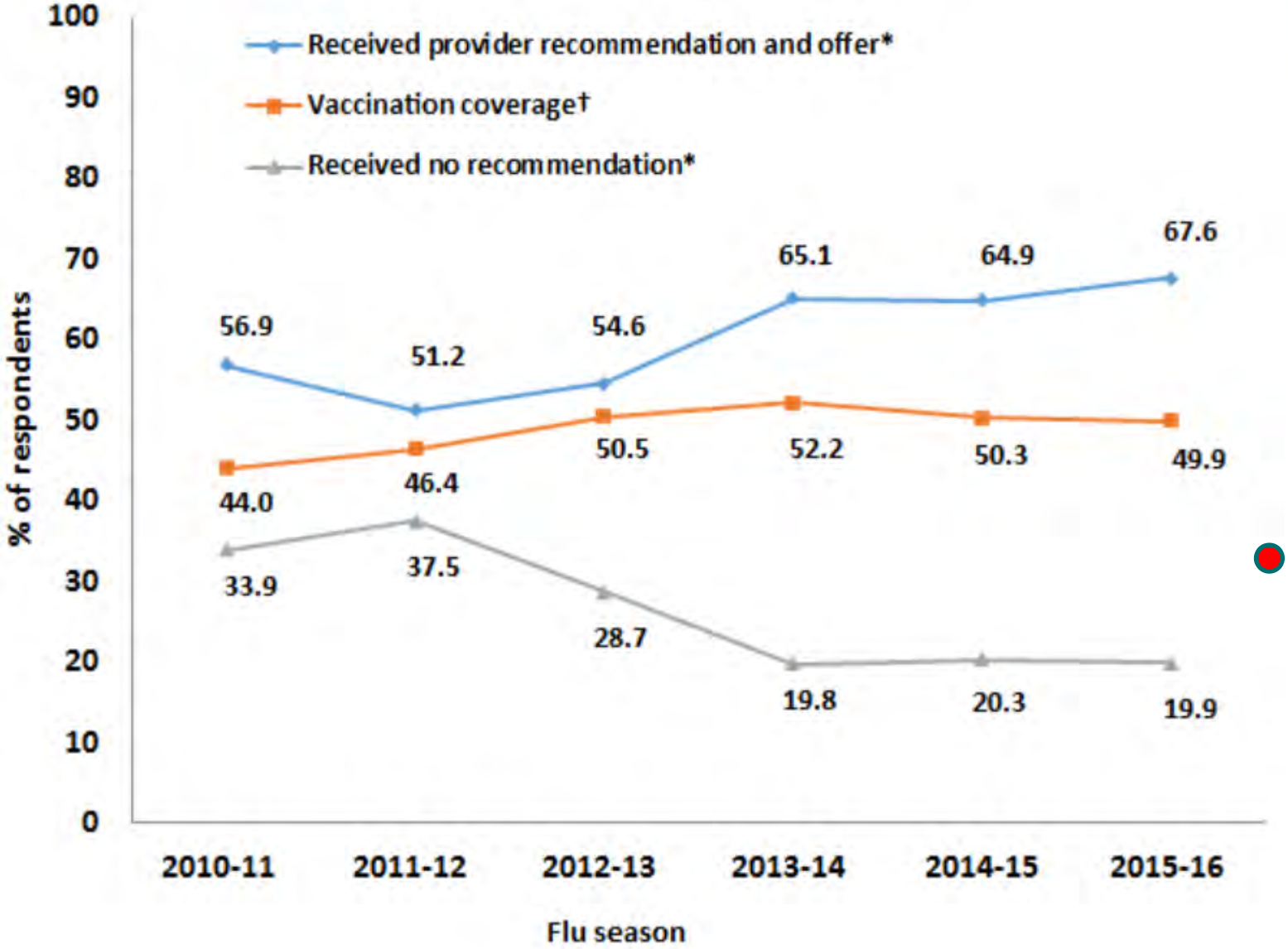
https://www.cdc.gov/flu/pdf/partners/flu-pregnancy-infographic-updated.pdf

www.cdc.gov/flu/protect/vaccine/pregnant.htm

NCIRDig705 | 10/25/17

*https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2016.htm **Sources: 2007-2010 BRFSS, 2010-11-2016-17 Internet Panel Survey.

Figure 1. Trend of flu vaccination coverage before and during pregnancy and prevalence of provider recommendation / offer or no recommendation for vaccination among women pregnant anytime October through January, Internet panel survey, United States, 2010-11 through 2015-2016 flu seasons

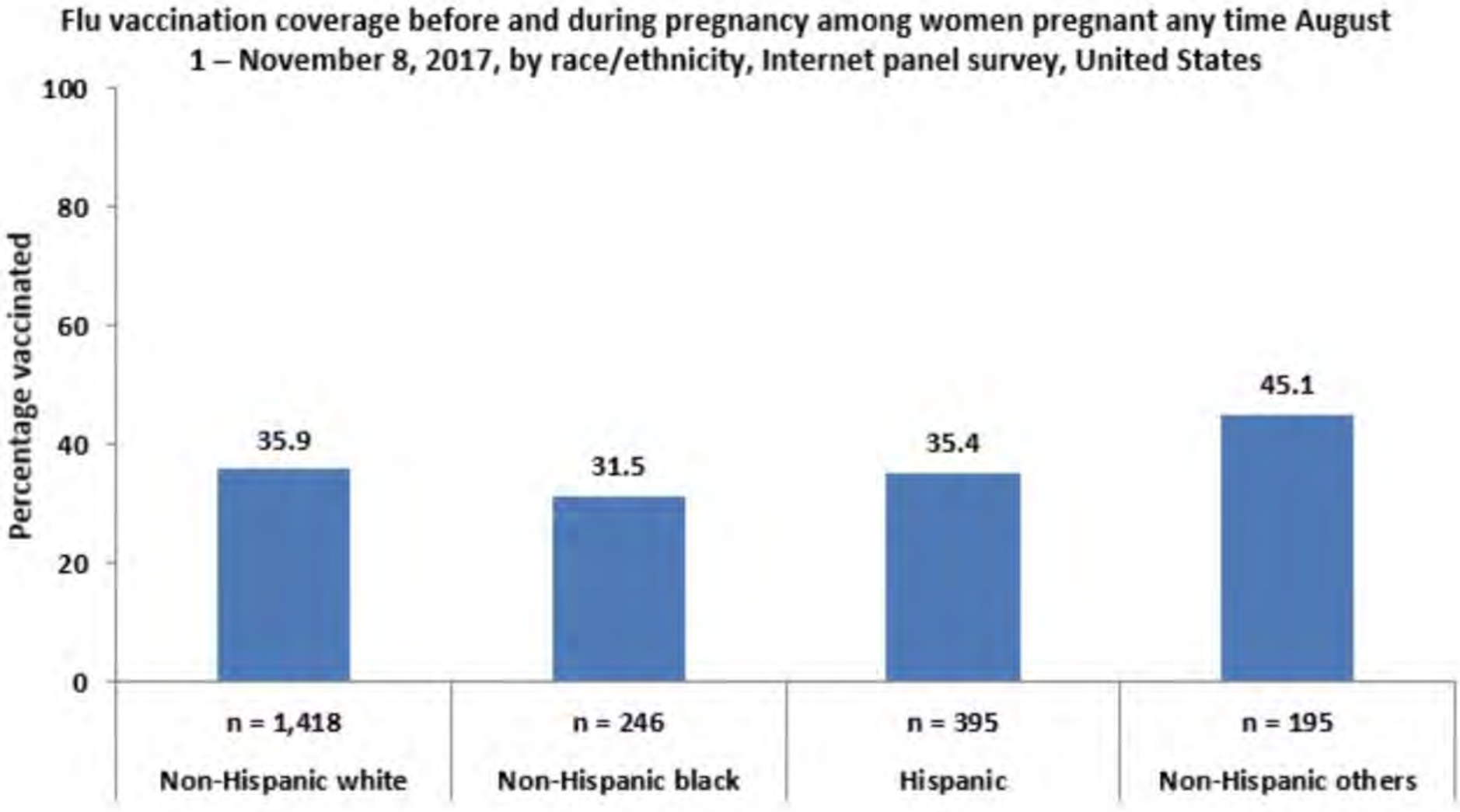


?42-46% by end of season?

35.6%
Diff't method '16-'17

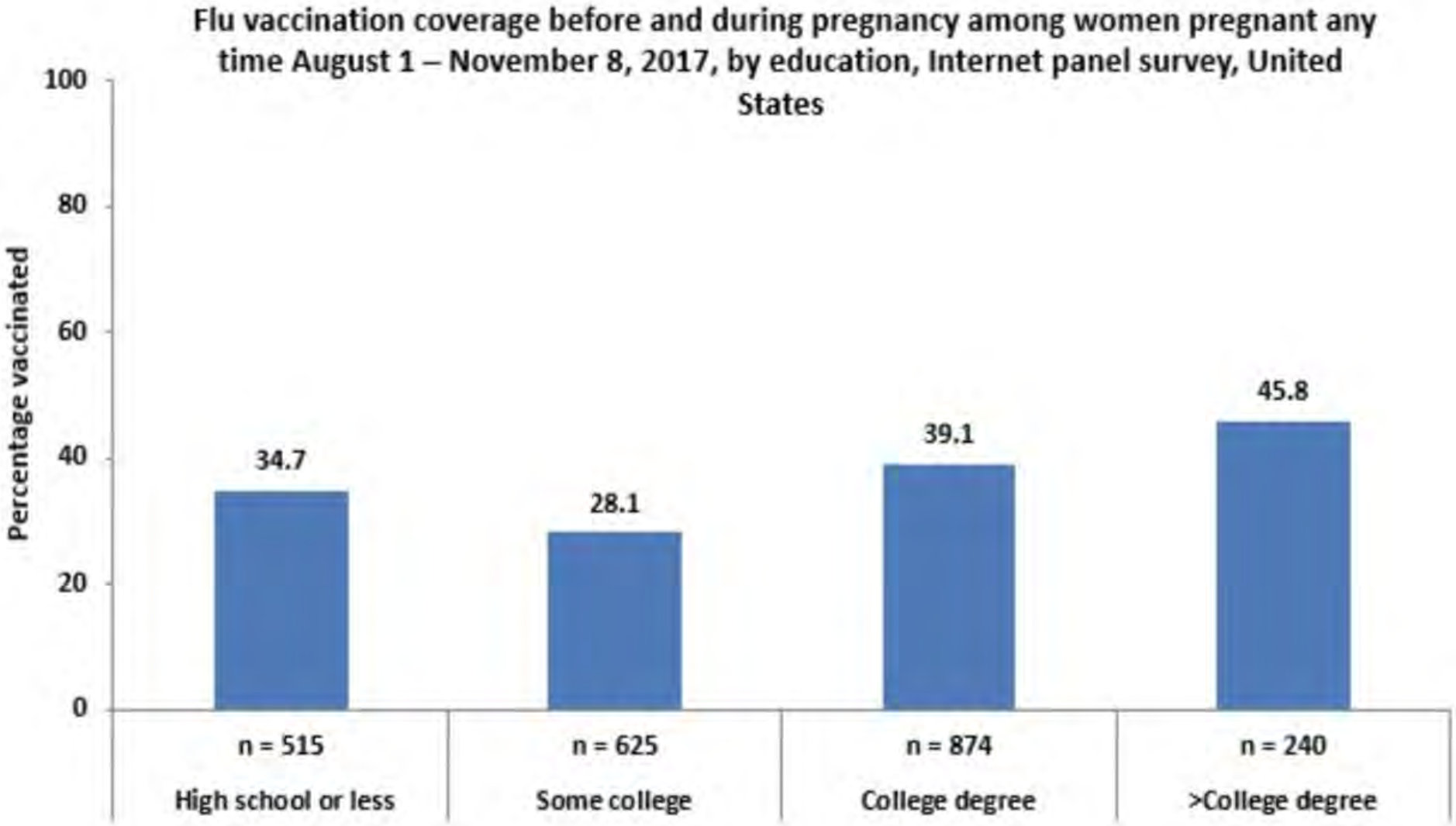
https://www.cdc.gov/flu/fluvaxview/pregnant-coverage_1516estimates.htm

Internet Panel of 2,254 Pregnant Women

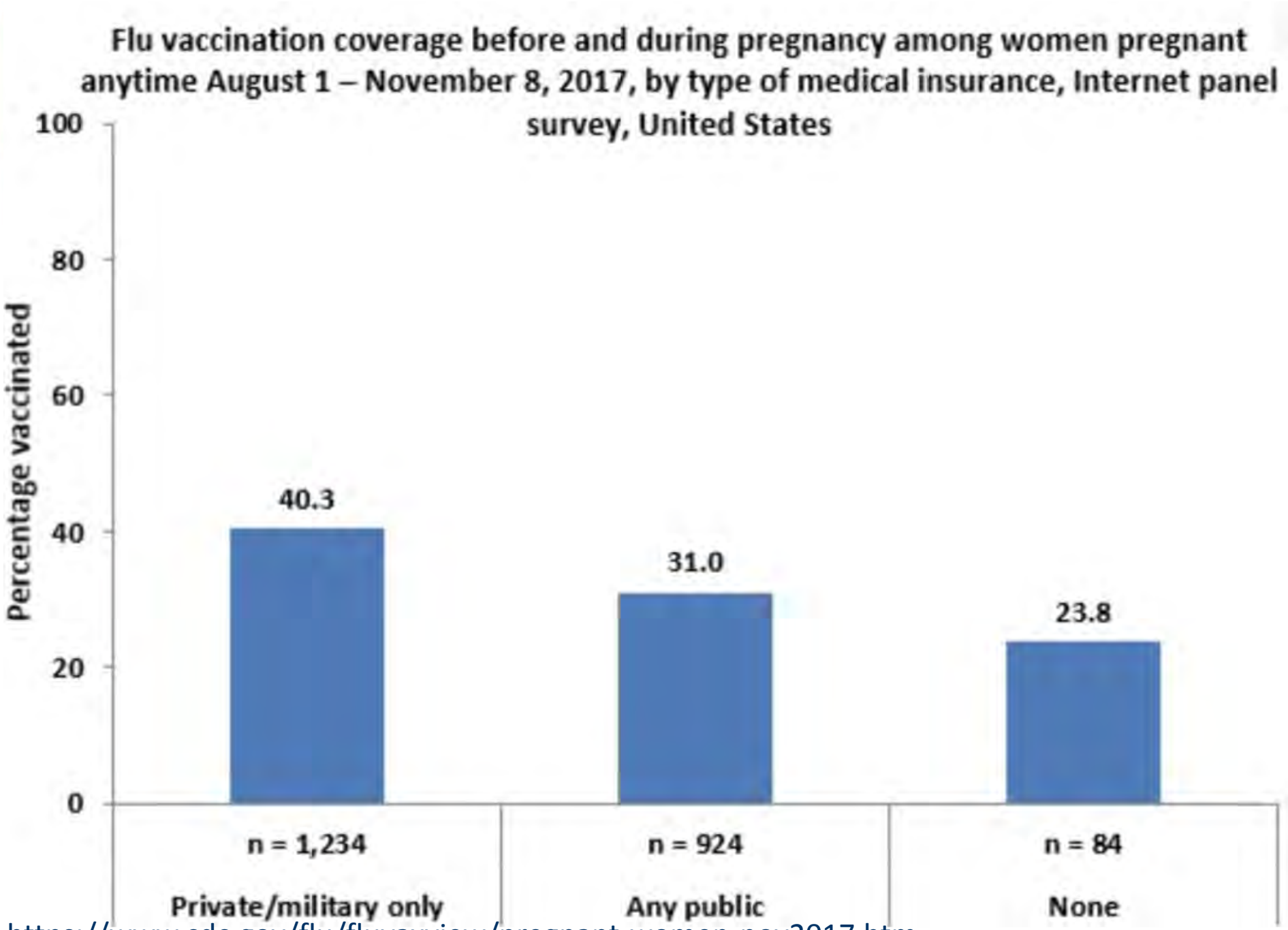


https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

Internet Panel – Pregnant Women: Vaccination by Education Level

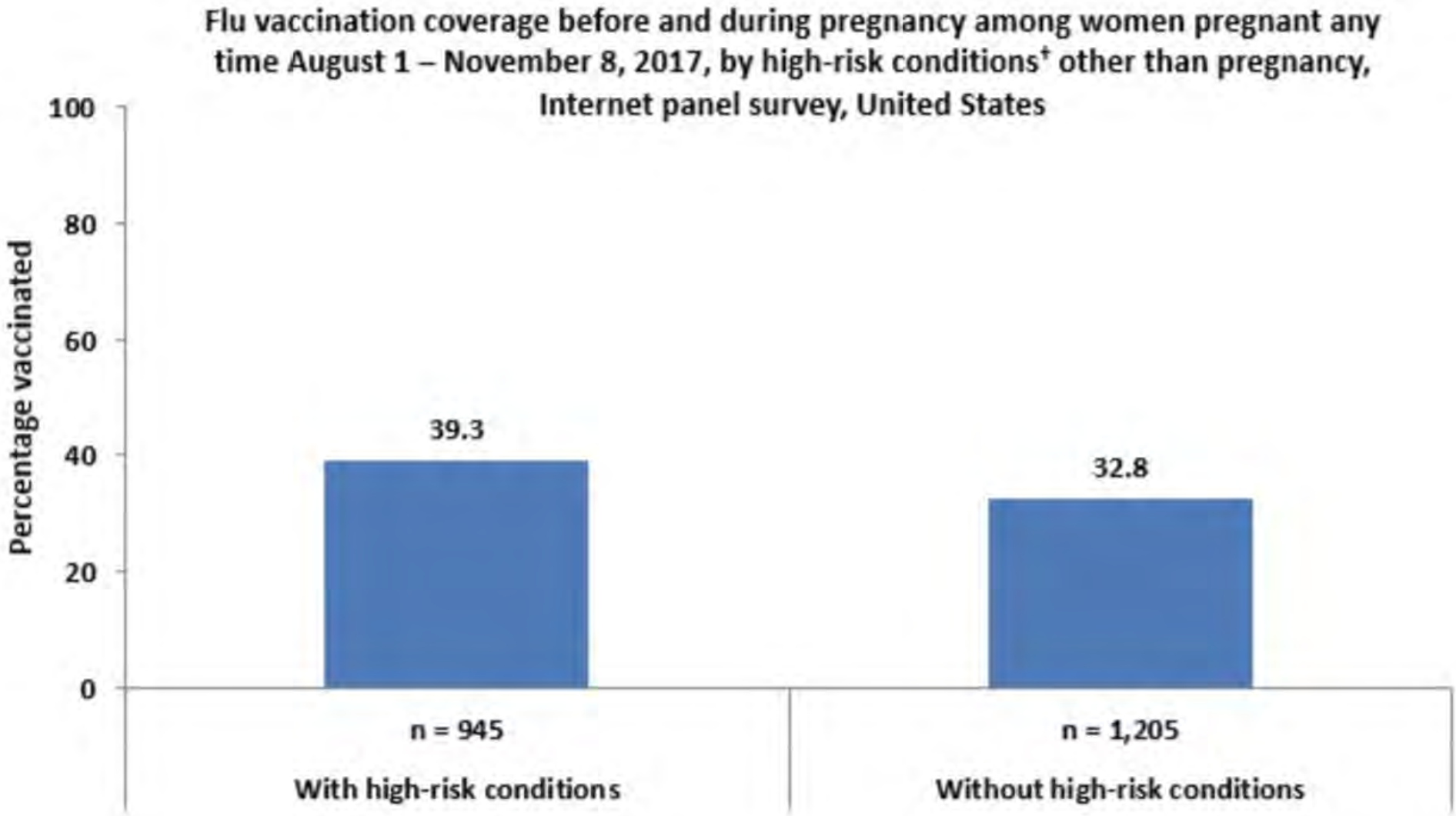


https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm



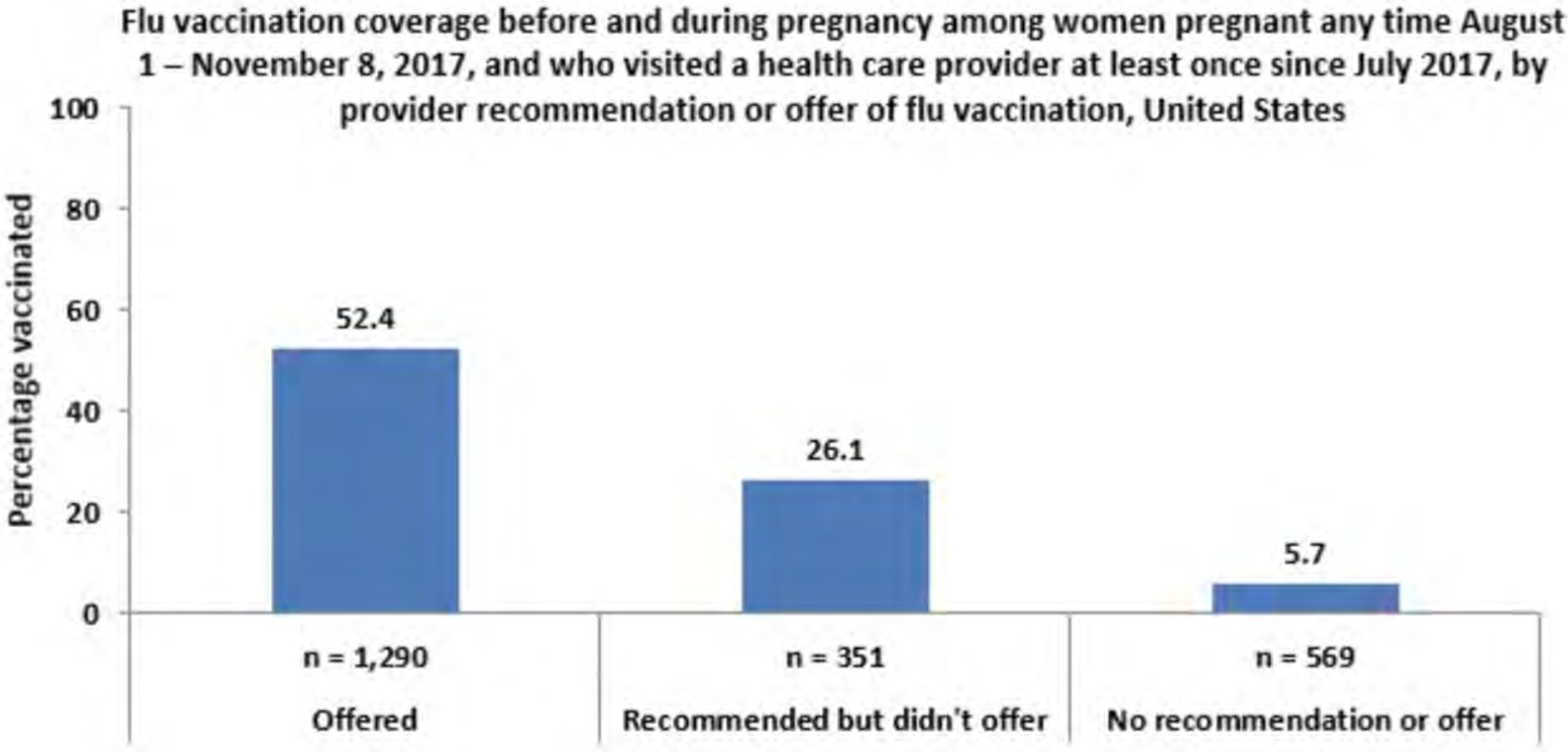
https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

Internet Panel – Pregnant Women: Vaccination by High Risk Conditions



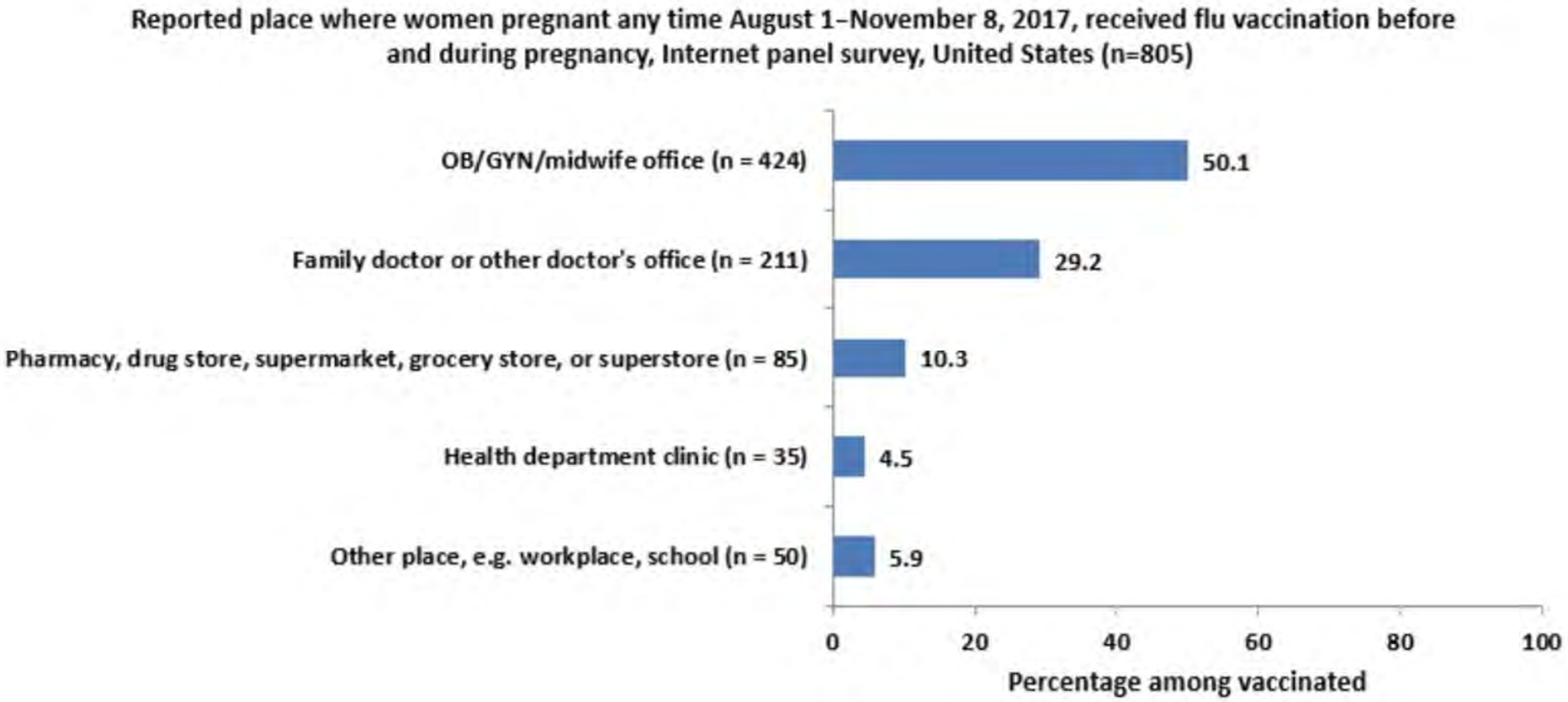
https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

Internet Panel – Pregnant Women: Vaccination by Health Care Provider Action



https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

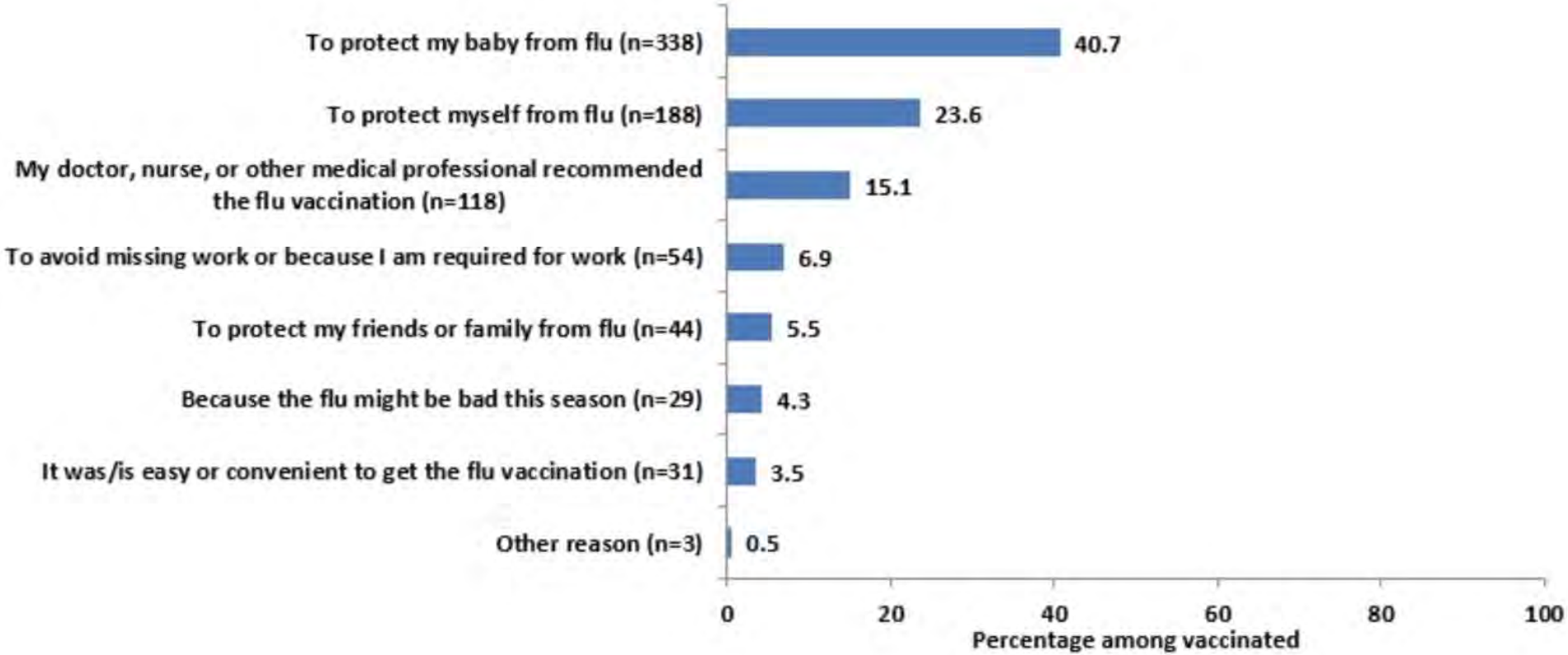
Internet Panel – Pregnant Women: Place Where Vaccinated



https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

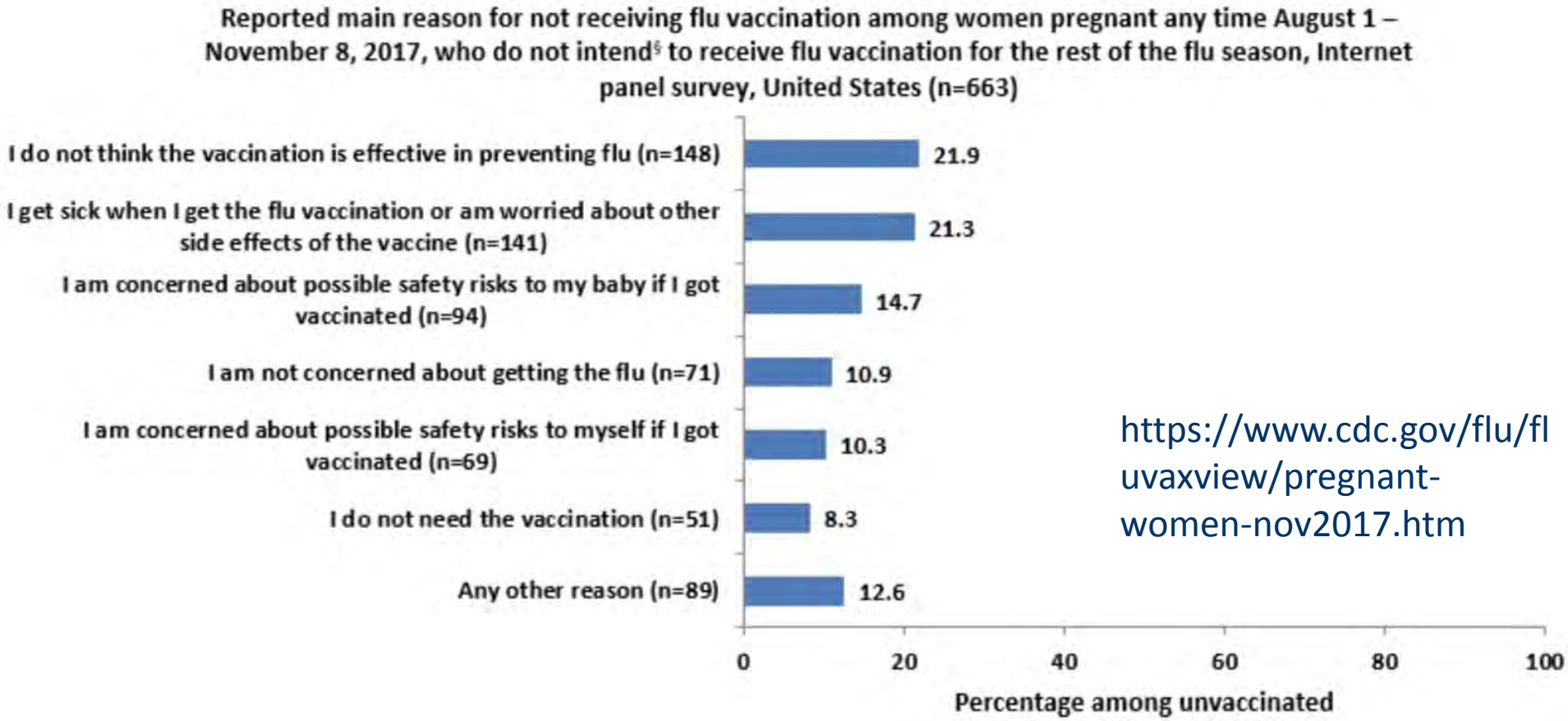
Internet Panel – Pregnant Women – Reason for Vaccination

Reported main reason for receiving flu vaccination among women pregnant any time August 1 – November 8, 2017, who were vaccinated before or during pregnancy (n=805)‡, Internet panel survey, United States



https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

Internet Panel – Pregnant Women: Reason for Not Getting Vaccinated



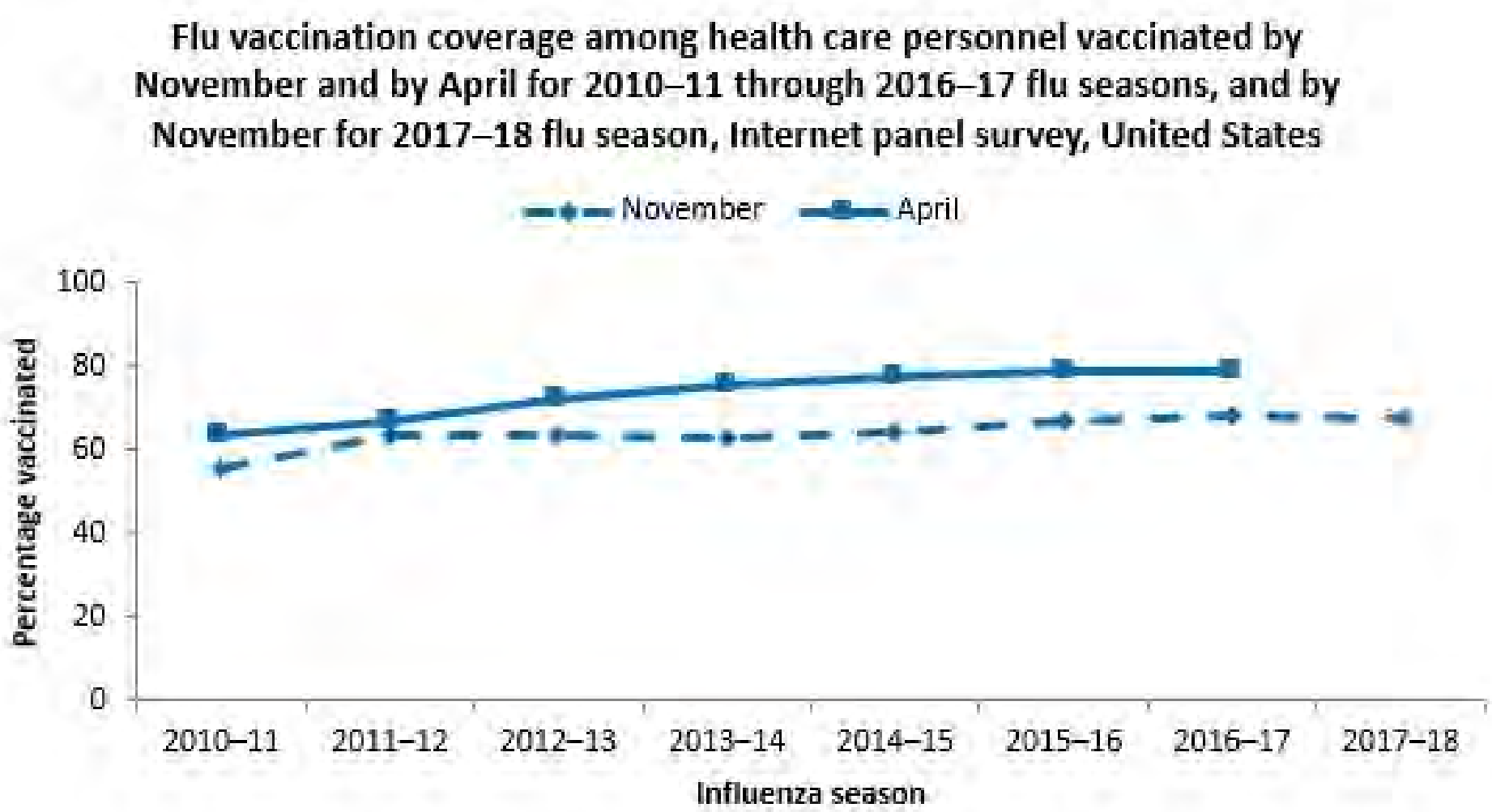
https://www.cdc.gov/flu/fluvaxview/pregnant-women-nov2017.htm

Continued efforts are needed to improve flu vaccination coverage among pregnant women, including:

- **Increasing the proportion of pregnant women who receive a recommendation for and offer of flu vaccination from their doctor or other medical professional:**
- Implementing and strengthening the systems that support provider ability to recommend and offer vaccination to pregnant women:
  - Standing orders; provider reminder systems; expanded access to vaccination services in multiple health care settings (e.g., pharmacies).

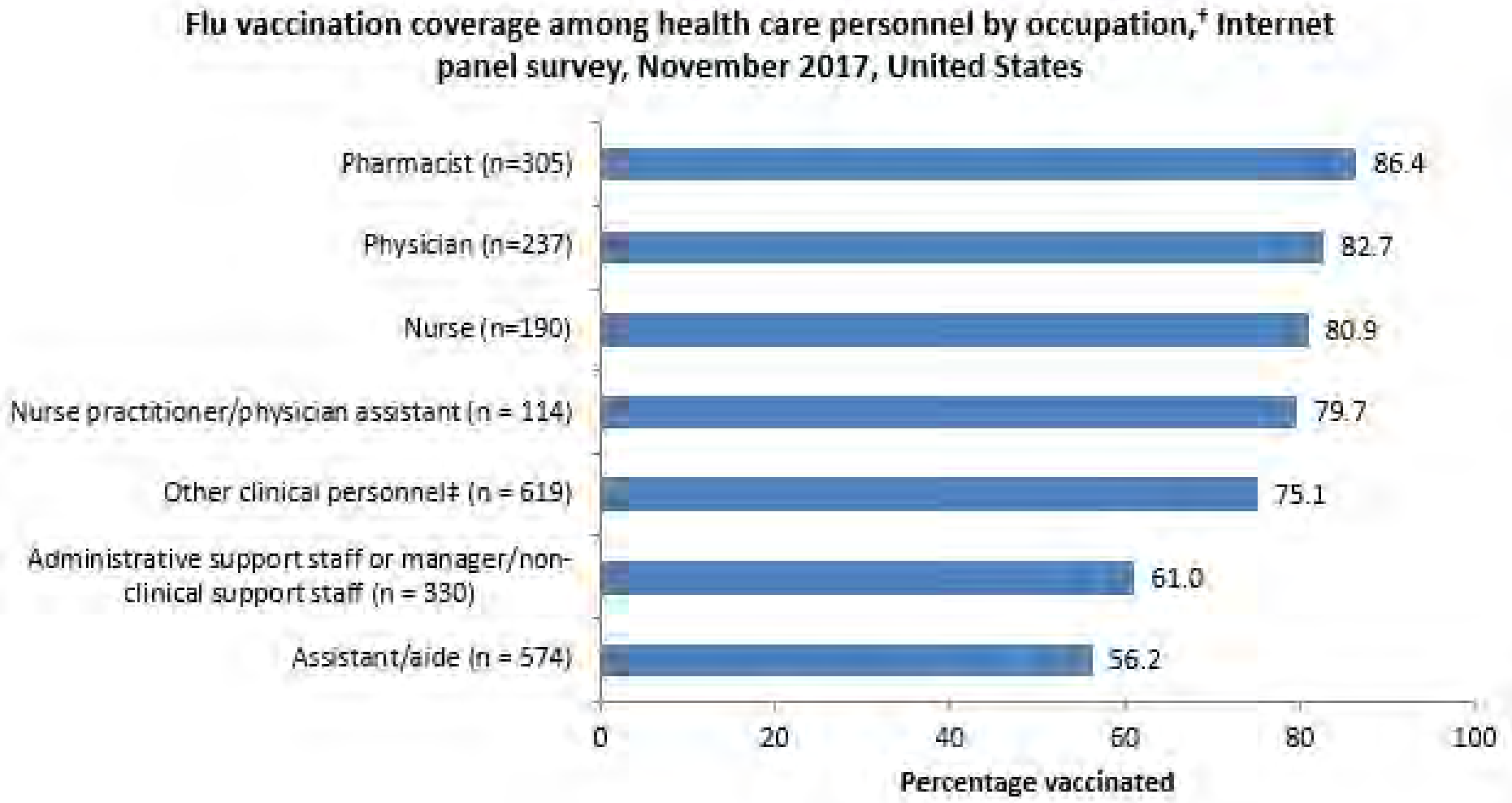
Vaccination of Health Care Personnel

- Influenza infection among health care personnel (HCP) can result in lost work days for HCP
- Ill HCP can spread flu to other HCP and to patients, including pregnant women, young children, older people, and those with medical conditions who are at higher risk of serious flu complications.
- Flu vaccination of HCP has been shown to reduce the risk of flu and absenteeism in vaccinated HCP and reduce the risk of respiratory illness and deaths in nursing home residents
- The Advisory Committee on Immunization Practices (ACIP) recommends that all HCP receive an annual flu vaccination
- Flu vaccination rates of HCP have improved over the past 6 years but are still under Healthy People 2020 target of 90%



https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm

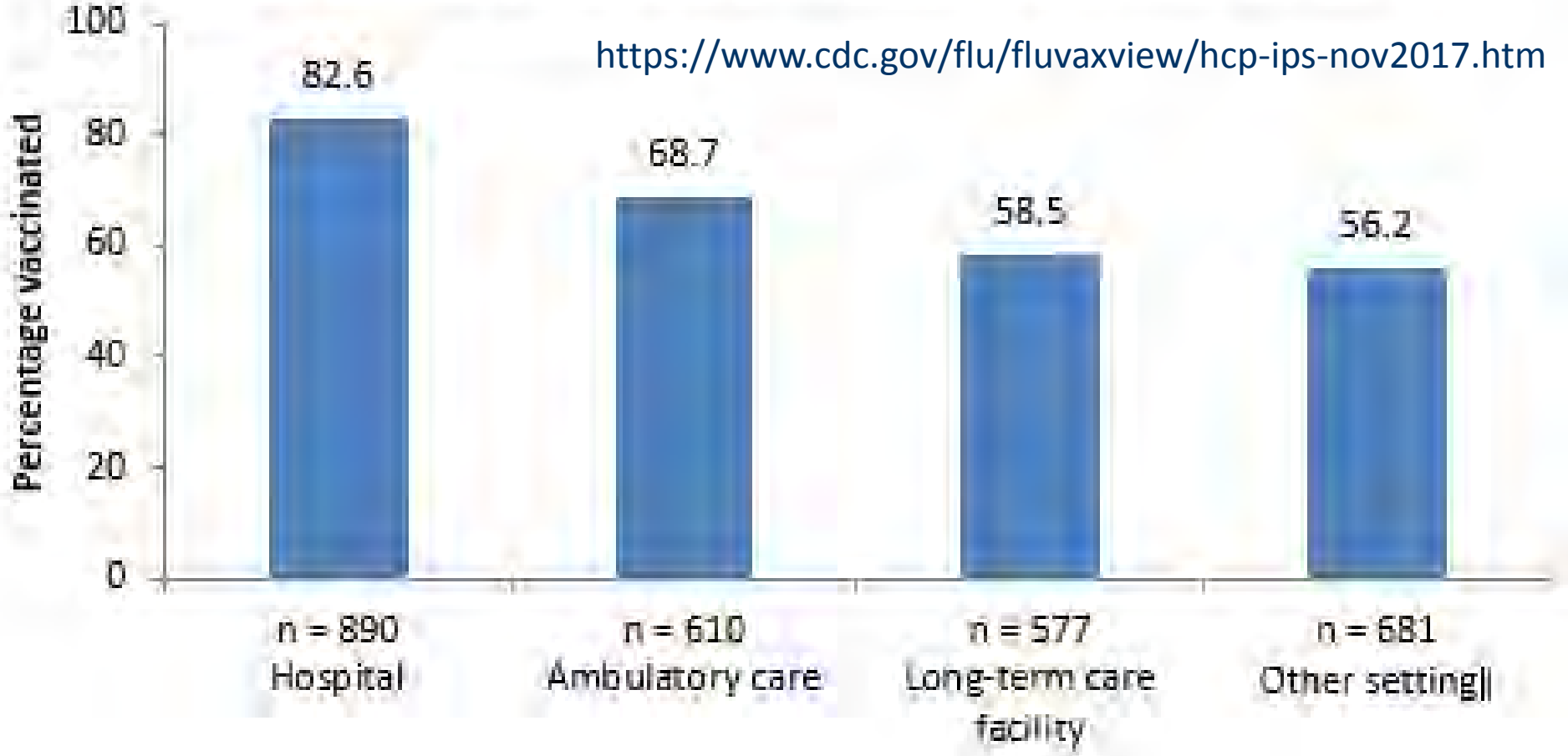
Vaccination of HCW, 2017-18 early season



https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2016.htm

Internet panel survey of 2,399 self-selected HCP 10/26-11/10/17

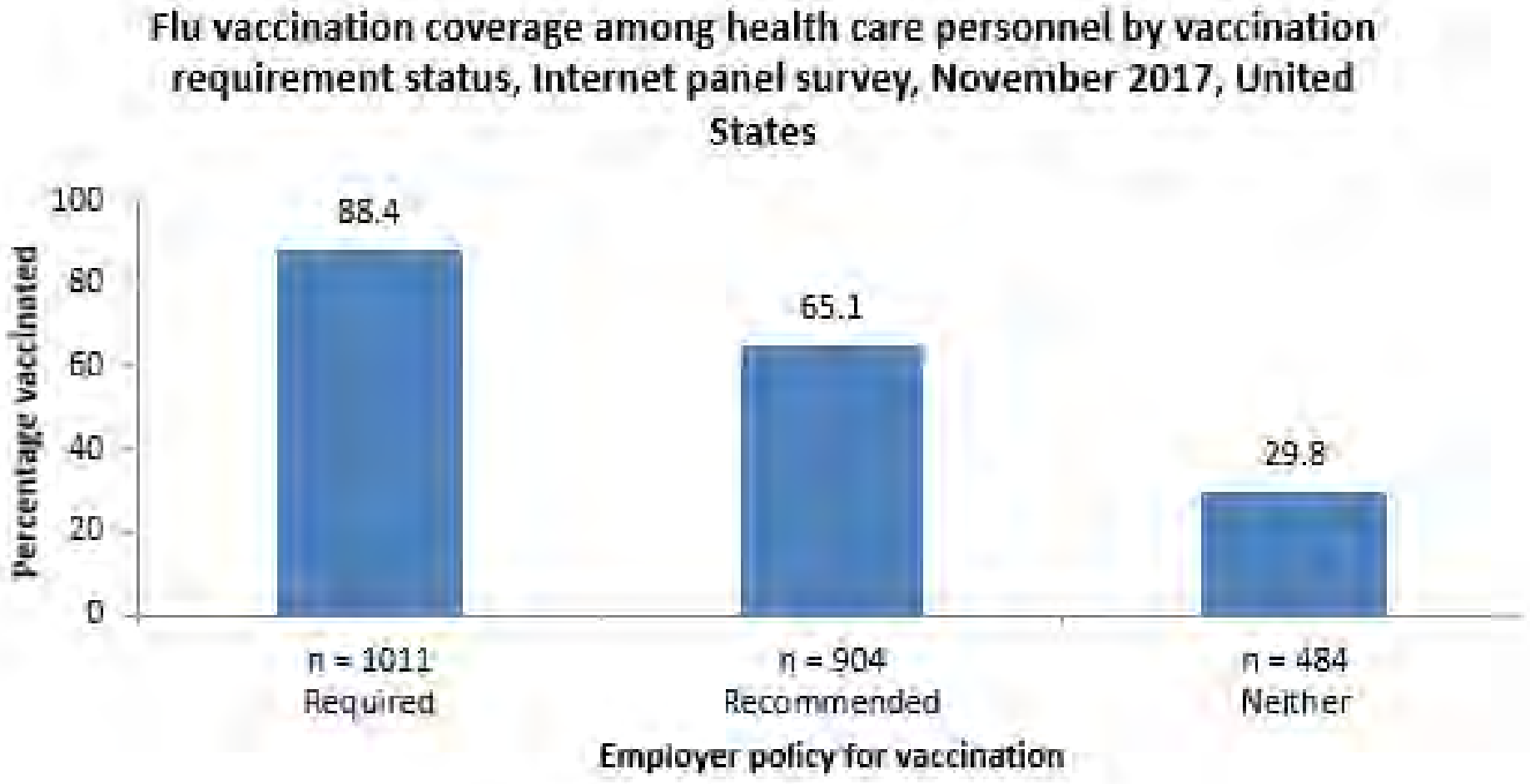
Flu vaccination coverage among health care personnel by work setting,§ Internet panel survey, November 2017, United States



https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm

- Coverage among HCP working in "other" settings decreased by 9.9 percentage points from early-season 2016–17 to early-season 2017–18

‖ Includes dental offices, pharmacies, emergency medical service locations, and other health care settings.



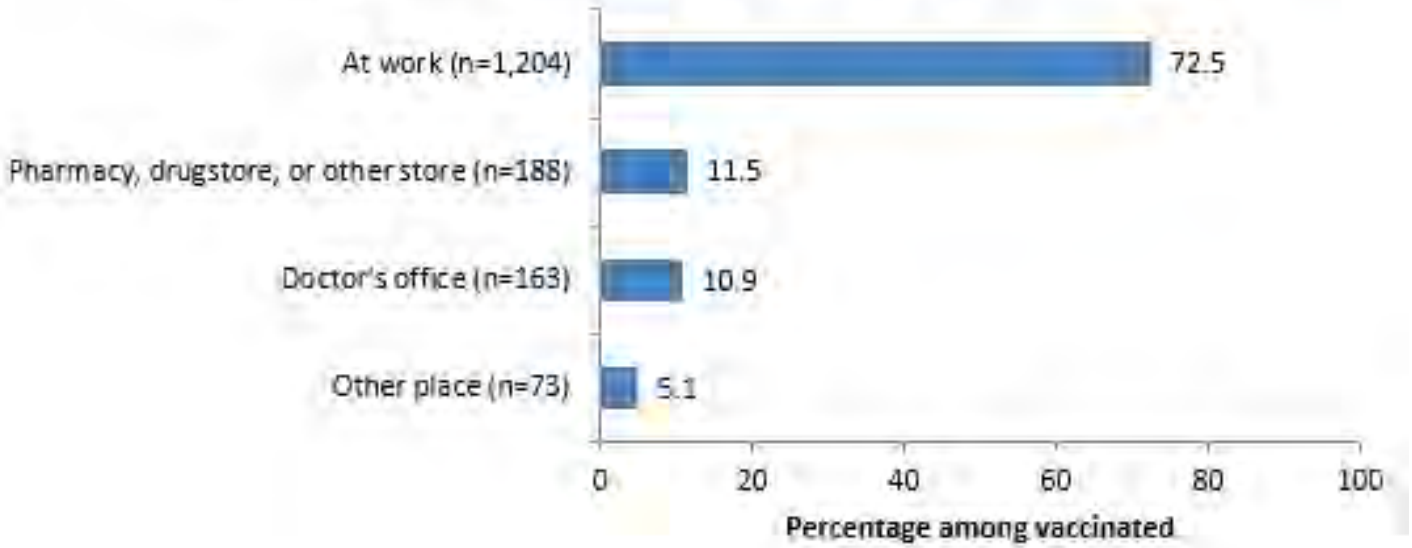
https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm

Percentage of HCP with an employer requirement for vaccination and percentage of HCP vaccinated with and without an employer requirement for vaccination, by work setting,[§] Internet panel survey, November 2017, United States

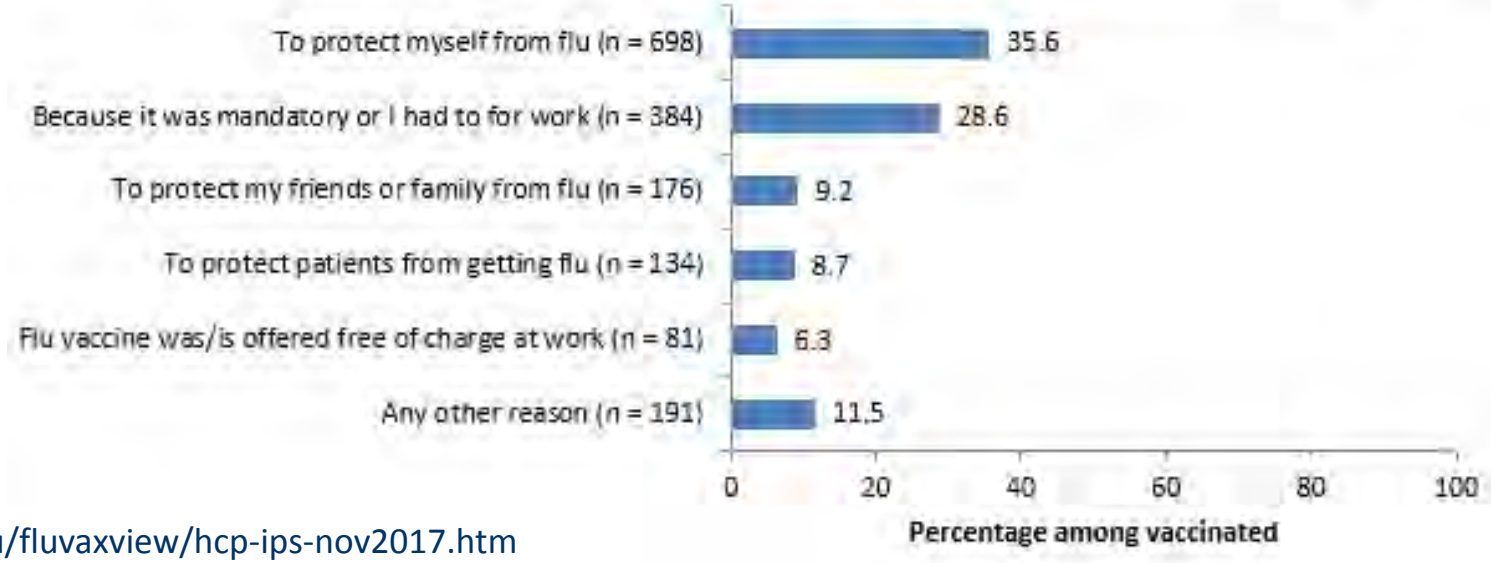
			Percentage vaccinated among HCP with and without an employer requirement for vaccination	
	Percentage of HCP with an employer requirement for vaccination		Required	Not required
	Unweighted n	Weighted %	Weighted %	Weighted %
Hospital	653	66.9	89.0	69.7
Ambulatory care / Physician office	282	41.7	91.2	52.5
Long-term care facility	166	28.4	86.5	47.5
Other setting[‖]	170	22.4	85.2	47.8
Total	1011	41.4	88.4	52.8

https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm

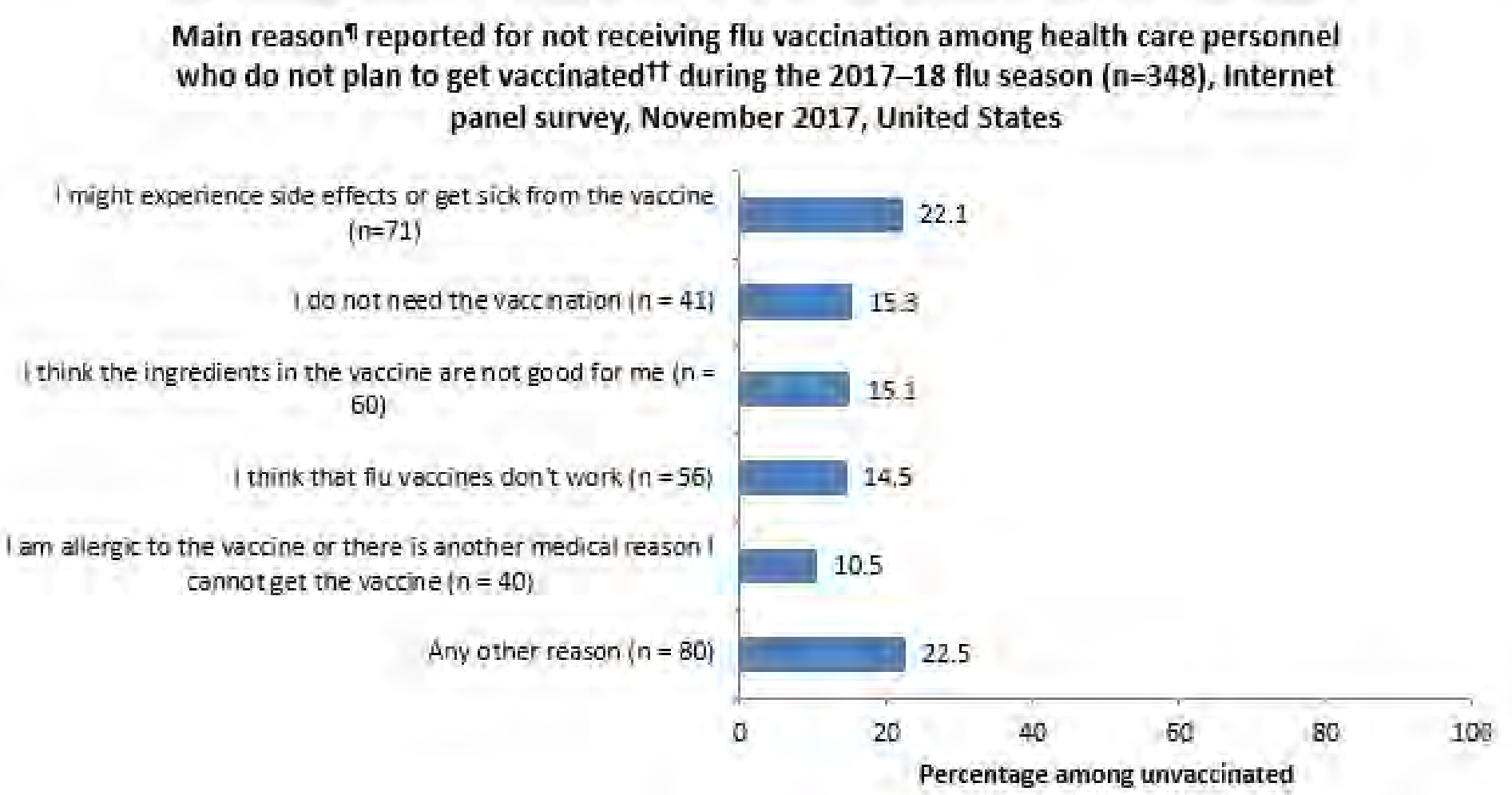
Reported place that health care personnel received flu vaccinations (n=1,664), Internet panel survey, November 2017, United States



Main reason¶ reported for receiving flu vaccination among vaccinated health care personnel (n=1,664), Internet panel survey, November 2017, United States



https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm



- Employers should offer flu vaccination to HCP:
  - Onsite over multiple days and shifts,
  - Free of charge, and with
  - Active promotion
- Educational materials should be provided to address questions and misperceptions about flu vaccination benefits and risks.

https://www.cdc.gov/flu/fluvaxview/hcp-ips-nov2017.htm

How do we counter this?

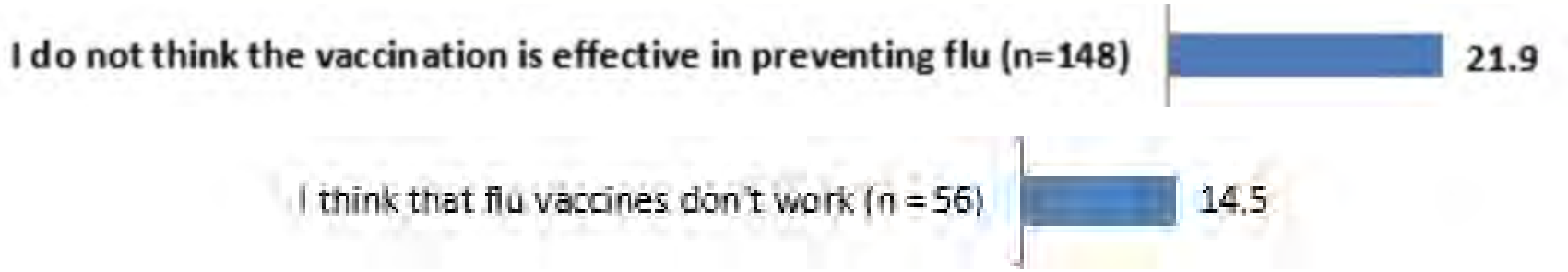


Table. Adjusted vaccine effectiveness estimates for influenza seasons from 2005-2016

Influenza Season†	Reference	Study Site(s)	No. of Patients‡	Adjusted Overall VE (%)	95% CI
2004-05	Belongia 2009	WI	762	10	-36, 40
2005-06	Belongia 2009	WI	346	21	-52, 59
2006-07	Belongia 2009	WI	871	52	22 ,70
2007-08	Belongia 2011	WI	1914	37	22, 49
2008-09	Unpublished	WI, MI, NY, TN	6713	41	30, 50
2009-10	Griffin 2011	WI, MI, NY, TN	[illegible]	56	23, 75
2010-11	Treanor 2011	WI, MI, [illegible]	[illegible]	[illegible]	53, 66
2011-12	Ohmit 2014	WI, MI, P[illegible]	[illegible]	[illegible]	36, 56
2012-13	McLean 2014	WI, MI, PA, TX, [illegible]	[illegible]	[illegible]	43, 55
2013-14	Gaglani 2016	WI, MI, PA, TX, WA	5999	52	44, 59
2014-15	Zimmerman 2016	WI, MI, PA, TX, WA	9311	19	10, 27
2015-16*	Jackson 2017	WI, MI, PA, TX, WA	6879	48*	41, 55*
2016-17**	ACIP presentation, Ferdinands [743 KB, 19 pages]	WI, MI, PA, TX, WA	7205	42**	35, 48

80% mismatch H3N2

http://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm

the **benefits** of **flu vaccination** 2014-2015

The estimated number of influenza-associated **illnesses prevented** by flu vaccination during the 2014-2015 season:

1.9 million

greater than the population of the city of Philadelphia

The estimated number of flu-associated **medical visits prevented** by vaccination during the 2014-2015 season:

966,000

as many people as can fit in Manhattan's Times Square

The estimated number of flu **hospitalizations prevented** during the 2014-2015 season:

67,000

as many people as Seattle's Seahawks stadium can seat

get **vaccinated**

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

DATA: www.cdc.gov/flu/about/disease/2014-15.htm
Morbidity and Mortality Weekly Report (MMWR), October 4–November 28, 2015: Vol. 64, No. 48
NCIRDIg-529 | 12.10.2015

www.cdc.gov/flu

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2010-11	Treanor 2011	WI, MI, NY, TN	4757	60	53, 66
2011-12	Ohmit 2014	WI, MI, PA, TX, WA	4771	47	36, 56
2012-13	McLean 2014	WI, MI, PA, TX, WA	6452	49	43, 55
2013-14	Gaglani 2016	WI, MI, PA, TX, WA	5999	52	44, 59
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http://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm

the **benefits** of **flu vaccination** 2015-2016

The estimated number of flu **illnesses prevented** by flu vaccination during the 2015-2016 season:

5 million

as many people use Denver International Airport in one month

The estimated number of flu **medical visits prevented** by vaccination during the 2015-2016 season:

2.5 million

equal to the population of Portland, Oregon

The estimated number of flu **hospitalizations prevented** by vaccination during the 2015-2016 season:

71,000

enough to fill every registered hospital bed in the state of Texas

DATA: Influenza Division program impact report 2015-2016, https://www.cdc.gov/flu/about/disease/2015-16.htm

NCIRDjg-607 | 12.06.2016

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

get **vaccinated**
www.cdc.gov/flu

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2012-13	McLean 2014	WI, MI,		49	43, 55
2013-14	Gaglani 2016	WI, MI		2	44, 59
2014-15	Zimmerman 2016	WI, MI, PA, TX		19	10, 27
2015-16*	Jackson 2017	WI, MI, PA, TX, WA	6879	48*	41, 55*
2016-17**	ACIP presentation, Ferdinands [743 KB, 19 pages]	WI, MI, PA, TX, WA	7205	42**	35, 48

Good match this year, but only 34% effective against H3N2

http://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm

2016-17 Virus (Last Season) – Antigenic Match to Vaccine

- **2009 H1N1**
  - 99% match to 2016-2017 H1N1 vaccine component
- **Influenza A (H3N2)**
  - 93-95% match
- **Influenza B:**
  - ~71% Yamagata lineage (in only quadrivalent vaccine): 100% match
  - ~29% Victoria lineage (in trivalent and quadrivalent): ~85% match

MMWR 6/10/17; 66(25);668-676

Flu Vaccine Effectiveness Issues

- Even years with good match, effectiveness 40-60%; much lower than most non-influenza vaccines
- Concerns from Australian experience 2017
  - Record high numbers of cases and outbreaks
    - 215,280 notifications by mid-October; far exceeding 59,022 notifications from 2009 H1N1 pandemic
  - H3N2 predominant
  - Initial estimates of vaccine effectiveness against H3N2 only 10%
  - Same vaccine composition as we have this season

N Engl J Med 378;1 nejm.org January 4, 2018

Potential reasons for suboptimal effectiveness

- Prior influenza exposure and vaccination history
- Age, coexisting conditions
- Egg adaptation postulated
  - Vaccine virus acquires amino acid changes that facilitate replication in eggs during the egg production process
    - Changes in the hemagglutinin (HA) protein that mediates receptor binding
  - Influenza HA is the primary target of neutralizing antibodies, small modifications in this protein can cause antigenic changes in the virus and decrease vaccine effectiveness.
  - True impact on vaccine effectiveness largely unknown

N Engl J Med 378;1 nejm.org January 4, 2018

Egg-adapted mutation 2016-2017 season

- Circulating viruses possessed a HA glycosylation site that was lost in the vaccine strain during egg adaptation
  - Ferret and human antibodies elicited by vaccination poorly neutralized virus
- Most people who had strong antibody response to the HA glycosylation site had been vaccinated with recombinant (baculovirus) vaccine (not produced in eggs)
- The cell culture vaccine in 2016-17 was made from a seed virus that had initially undergone egg passage, so also had this mutation
  - Starting 2017-18 season, seed virus for cell culture vaccines will be made in cell culture
- Australian low vaccine effectiveness does not appear to be from antigenic mismatch; egg-propagated vaccine viruses appear to have acquired changes in the HA

N Engl J Med 378;1 nejm.org January 4, 2018

Number of Influenza Viruses Antigenically Characterized that Matched Vaccine Strains 2017-2018

Influenza Subtype/Lineage	Vaccine Strain	California	United States
Influenza A (H1)	A/Michigan/45/2015-like	9/9	41/41
Influenza A (H3)	A/Hong Kong/4801/2014-like	5/5	126/127
Influenza B Victoria*	B/Brisbane/60/2008-like	2/2	4/7
Influenza B Yamagata†	B/Phuket/3073/2013-like	8/8	71/71

* The influenza B Victoria lineage virus is included in both the 2017–2018 trivalent and quadrivalent influenza vaccines

† The influenza B Yamagata lineage virus is included in only the 2017–2018 quadrivalent influenza vaccine

- Cannot predict what vaccine effectiveness will be this season
  - "CDC believes U.S. VE estimates from last season are likely to be a better predictor of the flu vaccine benefits to expect this season against circulating H3N2 viruses in the United States. This is assuming minimal change to circulating H3N2 viruses. However, because it is early in the season, CDC flu experts cannot predict which flu viruses will predominate. "

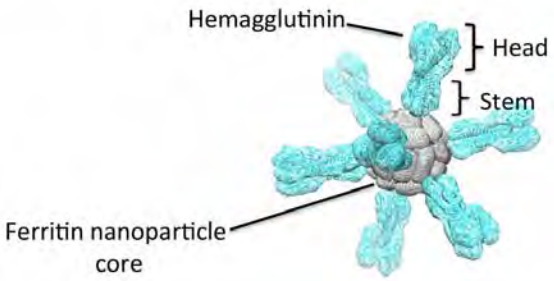
www.cdph.ca.gov
https://www.cdc.gov/flu/about/season/flu-season-2017-2018.htm#effectiveness

Future of influenza vaccine

- Other platforms instead of egg – recombinant, cell culture, etc.
- Eventual goal “universal” influenza vaccine that will protect against seasonal influenza drift variants as well as potential pandemic strains, not subject to egg-based vaccine technology limitations
- Current seasonal influenza vaccines target HA head which varies; stem stays relatively unchanged, making it a good target for antibodies

Examples of vaccines under investigation

- NIAID experimental vaccine with ferritin, which assembles into nanoparticles. Targets HA stem
  - Showed promise in early animal trials
- NIAID vaccine with 4 subtypes HA in one vaccine
  - Uses non-infectious virus-like particles (VLP) immune response but cannot replicate or cause disease
  - Showed promise in animal trials; evaluating for human trials
- NIAID Phase I/II studies - Investigational DNA-based vaccine (called a DNA "prime") followed by a licensed seasonal influenza vaccine ("boost") to improve the potency and durability of seasonal influenza vaccines.



Clinicaltrials.gov – open studies

- A Study to Evaluate the Reactogenicity, Safety and Immunogenicity of GlaxoSmithKline (GSK) Biologicals' Investigational Supra-seasonal Universal Influenza Vaccines - Inactivated (SUIVs) (GSK3816302A) in Healthy Adults Aged 18 to 39 Years
- Safety and Immunogenicity of a Live-attenuated Universal Flu Vaccine Followed by an Inactivated Universal Flu Vaccine

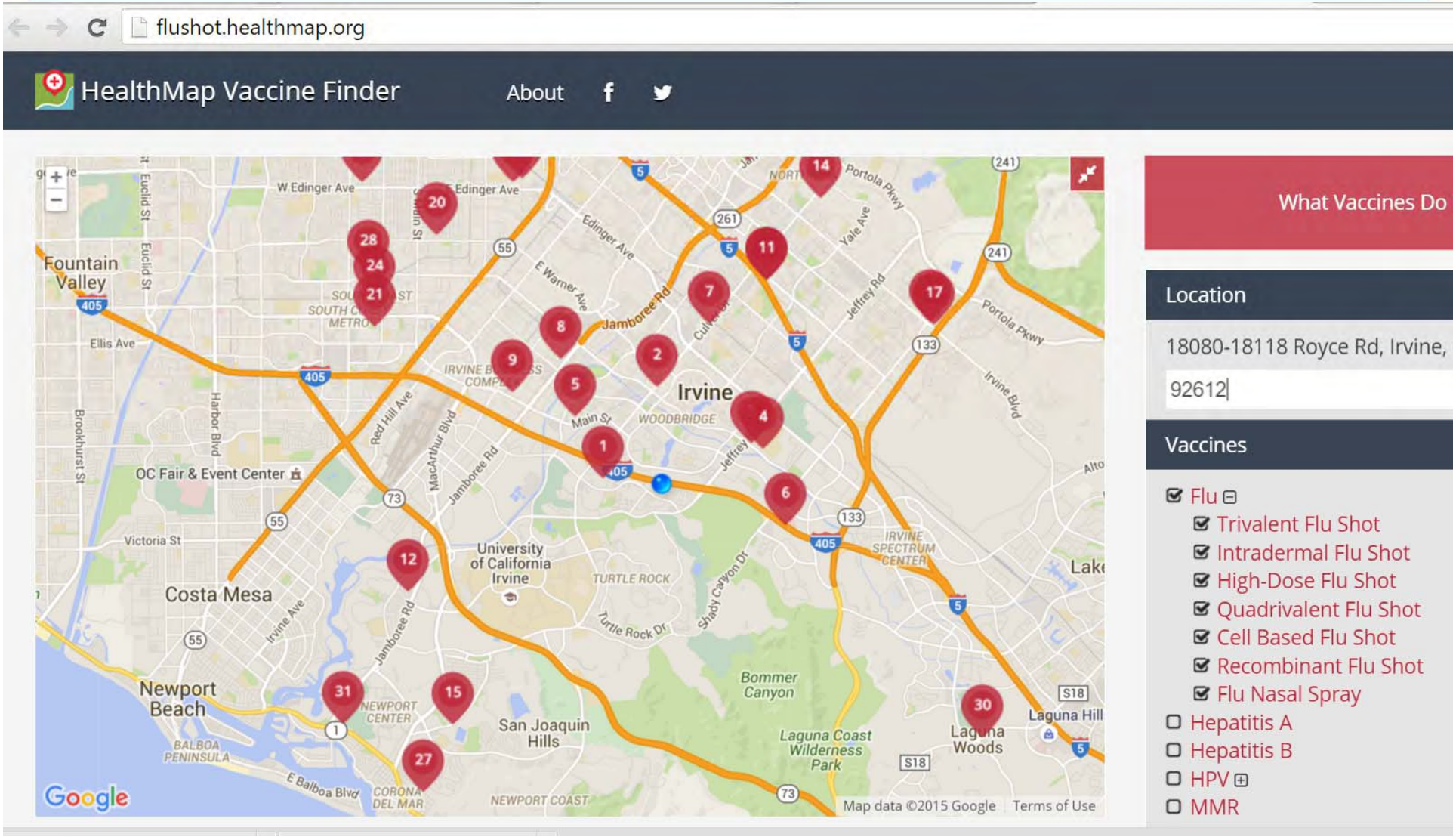
STILL A LONG WAY TO GO UNTIL WE HAVE UNIVERSAL VACCCINES

Current vaccine supply

- Estimated influenza vaccine supply 2017-18
  - 151-166 million doses injectable influenza vaccine (inactivated and recombinant) projected to be available this season
  - Approximately 130 million doses thimerosal-free vaccine expected

https://www.cdc.gov/flu/about/qa/vaxsupply.htm

http://flushot.healthmap.org



http://ochealthinfo.com/phs/about/family/flu

Where can I get a Flu Shot?

There are many ways to get your flu shot:

1. Ask your doctor

If you have health insurance, you can get a flu shot from your medical provider. It is usually free. Ask your doctor about it.

2. Find a clinic

See a **list of clinics** where you can get free flu shots in Orange County. You can also call (800) 564-8448 to find out where you can get a free flu shot.

3. Go to a pharmacy

Visit the **HealthMap Vaccine Finder** to find a pharmacy where you can get flu shots. Check with your health plan to see if it's covered.

4. Visit our clinic

If you don't have a doctor or health insurance, you can get a free flu shot from the Health Care Agency Flu Clinic (see below).

Health Care Agency Flu Clinic

The Public Health Services Family Health Clinic will be offering free flu shots every Wednesday, starting November 1, 2017 from 8:00 am to 11:30 am and 1:00 pm to 4:00 pm.

Beginning December 1, 2017, flu shots will be offered Monday through Friday from 8:00 am to 11:30 am and 1:00 pm to 4:00 pm. No appointment is needed.

Where: 1725 W. 17th Street, Santa Ana, CA 92706 map

Phone: For more information please call the Health Referral Line (800) 564-8448, Monday-Friday 8:00 AM – 5:00 PM

http://ochealthinfo.com/phs/about/family/flu

12/06/2017

Community Sites Offering Flu Vaccinations

Call to see if vaccinations are provided for children

Additional pages on website

FLU CLINIC LOCATIONS				
Location	**Address**	**Clinic Type**	**Schedule**	**Telephone**
AltaMed	8041 Newman Avenue Huntington Beach 92647	Walk-in	**Tuesdays and Thursdays** 10:00 am – 6:00 pm	For information call 888-499-9303
Friends of Family Health Center-Tustin	13152 Newport Avenue Suite B Tustin 92780	Walk-in	**Tuesdays** 9:00 am – 12:00 pm **Thursdays** 1:00 – 4:00 pm	For information call 714-263-8600
Health Care Agency	1725 W. 17th Street Santa Ana 92706	Walk-in	**Monday-Friday** 8:00 – 11:30 am 1:00 – 4:00 pm	For information call 800-564-8448
HOPE Clinic	2045 Meyer Place Building C Costa Mesa 92627	By Appointment Only	**Please call for appointment**	For information call 949-515-3725
Hurtt Family Health Clinic-Santa Ana	1100 B. North Tustin Avenue Suite A Santa Ana 92705	Walk-in	**Monday-Friday** 8:30 am – 4:30 pm	For information call 714-247-0300

Even in influenza seasons with poor vaccine match….

- Vaccination still recommended
  - Can prevent serious outcomes and infection with other strains in the vaccine that may be circulating later
- Emphasizes need for adjunctive measures such as prompt antiviral therapy for those at high risk for complications

CDC SAYS:

"TAKE 3" ACTIONS TO FIGHT THE FLU

1 Vaccinate

2 Stop Germs

3 Antiviral Drugs

www.cdc.gov

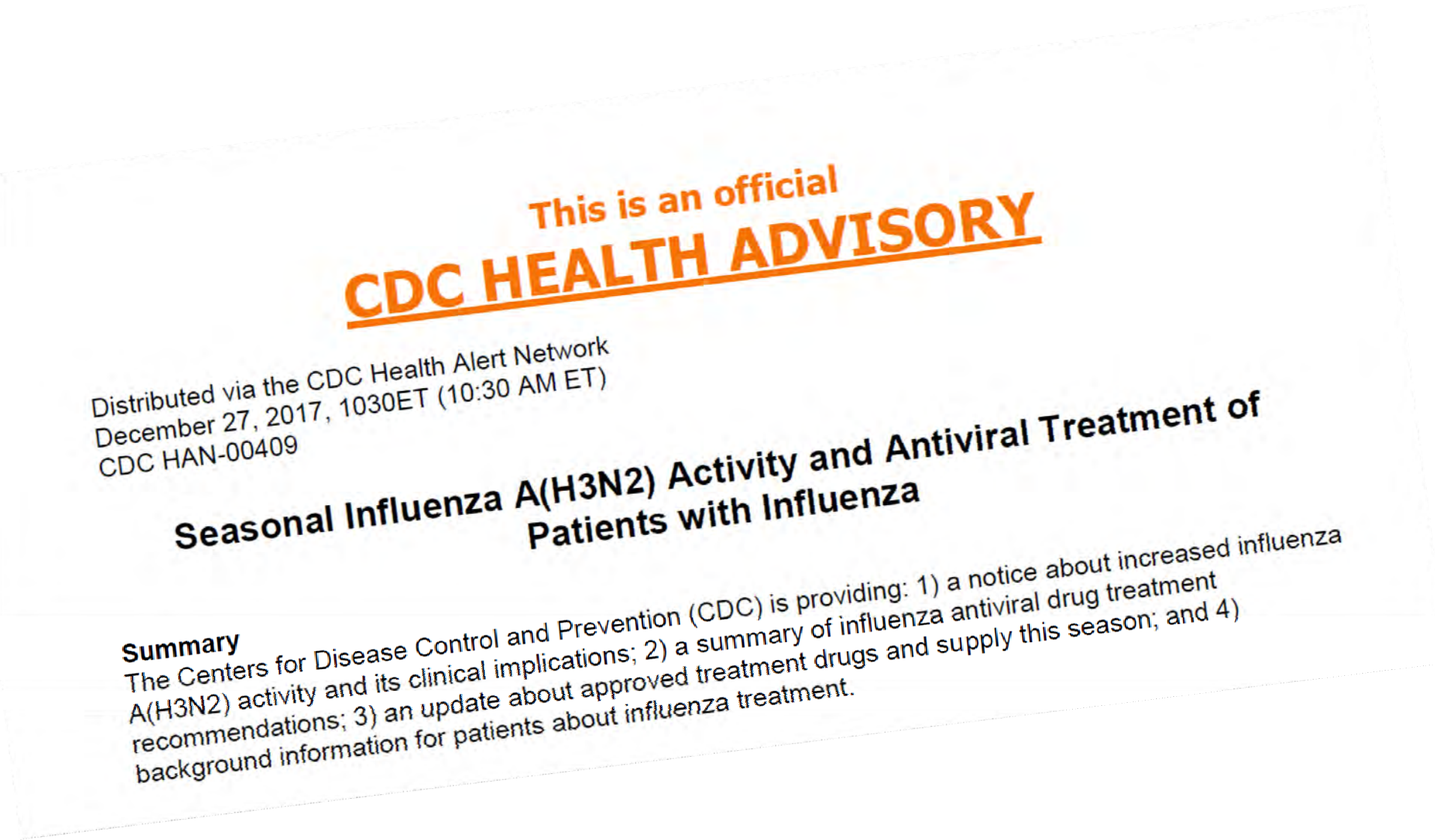

TAKE ANTIVIRAL DRUGS IF YOUR DOCTOR PRESCRIBES THEM!
Rx
FLU ANTIVIRALS
If you get the flu, antiviral drugs can be used to treat flu illness.
Antiviral drugs can make illness milder and shorten the time you are sick. They also can prevent serious flu complications, like pneumonia.
CDC recommends that antiviral drugs be used early to treat people who are very sick with the flu (for example, people who are in the hospital) and people who are sick with the flu and are at high risk of serious flu complications, either because of their age or because they have a high risk medical condition.
Learn more: https://www.cdc.gov/flu/consumer/treatment.htm
#FIGHT FLU
CDC

www.cdc.gov

Background on antiviral recommendations

- Clinical trials and observational data show that early antiviral treatment can shorten the duration of fever and illness symptoms, and may reduce the risk of complications from influenza (e.g., otitis media in young children, pneumonia, and respiratory failure).
- Early treatment of hospitalized patients can reduce death.
- In hospitalized children, early antiviral treatment has been shown to shorten the duration of hospitalization.
- Clinical benefit is greatest when antiviral treatment is administered early, especially within 48 hours of influenza illness onset.

http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm



This is an official

CDC HEALTH ADVISORY

Distributed via the CDC Health Alert Network
December 27, 2017, 1030ET (10:30 AM ET)
CDC HAN-00409

Seasonal Influenza A(H3N2) Activity and Antiviral Treatment of Patients with Influenza

Summary
The Centers for Disease Control and Prevention (CDC) is providing: 1) a notice about increased influenza A(H3N2) activity and its clinical implications; 2) a summary of influenza antiviral drug treatment recommendations; 3) an update about approved treatment drugs and supply this season; and 4) background information for patients about influenza treatment.

https://emergency.cdc.gov/han/index.asp

Treatment

- Start antiviral treatment ASAP in patients with clinically suspected influenza illness who:
  - are hospitalized;
  - have severe, progressive or complicated illness, regardless of previous health status;
  - are at higher risk for influenza complications.
- Do not delay antiviral treatment for test results
- History of vaccination does not rule out influenza

- Antiviral treatment initiated later than 48 hours after illness onset can still be beneficial for some patients

High risk for complications

- Children <5 years, esp <2 years old
- Pregnant or post-partum women (within 2 weeks of delivery)
- Persons aged ≥65 years
- Adults and children with certain chronic medical problems, including:
  - chronic pulmonary (including asthma)
  - cardiovascular (except hypertension alone)
  - renal, hepatic, hematological (including sickle cell disease)
  - metabolic disorders (including diabetes mellitus)
  - neurologic and neurodevelopment conditions (including disorders of the brain, spinal cord, peripheral nerve, and muscle such as cerebral palsy, epilepsy [seizure disorders], stroke, intellectual disability [mental retardation], moderate to severe developmental delay, muscular dystrophy, or spinal cord injury)
  - extreme obesity (i.e., body-mass index is equal to or greater than 40)
  - immunosuppression, including that caused by medications or by HIV infection
- People aged younger than 19 years who are receiving long-term aspirin therapy
- American Indians/Alaska Natives
- Residents of nursing homes and other chronic-care facilities

https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm

Available Influenza Antivirals 2017-2018

- Recommended (neuraminidase inhibitors)
  - oral **oseltamivir** (Tamiflu®) **– generic FDA approved 2016**
  - inhaled **zanamivir** (Relenza®)
  - intravenous **peramivir** (Rapivab®) [FDA approved 12/2014]
  - Resistance low
- NOT Recommended (adamantanes) for years now!
  - amant[illegible]ine
  - riman[illegible]
  - Active a[illegible]uenza A, but not B
  - >99% [illegible]anc[illegible]amantanes in circulating influenza A H3N2 a[illegible]d 2009 H1N1 strains
  - DO NOT USE FOR TREATMENT OR PROPHYLAXIS

2017-2018 as of 12/30/17	Oseltamivir		Zanamivir		Peramivir
	Virus Samples tested (n)	**Resistant Viruses, Number (%)**	**Virus Samples tested (n)**	**Resistant Viruses, Number (%)**	**Virus Samples tested (n)**	**Resistant Viruses, Number (%)**
Influenza A (H1N1)pdm09	111	1 (0.9)	99	0 (0.0)	111	1 (0.9)
Influenza A (H3N2)	462	0 (.0)	462	0 (0.0)	375	0 (0.0)
Influenza B	117	0 (0.0)	127	0 (0.0)	127	0 (0.0)

- Majority of circulating influenza viruses are susceptible to neuraminidase inhibitors
  - Rare sporadic instances of oseltamivir-resistant and peramivir-resistant influenza A (H1N1)pdm09 and oseltamivir-resistant influenza A (H3N2) viruses have been detected worldwide
  - The resistant A (H1N1) isolates may remain susceptible to zanamivir

https://www.cdc.gov/flu/weekly/

CDPH data

	Oseltamivir Resistance
Influenza 2009A (H1)	1/10
Influenza A (H3)	0/45
Influenza B	0/10

Duration of Treatment or Chemoprophylaxis

Treatment	Recommended duration for antiviral treatment is 5 days for oseltamivir or zanamivir. Longer treatment courses for patients who remain severely ill after 5 days of treatment can be considered. For the treatment of uncomplicated influenza with intravenous peramivir, duration of treatment is 1 day.
Chemo prophylaxis	Recommended duration is 7 days (after last known exposure).
	For control of outbreaks in institutional settings (e.g. long-term care facilities for elderly persons and children) and hospitals, CDC recommends antiviral chemoprophylaxis for a minimum of 2 weeks, and continuing up to 1 week after the last known case was identified. Antiviral chemoprophylaxis is recommended for all residents, including those who have received influenza vaccination, and for unvaccinated institutional employees.

See http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm for dosing

Healthy symptomatic outpatients

- Antiviral treatment also can be considered for symptomatic outpatients not at high risk who have confirmed or suspected influenza on the basis of clinical judgment, if treatment can be initiated within 48 hours of illness onset
- For outpatients with acute uncomplicated influenza, oral oseltamivir, inhaled zanamivir, or intravenous peramivir may be used for treatment.
  - The recommended treatment course for uncomplicated influenza is two doses per day of oral oseltamivir or inhaled zanamivir for 5 days, or one dose of intravenous peramivir for 1 day.

http://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm

Antiviral Supply Issues

- Reports of local supply issues – NO state or national shortage of oseltamivir
- Wholesalers can order from manufacturer (Genentech) who can ship directly to retail or hospital pharmacies
  - Pharmacies should consider contacting their wholesaler's customer service desk to request drop shipments of antivirals from manufacturers if the wholesaler is unable to supply needed antiviral medication in a timely manner.

State of California—Health and Human Services Agency
California Department of Public Health

KAREN L. SMITH, MD, MPH
Director and State Public Health Officer

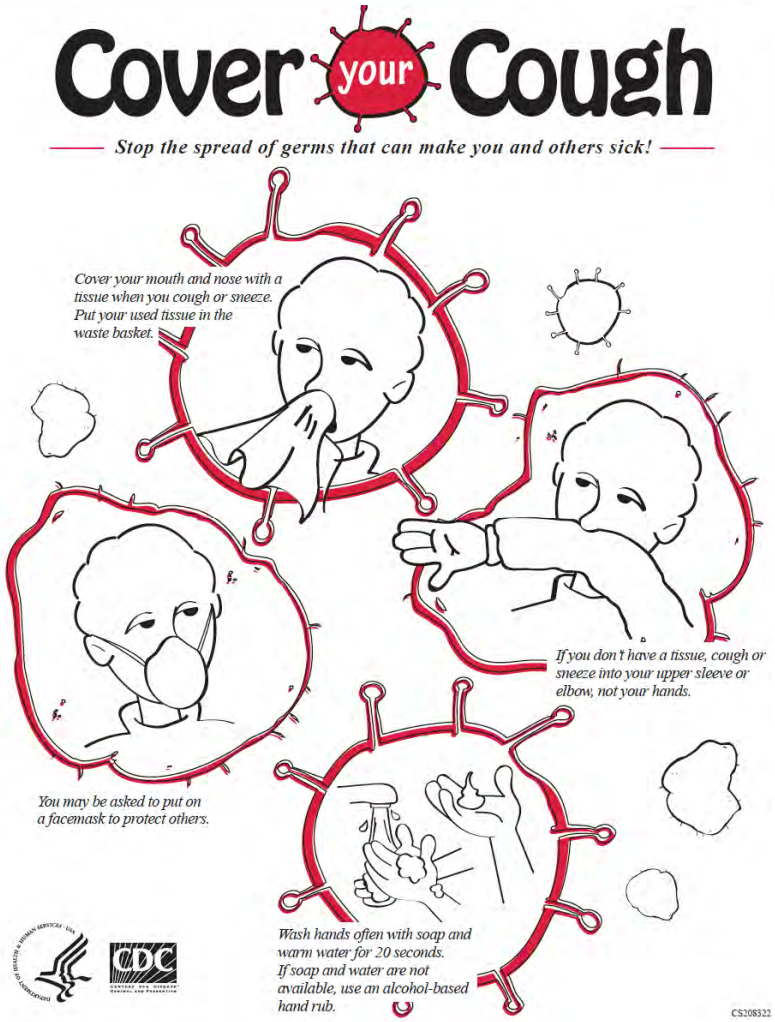
EDMUND G. BROWN JR.
Governor


TAKE ACTION TO PREVENT THE FLU.
Rx
Flu activity is widespread in most of the U.S. Take action to prevent flu!


CDC SAYS:
"TAKE 3" ACTIONS TO FIGHT THE FLU
1
Vaccinate
2
Stop Germs
3
Antiviral Drugs

Respiratory Hygiene/ Cough Etiquette

http://www.cdc.gov/flu/protect/covercough.htm



Droplet Precautions
in
health care settings

Contact avoidance

- Try to avoid close contact with sick people.
- While sick, limit contact with others as much as possible to keep from infecting them.
- If you are sick with flu-like illness, CDC recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities. (Your fever should be gone for 24 hours without the use of a fever-reducing medicine.)
- Avoid touching your eyes, nose and mouth. Germs spread this way.
- Clean and disinfect surfaces and objects that may be contaminated with germs like the flu.

Cleaning to Prevent the Flu

How long can the flu virus live on objects, such as doorknobs and tables?

The flu virus can "live" on some surfaces for up to 24 hours. Routine cleaning of surfaces may reduce the spread of flu.

What kills flu viruses?

Flu viruses are killed by heat above 167° F [75° C]. Common household cleaning products can also kill the flu virus, including products containing:

- chlorine
- hydrogen peroxide
- detergents (soap)
- iodophors (iodine-based antiseptics)
- alcohols

https://www.cdc.gov/immigrantrefugeehealth/pdf/seasonal-flu/contamination_cleaning_english_508.pdf

Environmental cleaning/disinfecting

- **Cleaning removes germs**, dirt, and impurities from surfaces or objects. Cleaning works by using soap (or detergent) and water to physically remove germs from surfaces. This process does not necessarily kill germs, but by removing them, it lowers their numbers and the risk of spreading infection.
- **Disinfecting kills germs** on surfaces or objects. Disinfecting works by using chemicals to kill germs on surfaces or objects. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface after cleaning, it can further lower the risk of spreading infection.
- **Sanitizing lowers the number of germs** on surfaces or objects to a safe level, as judged by public health standards or requirements. This process **works by either cleaning or disinfecting** surfaces or objects to lower the risk of spreading infection.

https://www.cdc.gov/flu/school/cleaning.htm

Routine cleaning and disinfecting

- Frequently touched items
  - Desks, countertops, doorknobs, computer keyboards, hands-on learning items, faucet handles, phones, toys, etc.
- Most studies have shown that the flu virus can live and potentially infect a person for up to 48 hours after being deposited on a surface
- Flu viruses are relatively fragile, so standard cleaning and disinfecting practices are sufficient to remove or kill them
- Wash surfaces with a general household cleaner to remove germs. Rinse with water, and follow with an EPA-registered disinfectant to kill germs
- If not visibly dirty, can use EPA-registered product that both cleans (removes germs) and disinfects (kills germs) instead
- **Always follow label directions on cleaning products and disinfectants**

https://www.cdc.gov/flu/school/cleaning.htm

Infection Control

Clinical Advisory (January 2, 2018)
Influenza

Infection prevention and control for influenza should include the following measures (excerpted from CDC's Prevention Strategies for Seasonal Flu in Healthcare Settings).
See also CDPH recommendations for the prevention and control of influenza in California long-term care facilities and All Facilities Letter (AFL).

1) Promote and administer seasonal influenza vaccine to health care providers and patients.

2) Take steps to minimize potential exposures.
    a. Before arrival to a healthcare setting
        - When scheduling appointments, instruct patients and persons who accompany them to inform healthcare personnel (HCP) upon arrival if they have symptoms of any respiratory infection and to take appropriate preventive actions (e.g., wear a facemask upon entry, follow triage procedure).
        - During periods of increased influenza activity, take steps to minimize elective visits by patients with suspected or confirmed influenza. For example, provide telephone consultation to patients with mild respiratory illness to determine if there is a medical need to visit the facility.
    b. Upon entry and during visit to a healthcare setting
        - Take steps to ensure all persons with symptoms of a respiratory infection adhere to respiratory hygiene, cough etiquette, hand hygiene, and triage procedures throughout the duration of the visit. Post visual alerts at the

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx

entrance and in waiting areas, elevators, cafeterias, etc. to provide patients and HCP with instructions (in appropriate languages) about respiratory hygiene and cough etiquette. See CDC and CDPH signage.

- Provide facemasks to patients with signs and symptoms of respiratory infection.
- Provide supplies to perform hand hygiene to all patients upon arrival to facility and throughout the entire duration of the visit to the healthcare setting.
- Provide space and encourage persons with symptoms of respiratory infections to sit as far away from others as possible. If available, facilities may wish to place these patients in a separate area while waiting for care.
- During periods of increased community influenza activity, facilities should consider setting up triage stations that facilitate rapid screening of patients for symptoms of influenza and separation from other patients

3) Monitor and manage ill healthcare personnel. Ill healthcare personnel should be excluded from work.

4) Adhere to standard and droplet precautions. Use caution when performing aerosol-generating procedures.
   - Influenza patients should be isolated in a single room or cohorted with other influenza patients if a single room is not available.
   - For aerosol-generating procedures, healthcare personnel should use an N95 respirator or higher level of respiratory protection.

5) Manage visitor access and movement within the facility. Visitors should be screened for illness. Visitors to patients in isolation for influenza should be limited to persons who are necessary for the patient's emotional well-being and care. Visitors who have been in contact with the patient before and during hospitalization are a possible source of influenza for other patients, visitors, and staff.

Eye on Influenza

Orange County Health Care Agency, Epidemiology & Assessment, 1719 W. 17th St. Santa Ana, CA 92706, (714) 834-8180

2005-06 Influenza Season Summary Report

Orange County

Eye on Influenza

Updates on Influenza in Orange County

December 2017 Volume 3

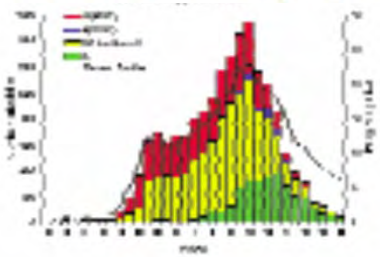
Sharp Increase in Influenza Activity in Orange County

Orange County has received a large number of influenza reports in the past week, in conjunction with increases in activity nationally. Key points:

- **It's not too late to vaccinate! Influenza vaccine is readily available at numerous locations throughout the county; see www.ochealthinfo.com/phs/about/family/flu.**
- **Clinicians should review the latest guidance on influenza treatment [attached Health Advisory] from the Centers for Disease Control and Prevention (CDC).**
- **Outbreaks of influenza have been reported from skilled nursing facilities in the County. Staff at long-term care facilities should review the recommendations for prevention and control of influenza outbreaks summarized on the next page and attached.**

deaths attributed to pneumonia and influenza did not exceed the epidemic threshold this season.

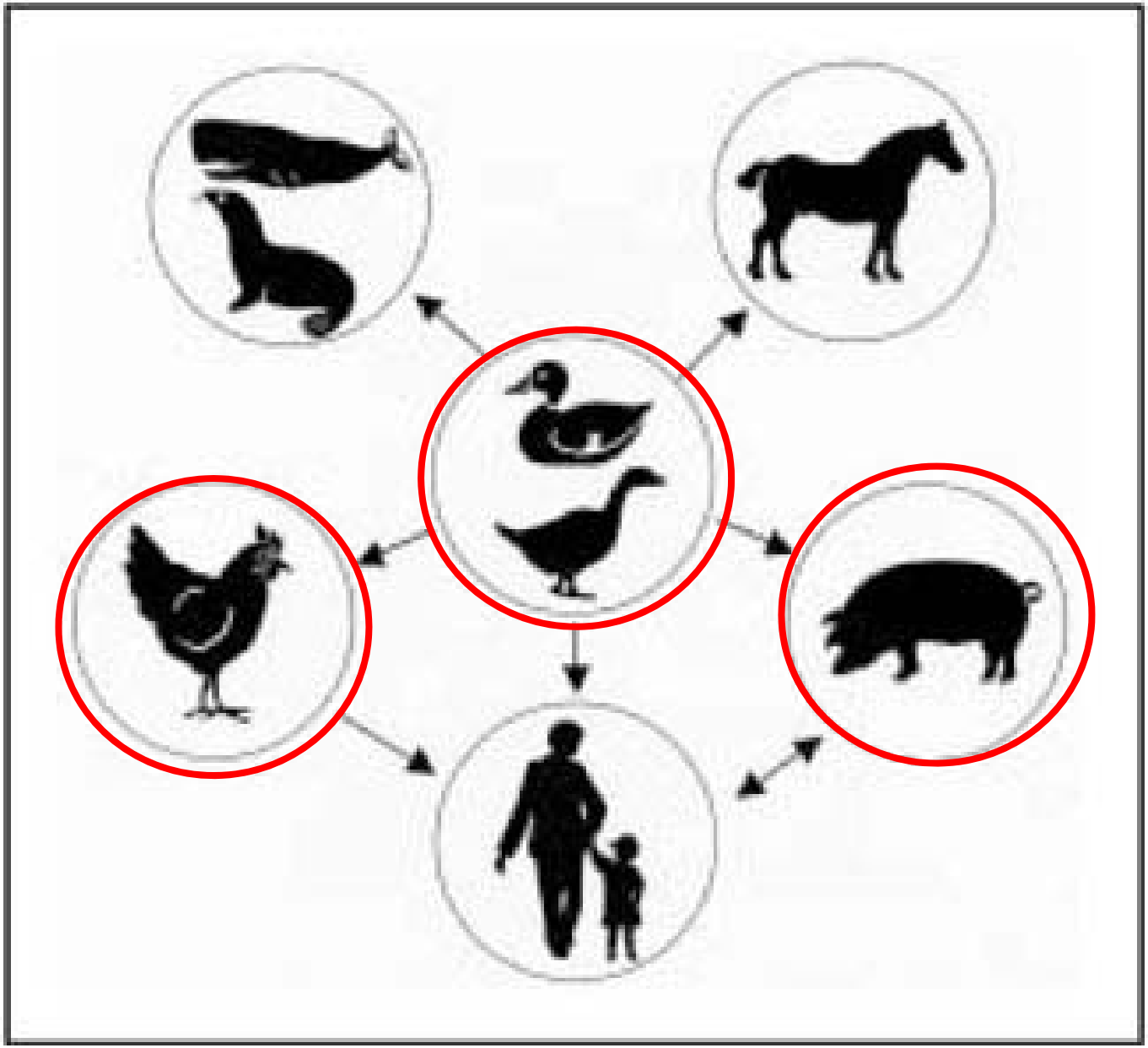
- Since October 2, 2005, 14,098 (80.9 %) positive flu specimens reported were flu A and 3,321 (19.1%) were B.
- Of the A subtypes identified, 92.4% were H3N2 and 7.6% were H1N1. 76% of H3N2 strains were A/California/07/2004-like and 14% were A/Wisconsin/67/2005-like.
- WHO has recommended that the 2006-07 trivalent influenza vaccine for the Northern Hemisphere contain A/New Caledonia/20/99-like (H1N1), A/Wisconsin/67/2005-like (H3N2), and B/Malaysia/2506/2004-like (from the B/Victoria lineage) viruses.



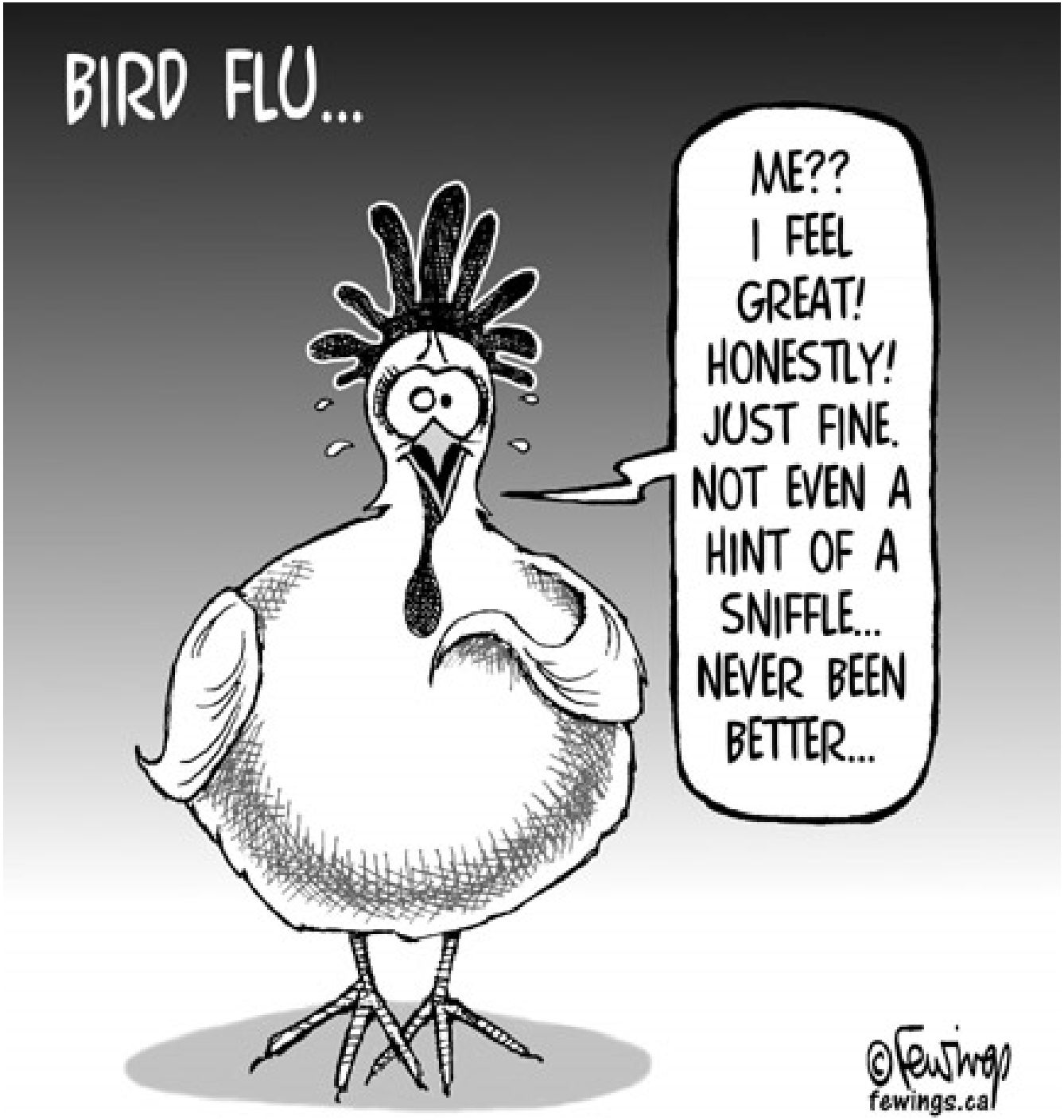
If you have any comments about the flyer, contact Pamela Rua Hipp or Sandra Nutter at (714) 834-8180.
To receive this newsletter by email, please contact us at epi@ochca.com.

Email epi@ochca.com or call
714-834-8180
to sign up

Aquatic birds are reservoirs for avian influenza viruses



http://www.mayoclinicproceedings.com/images/7904/7904crc-fig1.jpg, accessed 1/24/06


BIRD FLU...
ME??
I FEEL
GREAT!
HONESTLY!
JUST FINE.
NOT EVEN A
HINT OF A
SNIFFLE...
NEVER BEEN
BETTER...
©Fewings
fewings.ca

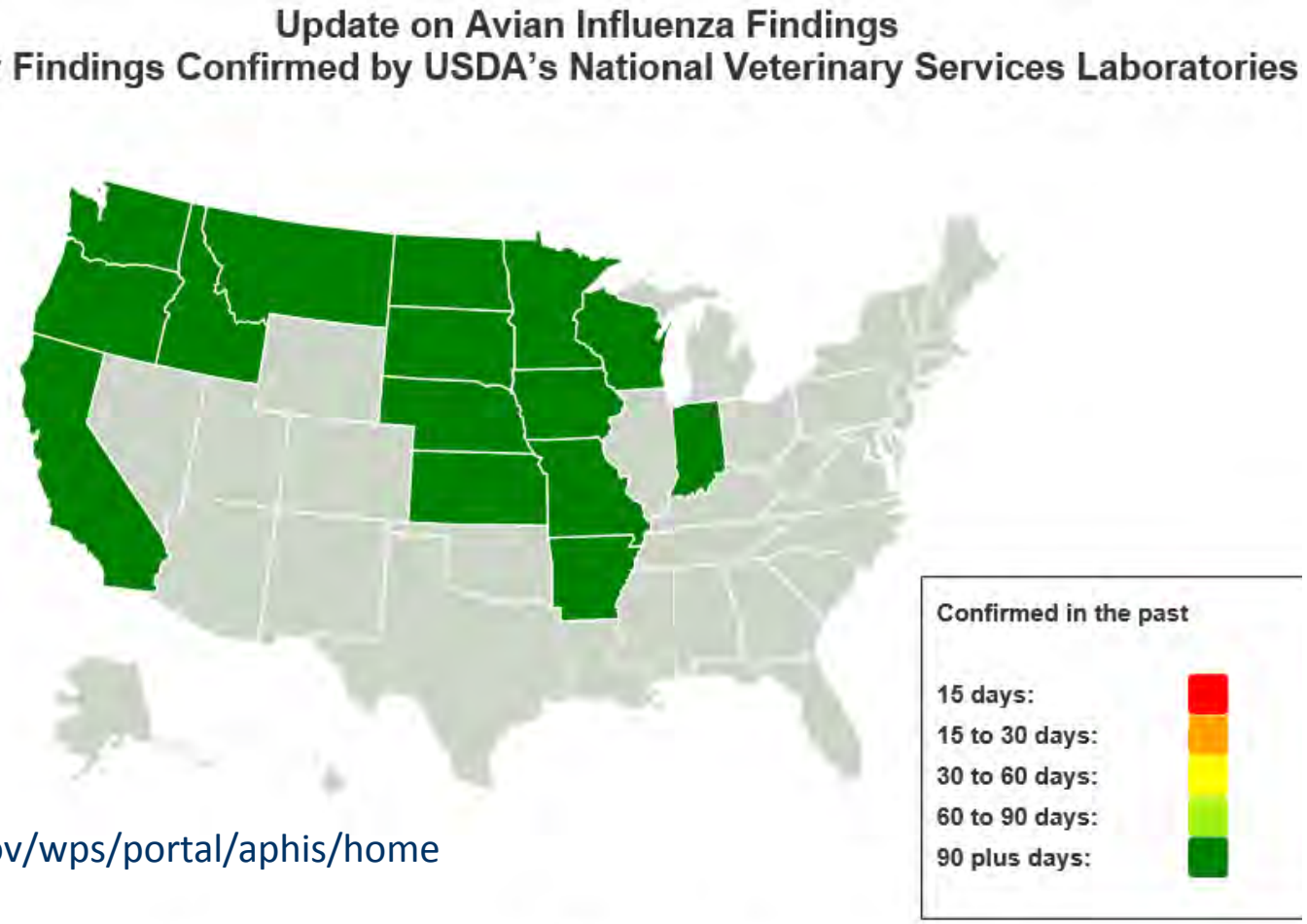
What is Avian Influenza?

- Avian influenza ≠ Pandemic influenza
- Strains of influenza that occur in birds
  - Many different strains (16 H, 9 N)
- Usually do not infect humans
- Wild birds may carry influenza viruses in their intestines but usually do not get sick
- In domestic poultry, 2 main forms of disease: “low pathogenic” and “highly pathogenic”

Suspect Avian Influenza

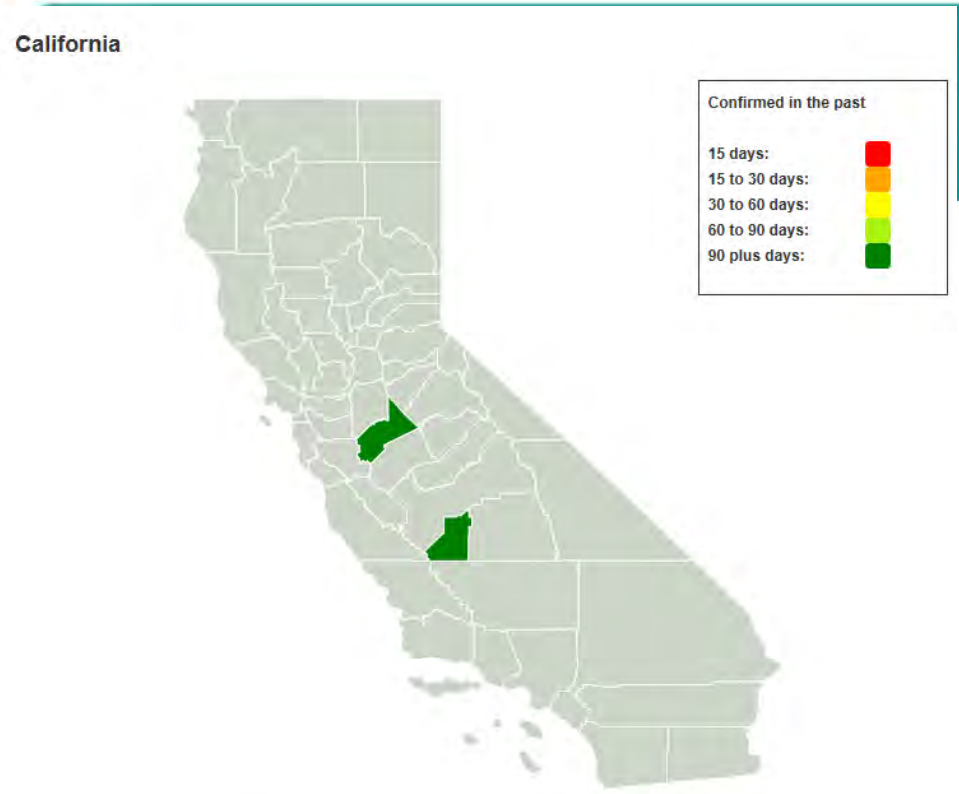
- Travel history to involved areas in past 10 days and appropriate symptoms
- Report to OC Public Health Epidemiology immediately at 714-834-8180
- Standard, contact and airborne precautions
- NP swab/aspirate for PCR at OCPHL (or ETT/BAL)
- Oseltamivir for treatment of hospitalized, confirmed or probable cases
- Oseltamivir prophylaxis of household/family member close contacts of confirmed cases; other contacts consider based on risk of exposure
  - Symptomatic contacts should be treated while under investigation

Highly Pathogenic (HPAI) Strains in the US too



http://www.aphis.usda.gov/wps/portal/aphis/home

219 Detections Reported	**48,082,293** Birds Affected
12/19/14 First Detection Reported	**6/17/15** Last Detection Reported



Kings and Stanislaus Counties

http://www.aphis.usda.gov/wps/portal/aphis/home

2	247,300
Detections Reported	Birds Affected
1/23/15	**2/12/15**
First Detection Reported	Last Detection Reported

th/SA_Animal_Disease_Info...

State	Flyway	Confirmed Detections	Last Detection Reported	Total Birds
Kings	Pacific	1	February 12, 2015	112,900
Stanislaus	Pacific	1	January 23, 2015	134,400

Consider testing the possibility of novel influenza A virus infection in…..

- Patients with medically-attended influenza-like illness (ILI) and acute respiratory infection (ARI) who have had recent contact[1] (<10 days prior to illness onset) with **sick or dead birds** in any of the following categories:
  - Domestic poultry (e.g., chickens, turkeys, ducks)
  - Wild aquatic birds (e.g., ducks, geese, swans)
  - Captive birds of prey (e.g., falcons) that have had contact with wild aquatic birds
- If suspected, contact OC Public Health, collect respiratory specimens with appropriate infection control precautions (standard, contact, and airborne) and send to OCPHL (courier)
  - NP swab or nasal aspirate or NP/nasal+oral
  - ETT or BAL
  - Viral transport media; keep at 4^{o}C for transport

Contact may include: direct contact with birds (e.g., handling, slaughtering, defeathering, butchering, preparation for consumption); or direct contact with surfaces contaminated with feces or bird parts (carcasses, internal organs, etc.); or prolonged exposure to birds in a confined space.

Evaluation of Possible HPAI H5 Patients

	HPAI H5-compatible signs/symptoms present (recommended actions)	NO HPAI H5-compatible signs/symptoms (recommended actions)
Patients recently exposed to infected birds or contaminated surfaces	1. Isolate patient and follow infection control recommendations below. 2. Initiate antiviral treatment. 3. Notify state/local health department.	1. Follow standard health care facility infection control practices/protocols. 2. Investigate other potential causes of the patient' signs and symptoms. 3. Contact state/local health department with any questions or concerns.

- Standard Precautions, plus Contact and Airborne Precautions are recommended
- If an airborne infection isolation room (AIIR) is not available, isolate the patient in a private room.
- Health care personnel should wear recommended personal protective equipment (PPE) when providing patient care.
- **Same infection control recommendations as for evaluation of patient with novel influenza.**

http://www.cdc.gov/flu/avianflu/clinicians-evaluating-patients.htm

Avian Influenza H7N2 in Cats in NY Shelter

- Outbreak of H7N2 in cats in NYC shelter reported December 2016
  - One associated human infection
    - Close, prolonged unprotected exposure to the respiratory secretions of infected, sick cats
    - Mild illness
    - No person-person spread noted
    - Contact investigation including domestic flight
    - Third human infection with H7N2 in U.S. [2002 (VA), 2003 (NY)]
    - Risk thought to be low for humans
    - Testing of virus for pathogenicity and effectiveness of 2002 candidate H7N2 virus
  - >350 people screened or tested for infection
- Avian influenza rarely reported in cats, but possible; guidance for cat owners available

https://www.cdc.gov/flu/spotlights/avian-influenza-cats.htm

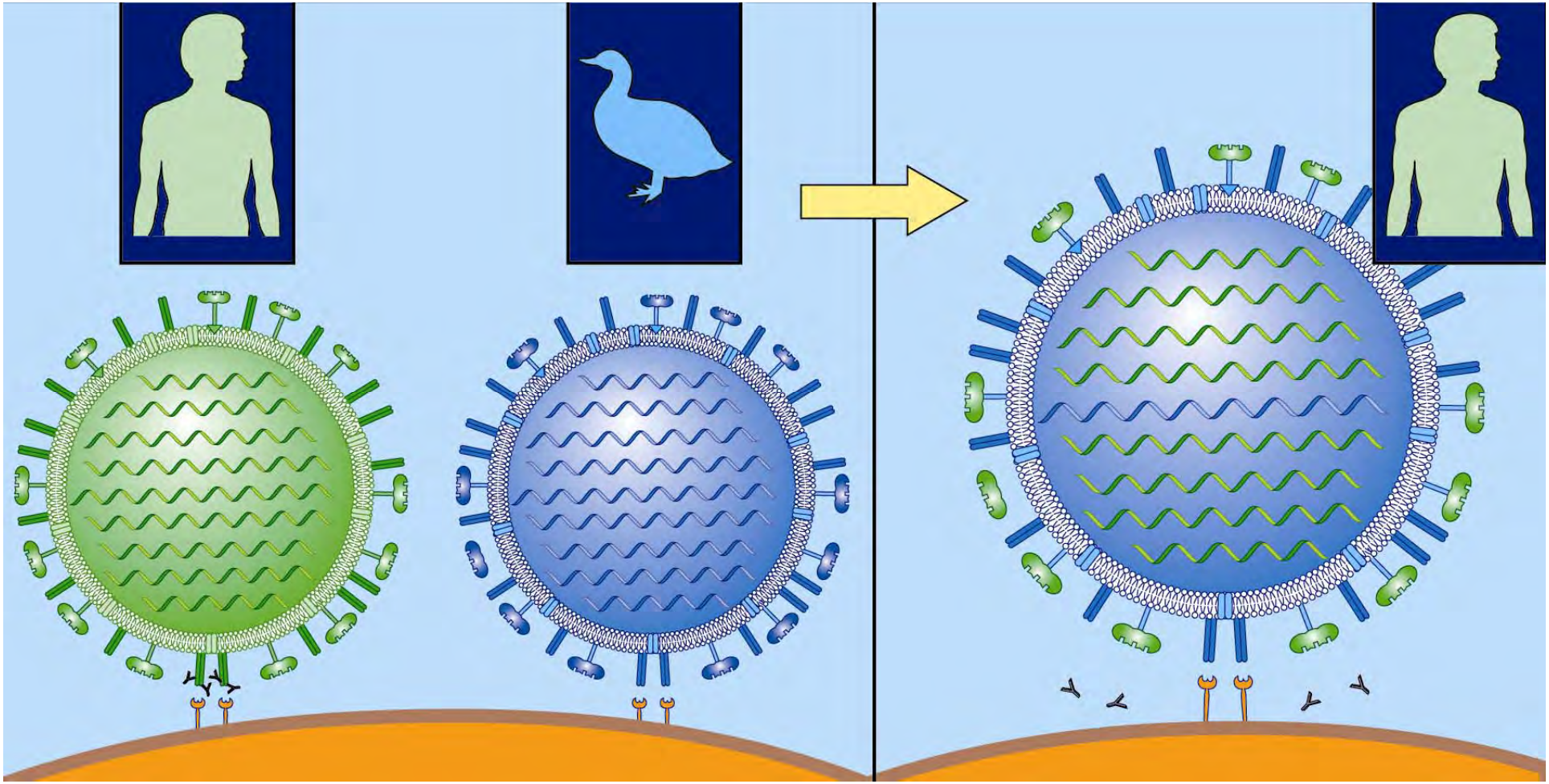
Viruses constantly changing, affecting different hosts

Canine influenza

- H3N8 and H3N2 – canine viruses, not human
- No human infections ever reported
- Canine H3N8 originated in horses, jumped to dogs, adapted and can spread in dogs
  - 2004: first detected in dogs – US greyhounds
  - Dog-specific virus now; spreads especially in kennels and shelters
  - Vaccine available
- Canine H3N2 – avian virus adapted to infect dogs
  - 2007: first detected in dogs – South Korea
  - Also in China, Thailand
  - Also has infected cats
  - 2015 (April): first detected in US dogs
  - Genetically different from human influenza

https://www.cdc.gov/flu/canineflu/keyfacts.htm

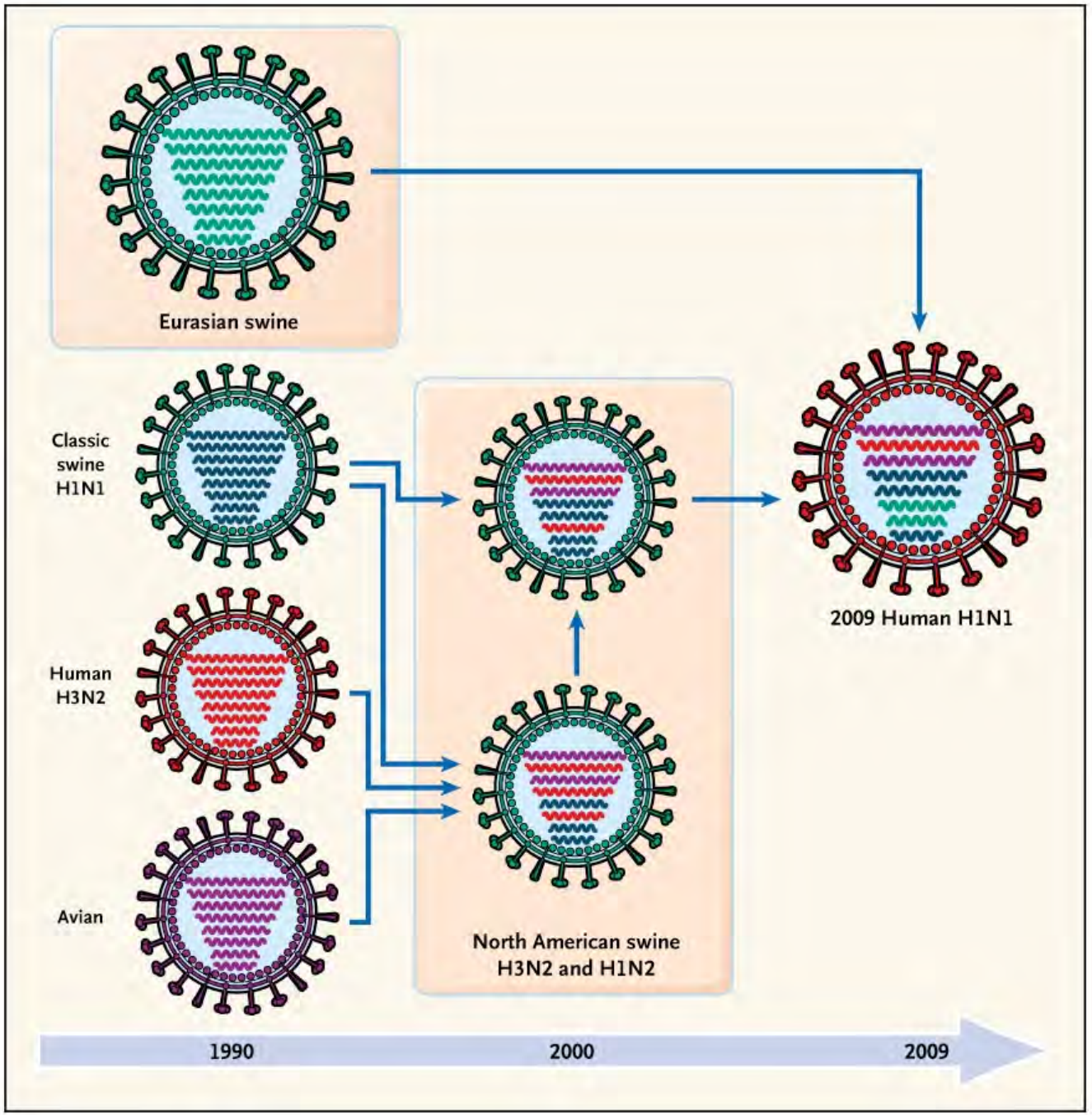
Pandemics – Antigenic Shift



Major variation; genetic reassortment

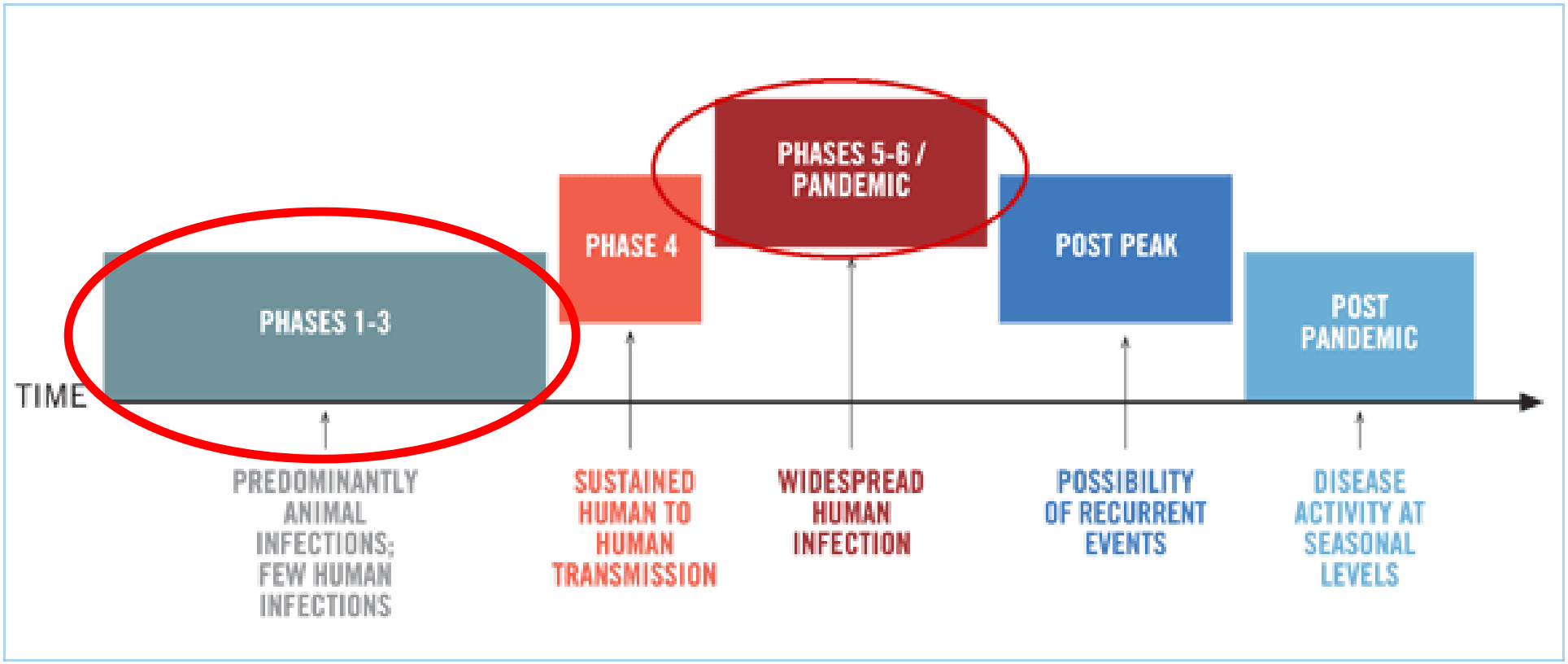
Different H or N subtypes. Can cause pandemics

Evolution of Novel H1N1 influenza virus (2009 H1N1 pandemic)



Trifonov et al. NEJM 361(2):115 July 9, 2009

WHO Pandemic Phases

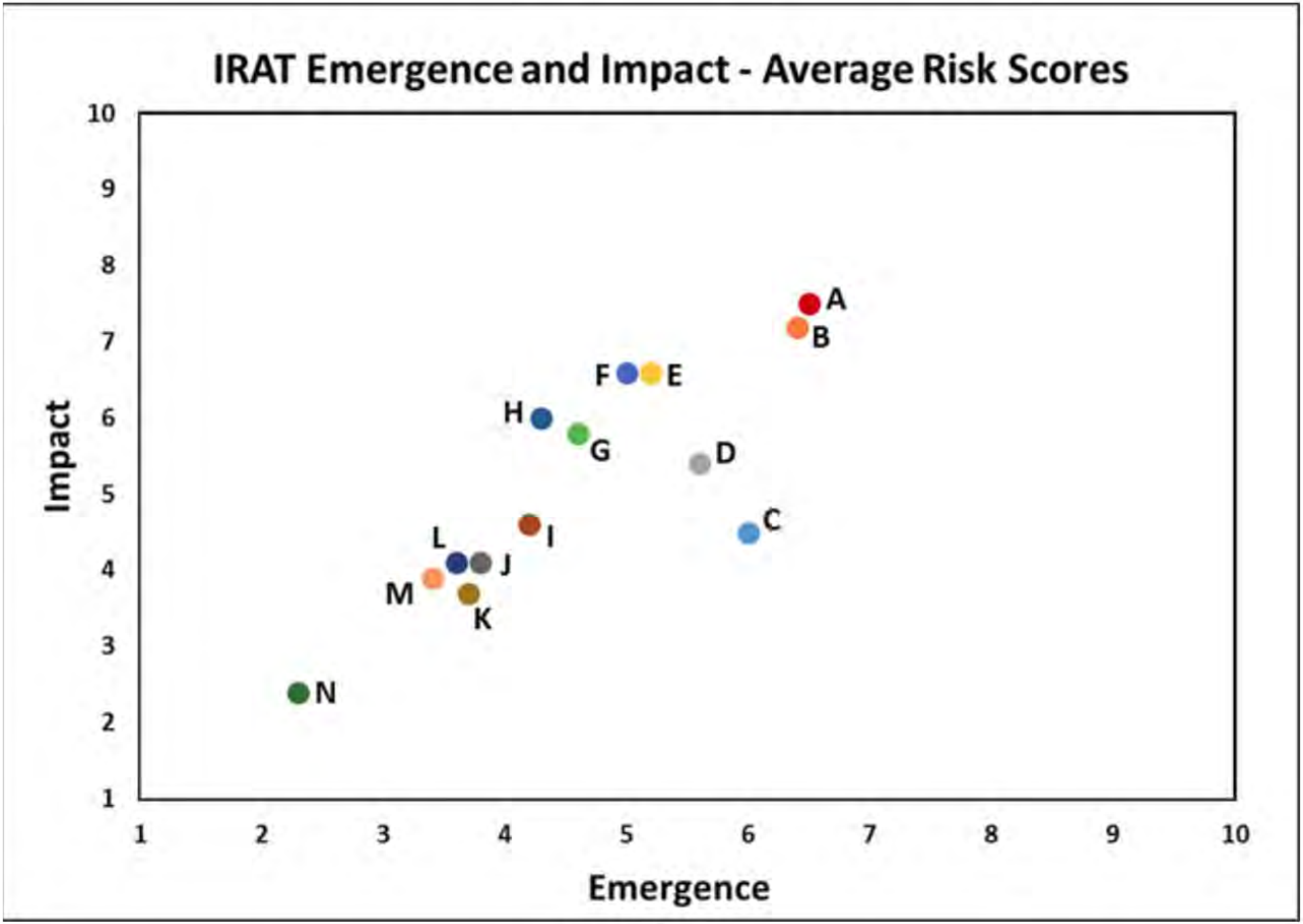


Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent…….

Influenza Risk Assessment Tool

Virus	Most Recent Date Evaluated	Potential Emergence Risk	Potential Impact Risk	Overall Summary
H1N1 [A/duck/New York/1996]	Nov 2011	2.3	2.4	Low
H3N2 variant [A/Indiana/08/2011]	Dec 2012	6.0	4.5	Moderate
H3N2 [A/canine/Illinois/12191/2015]	June 2016	3.7	3.7	Low
H5N1 Clade 1 [A/Vietnam/1203/2004]	Nov 2011	5.2	6.6	Moderate
H5N1 [A/American green-winged teal/Washington/1957050/2014]	Mar 2015	3.6	4.1	Low-Moderate
H5N2 [A/Northern pintail/Washington/40964/2014]	Mar 2015	3.8	4.1	Low-Moderate
H5N6 [A/Yunnan/14564/2015] – like	Apr 2016	5.0	6.6	Moderate
H5N8 [A/gyrfalcon/Washington/41088/2014]	Mar 2015	4.2	4.6	Low-Moderate
H7N7 [A/Netherlands/2019/2003]	Jun 2012	4.6	5.8	Moderate
H7N8 [A/turkey/Indiana/1573-2/2016]	July 2017	3.4	3.9	Low
H7N9 [A/Hong Kong/125/2017]	May 2017	6.5	7.5	Moderate-High
H7N9 [A/Shanghai/02/2013]	Apr 2016	6.4	7.2	Moderate-High
H9N2 G1 lineage [A/Bangladesh/0994/2011]	Feb 2014	5.6	5.4	Moderate
H10N8 [A/Jiangxi-Donghu/346/2013]	Feb 2014	4.3	6.0	Moderate

https://www.cdc.gov/flu/pandemic-resources/tools/irat-virus-summaries.htm



https://www.cdc.gov/flu/pandemic-resources/tools/irat-virus-summaries.htm

	Virus	Emergence Score	Impact Score
A	H7N9 [A/Hong Kong/125/2017]	6.5	7.5
B	H7N9 [A/Shanghai/02/2013]	6.4	7.2
C	H3N2 variant [A/Indiana/08/2011]	6.0	4.5
D	H9N2 G1 lineage [A/Bangladesh/0994/2011]	5.6	5.4
E	H5N1 Clade 1 [A/Vietnam/1203/2004]	5.2	6.6
F	H5N6 [A/Yunnan/14564/2015] – like	5.0	6.6
G	H7N7 [A/Netherlands/2019/2003]	4.6	5.8
H	H10N8 [A/Jiangxi-Donghu/346/2013]	4.3	6.0
I	H5N8 [A/gyrfalcon/Washington/41088/2014]	4.2	4.6
J	H5N2 [A/Northern pintail/Washington/40964/2014]	3.8	4.1
K	H3N2 [A/canine/Illinois/12191/2015]	3.7	3.7
L	H5N1 [A/American green-winged teal/Washington/1957050/2014]	3.6	4.1
M	H7N8 [A/turkey/Indiana/1573-2/2016]	3.4	3.9
N	H1N1 [A/duck/New York/1996]	2.3	2.4

https://www.cdc.gov/flu/pandemic-resources/tools/irat-virus-summaries.htm

1918

- "Spanish flu", caused by influenza A (H1N1)
- >20 million deaths from flu around the world
  - >500,000 in U.S. alone
  - More deaths than from War I
- Otherwise healthy adults affected

How to Prevent & Control Influenza

- Vaccination

- Covering your cough

- Washing your hands

- Staying home when ill
- For some people, antiviral medicines may be helpful

Pandemic H1N1 ("Swine Flu") 2009

- April 2009 – first cases of this novel Influenza A virus reported Southern California
  - Unique combination of gene segments not previously seen before in swine or human influenza viruses
- Person-to-person transmission; rapidly spread throughout the world
- WHO Pandemic Phase 6 declared June 2009

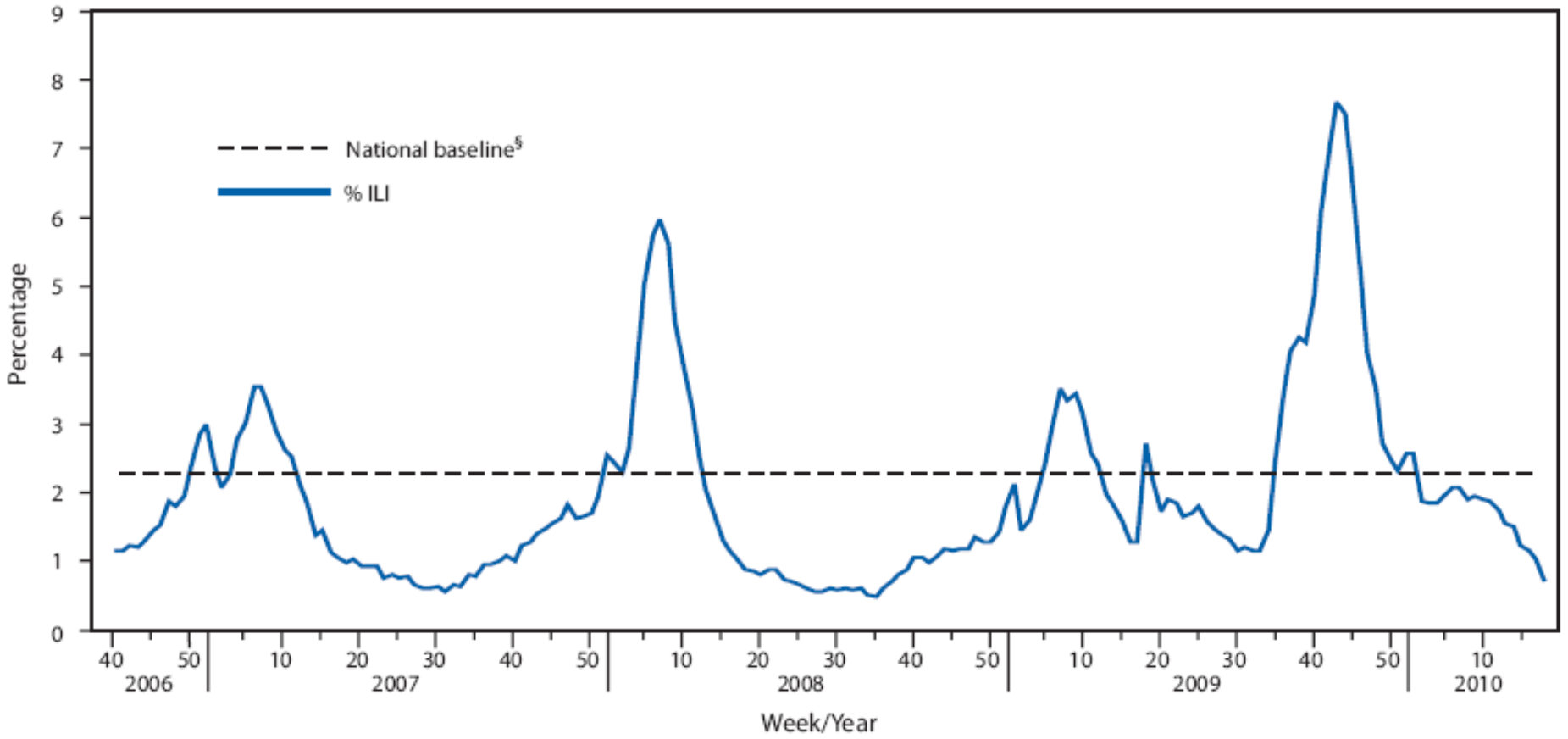
CDC estimates of H1N1 cases in U.S.

4/09-4/10

http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm

		TOTALS: From April, 2009 through April 10, 2010[b] *(extrapolated to the US & corrected for under-reporting)*
Deaths‡‡#		
0-17 yrs		1,282 *(912 – 1,883)*
18-64 yrs		9,565 *(6,803 – 14,043)*
+65 yrs		1,621 *(1,153 – 2,380)*
	sub-totals	***12,469*** ***(8,868 – 18,306)***
Hospitalizations‡		
0-17 yrs		86,813 *(61,742 – 127,454)*
18-64 yrs		160,229 *(113,955 – 235,239)*
+65 yrs		27,263 *(19,389 – 40,025)*
	sub-totals	***274,304*** ***(195,086 – 402,719)***
Cases‡‡‡#		
0-17 yrs		19,501,004 *(13,869,153 – 28,630,340)*
18-64 yrs		35,392,931 (25,171,524 – 51,962,026)
+65 yrs		5,943,813 (4,227,252 – 8,726,391)
	sub-totals	*60,837,748* *(43,267,929 – 89,318,757)*

FIGURE 2. Percentage of visits for influenza-like Illness (ILI)* reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet),† by surveillance week — United States, October 1, 2006–May 1, 2010



* ILI is defined as fever (temperature of ≥100°F [≥37.8°C) and a cough and/or a sore throat in the absence of a known cause other than influenza.
† ILINet consists of approximately 2,400 health-care providers in 50 states reporting approximately 16 million patient visits each year.
§ The mean percentage of visits for ILI during noninfluenza weeks for the previous three seasons plus two standard deviations. A noninfluenza week is a week during which <10% of specimens tested positive for influenza.

DORA

Orange County OA

Disease Outbreak Response Annex

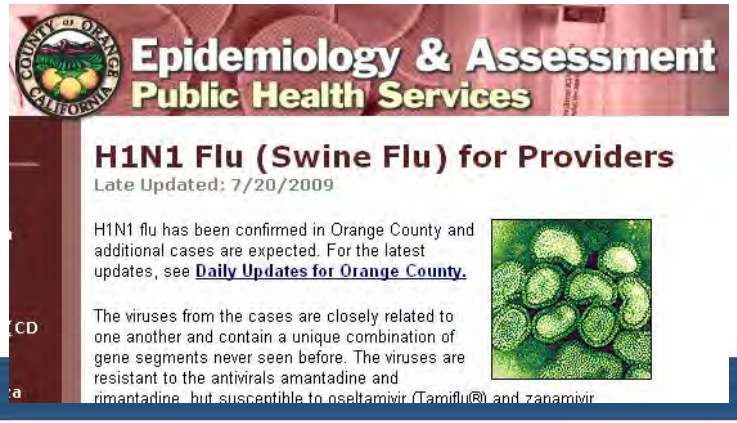
To The Orange County OA Emergency Operations Plan

Example: OCHCA Response to pH1N1 Pandemic

- Surveillance
  - Evolved over time; all cases initially then focus on severe cases and deaths
  - OC Public Health Laboratory testing
  - State and CDC surveillance of circulating viruses and antiviral resistance testing
  - Outbreak/cluster investigations

OCHCA Response (2)

- Medical provider and public education
  - Community mitigation measures
  - Treatment, prophylaxis, infection control, testing



OCHCA Response (3)

- Community coordination/communications
  - Hospitals, clinics, emergency medical services (EMS), other healthcare entities
  - Schools
  - Businesses
  - Community-based organizations
  - Cities, emergency management, operational area
  - Vaccine prioritization, distribution

Response: Point of Dispensing (POD)

Federally instituted **BEST PRACTICE** model for the dispensing of medication to a community of **healthy people** during a public health incident.

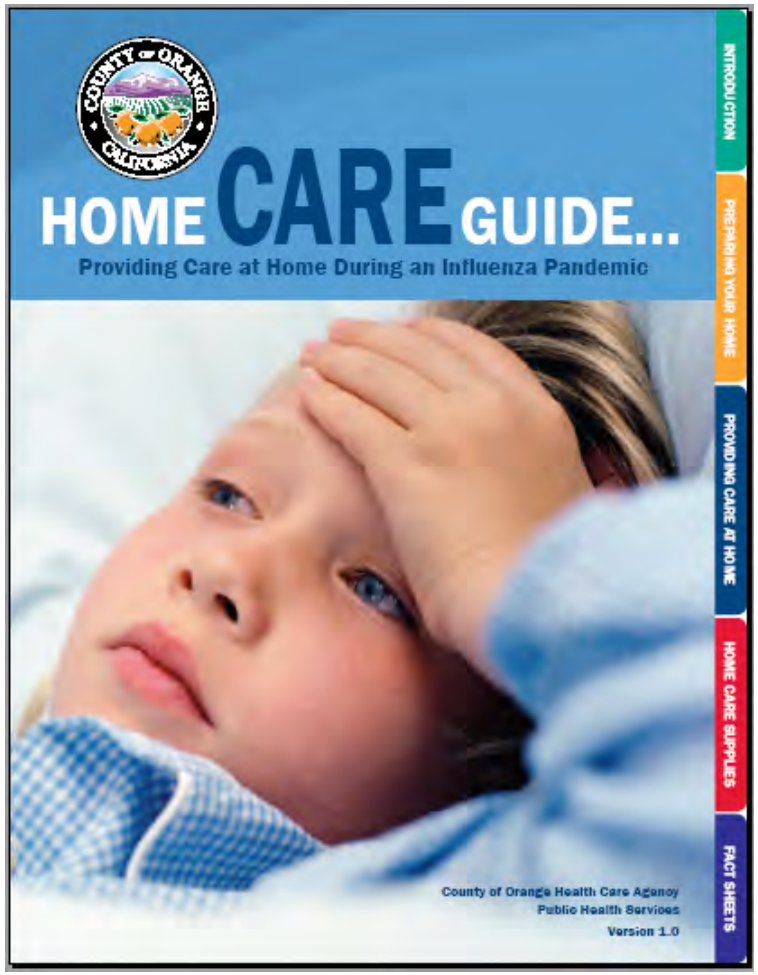
Medical Countermeasures

- New virus vaccine, limited doses available initially
  - Targeted distribution, utilizing CDC/CDPH prioritization guidance
    - 2 clinics (PODs) 10/31/2009: 2 to 9 years old, caregivers; nasal spray only. >3000 doses given
    - More vaccine available: 3 clinics 11/7/2009: Nasal spray, injectable and preservative free. >6000 doses
  - Mass vaccination when more vaccine available
    - More PODs
    - Contract nursing to vaccinate at 17th Street (HCA)
    - Support of school-based clinics
    - Over one million vaccine doses distributed
- ~200,000 antiviral courses received and/or distributed

Community Partnerships

- Medical Reserve Corps volunteers -- surge for Epidemiology, vaccination clinics
- Weekly conference calls with Hospital Association of Southern California (HASC), Coalition of Orange County Community Clinics, Orange County Department of Education
- Four tabletop exercises and H1N1 Summit summer 2009 before 2nd wave hit

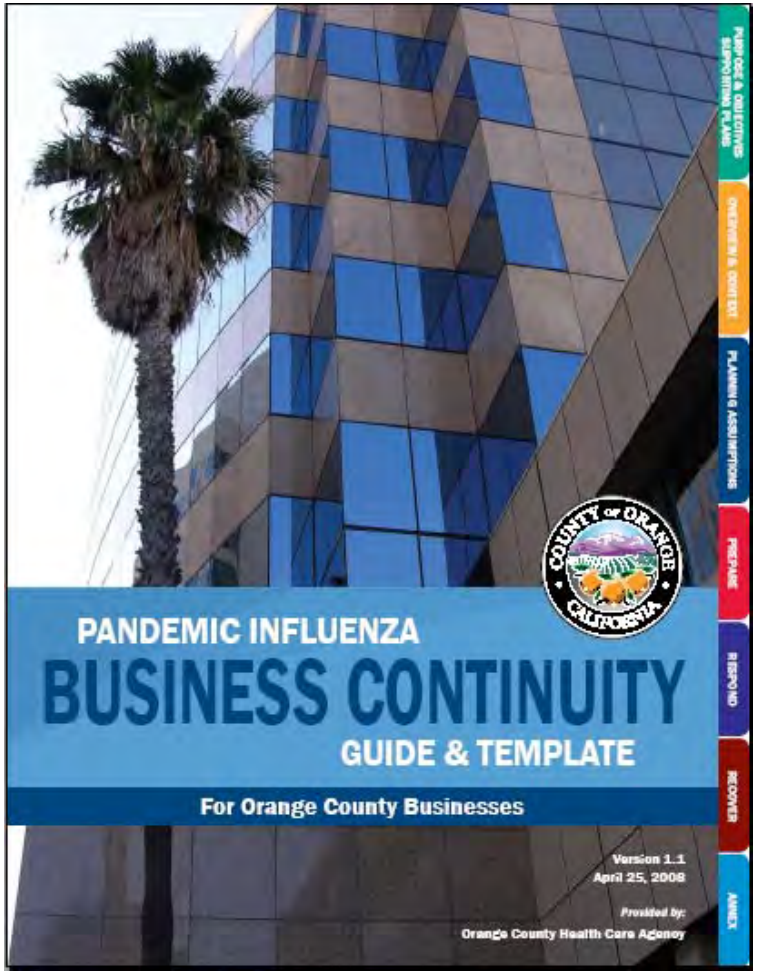
Pandemic Preparedness: At Home



Planning for:

- Providing Home Care
- Home Isolation
- Home Care Supplies
- Seeking Medical Care
- Fact Sheets and References

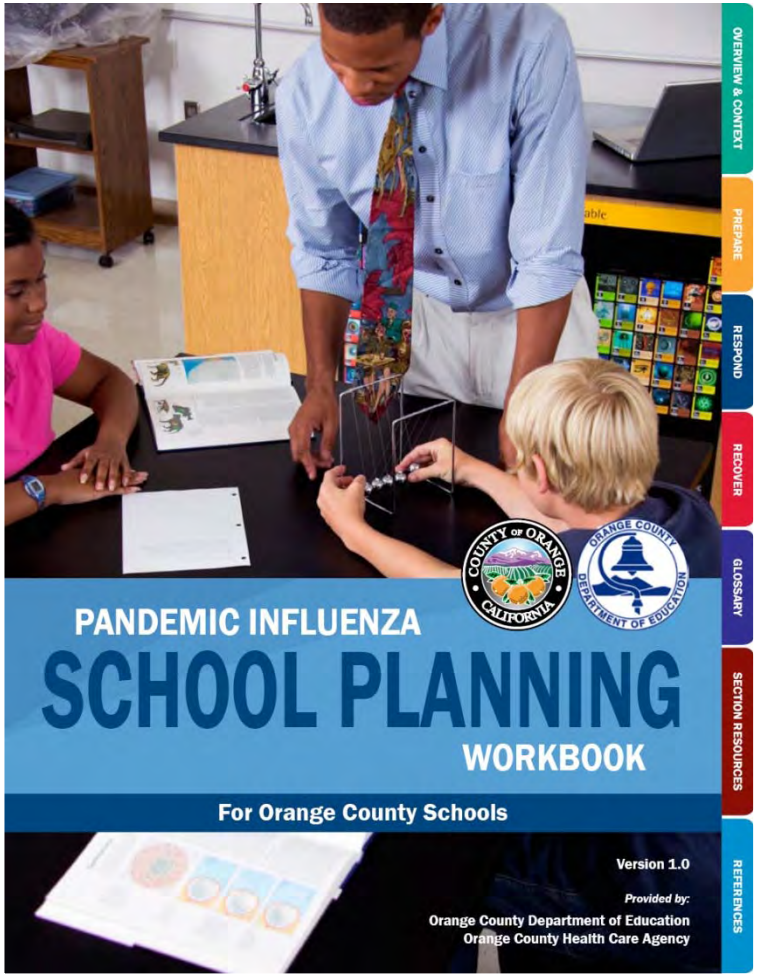
Pandemic Preparedness: At Work



Planning for:

- Worker Absenteeism
- Alternate Work Sites
- Shift Schedules
- Service Interruptions
- Social Distancing
- Workplace Hygiene

Pandemic Preparedness: At School



Planning for:

- Student Dismissals
- Staff Absenteeism
- Limiting School Activities
- Alternate Education Methods
- Education Continuity
- Infection Control & Reporting

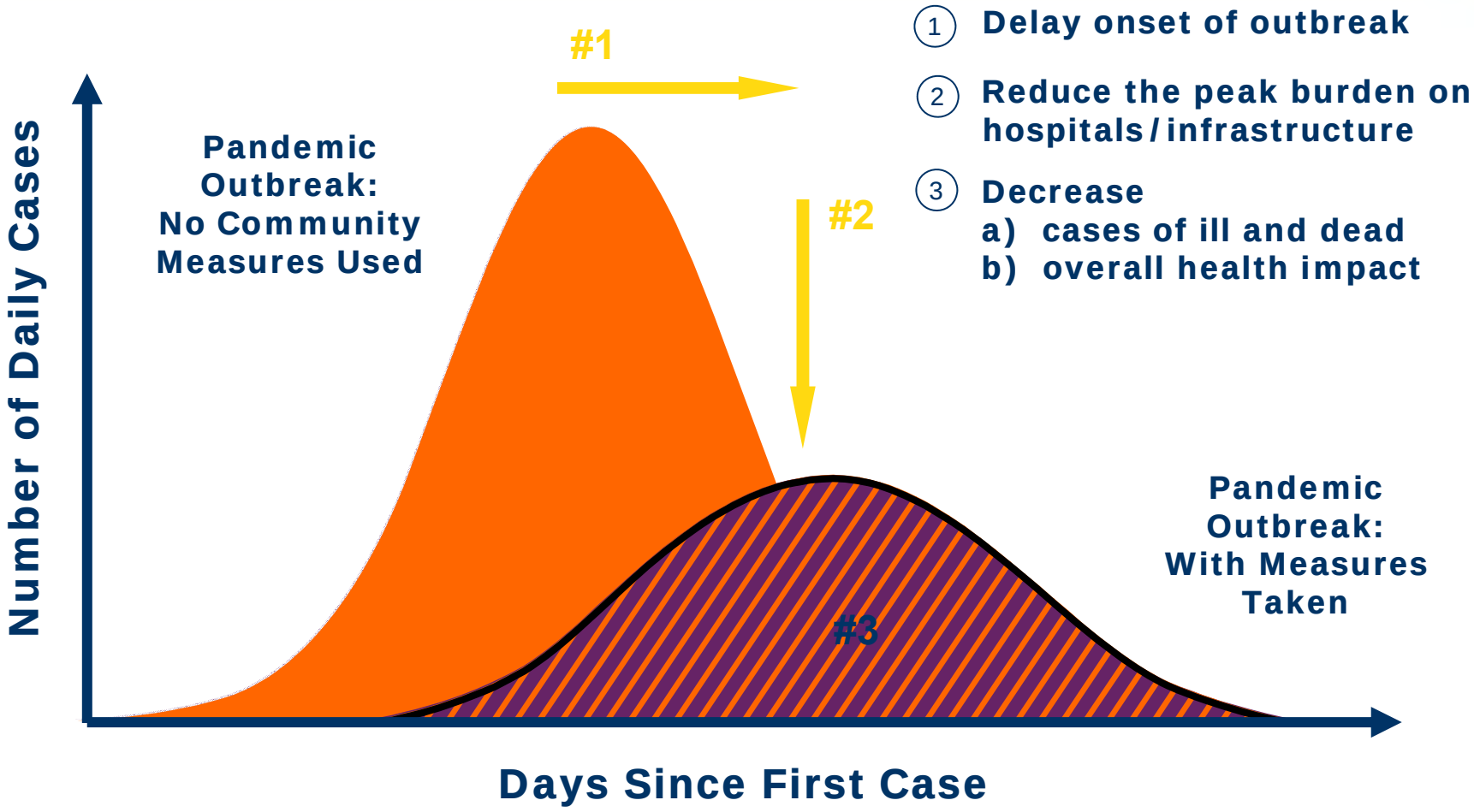
Public Health Emergency Preparedness
Public Health Role

- Enhanced surveillance
- Case finding, investigation, management
- Confirmation of diagnosis
- Identifying exposure date(s), location(s)
- Notification and collaboration with:
  - California Dept of Public Health
  - Centers for Disease Control & Prevention

Public Health Emergency Preparedness
Public Health Role

- Recommendations for treatment, infection control, preventive measures
- Identification of exposed persons
- Follow-up of cases and contacts
- Recommendations for mass prophylaxis (if indicated), prioritization if resources scarce
- Education of health care providers, public, community partners
- Coordination of emergency medical services
- Public information/risk communications
- Recommendations for community mitigation measures, including social distancing, isolation (and quarantine), if indicated

Community-based Interventions



1. Delay onset of outbreak
2. Reduce the peak burden on hospitals / infrastructure
3. Decrease
   a) cases of ill and dead
   b) overall health impact

10. Centers for Disease Control and Prevention (CDC)

The Mutual Aid System

A strong, coordinated system of support for response

Federal ⟷ **State**

Regions

Join the Medical Reserve Corps of Orange County

- Step 1: Register at www.healthcarevolunteers.ca.gov
- Step 2: Email or call the MRC Coordinator Steve Noriega at:
  - ocmrc@ochca.com

"I don't feel like going to school. Isn't that a flu-like symptom?"

Questions?

Michele Cheung, MD MPH, FAAP

Deputy Medical Director, Epidemiology

Orange County Health Care Agency

mcheung@ochca.com

714-834-7729