

Beware of Achoo! Preventing Influenza Outbreaks in Long-Term Care Facilities

HAI / AR Collaborative

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Objectives

- Influenza review and epidemiology of influenza outbreaks in long term care facilities
- Prevention and Control Recommendations
 - Cohorting and other strategies to mitigate exposure risk
 - Chemoprophylaxis
 - Vaccination

First...some definitions

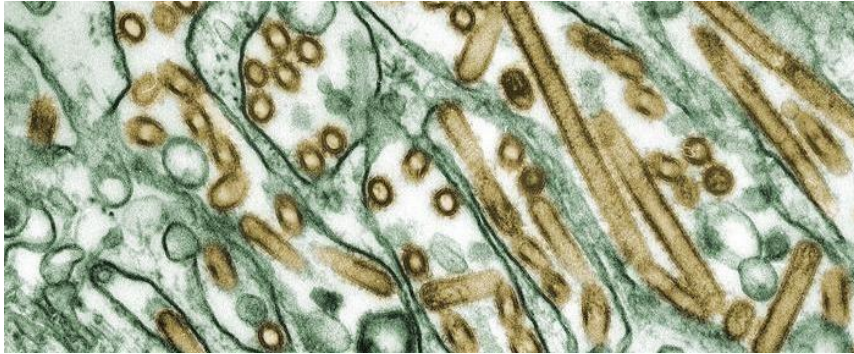
Long-term care facility

- Residential facility in which medical, psychiatric, rehabilitation or other supportive care is provided
- Available for all ages but majority of residents are elderly
- U.S.: 1.3 million older adults in 16,000 facilities

Seasonal influenza

- Influenza strains that circulate yearly
 - A- H1N1 and H3N2
 - B- Yamagata and Victoria
 - C- causes mild disease, sporadic local outbreaks
- Subtypes based upon changes in surface proteins, hemagglutinin (HA) and neuraminidase (NA)

Seasonal Influenza

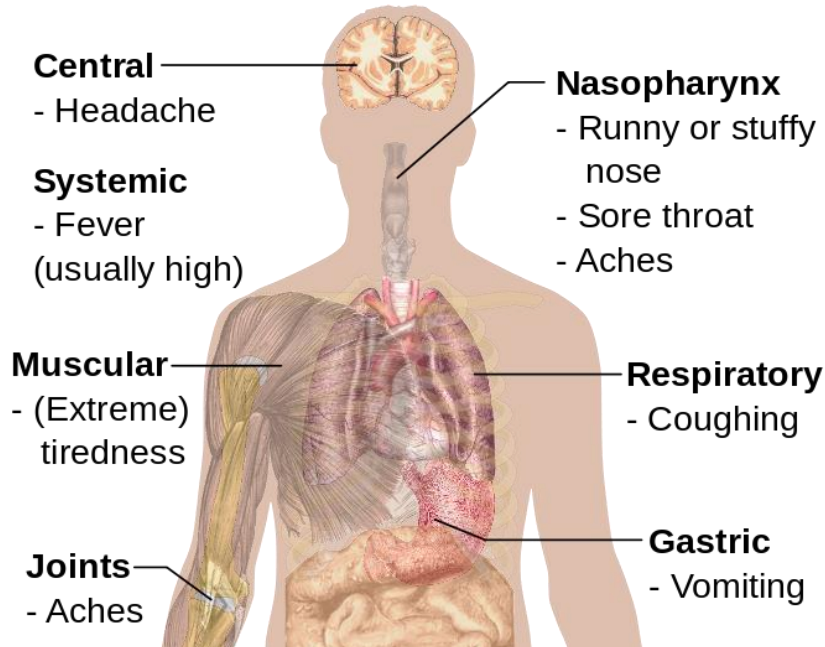


Flu season in the U.S. is usually during the **winter months** (October – April).

Symptoms usually resolve in **3-7 days BUT**

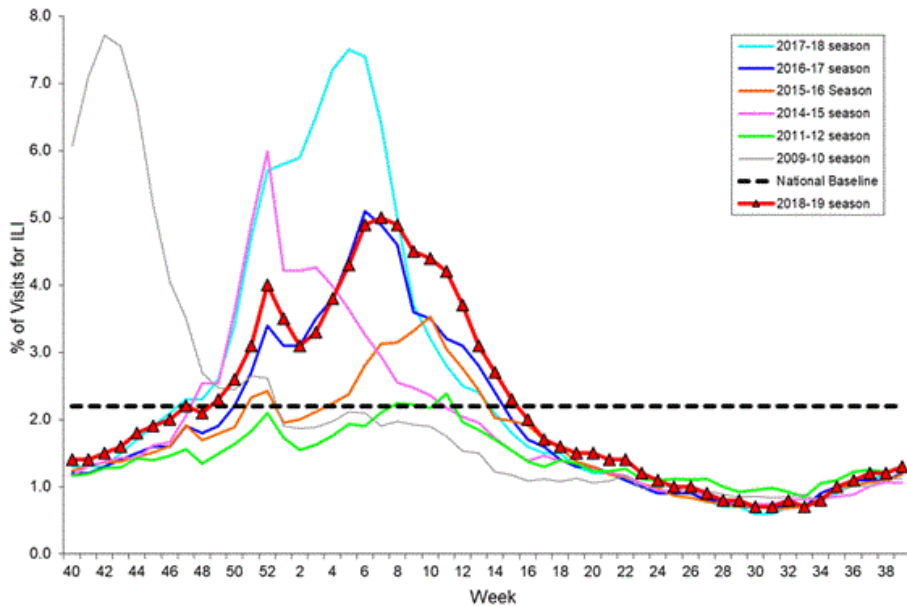
Complications lead to **hospitalization and death.**

Symptoms of Influenza



Influenza burden: US and Philadelphia

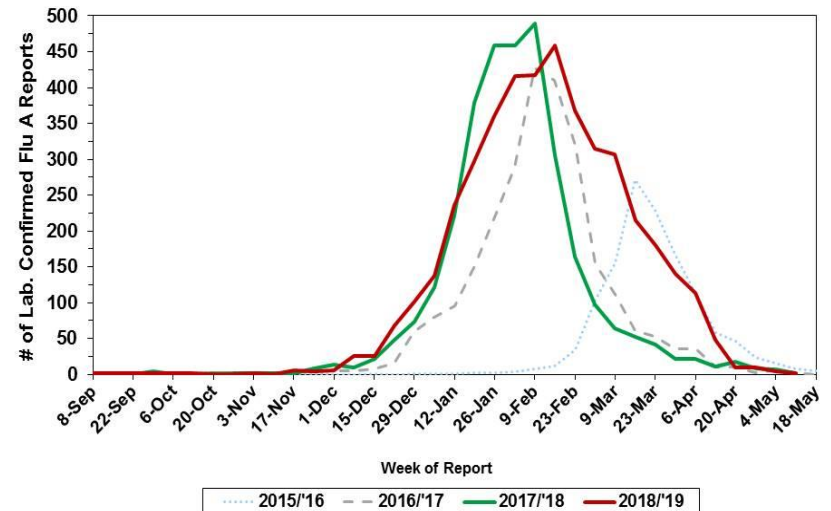
Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), Weekly National Summary, 2018-2019 and Selected Previous Seasons



US: % of outpatient visits for influenza-like illness

Laboratory-Based Surveillance for Influenza A Philadelphia, 2015/2016 through 2018/2019 Seasons*

*Based on select hospital laboratories participating in surveillance across respiratory virus seasons

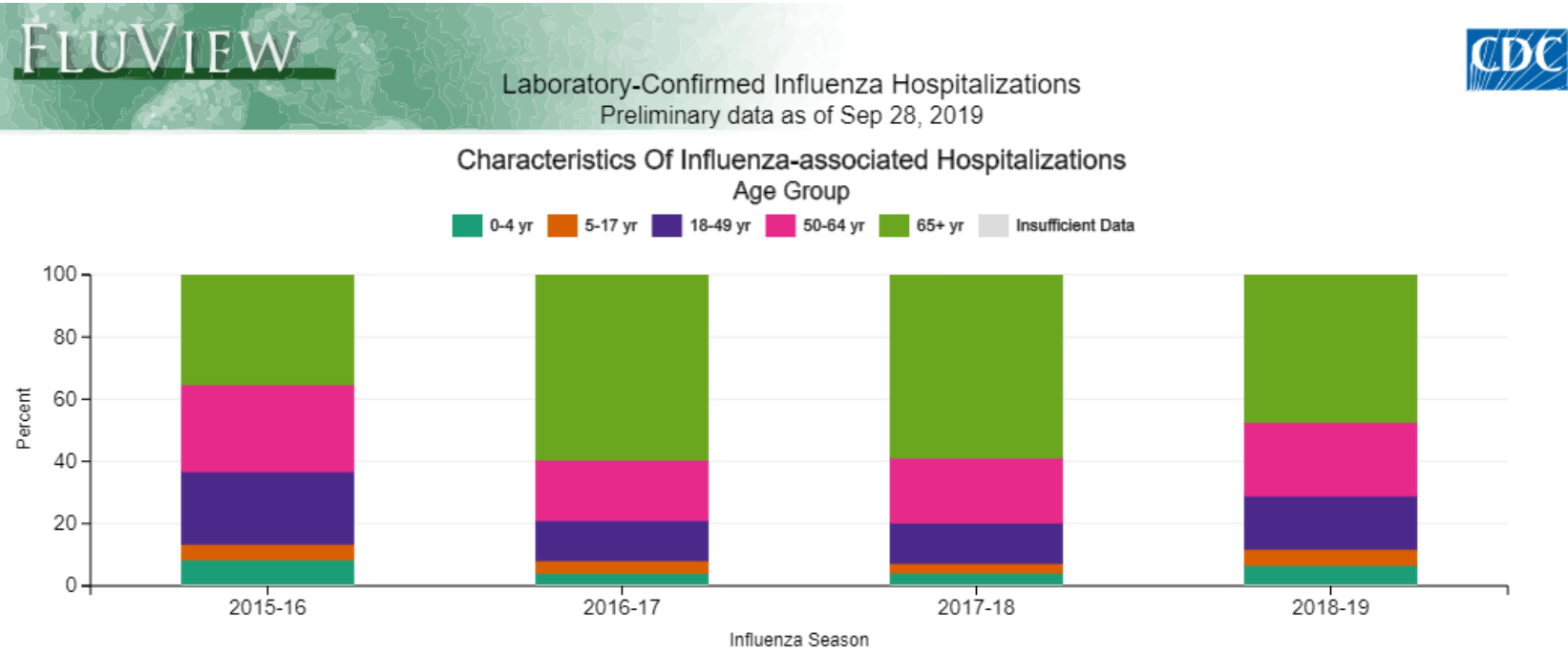


Serious Influenza: Who's at Risk?

- **Older adults >50 yrs old**
- **Long term care facility residents**
- Young children <2 yrs old and their contacts
- Health care professionals
- American Indians/Alaska Natives
- Pregnant women
- People with certain high risk conditions...
- **High-risk conditions**
 - Asthma
 - Other chronic lung conditions
 - Cardiac disease
 - Chronic renal dysfunction
 - Metabolic/endocrine conditions
 - Long-term salicylate therapy
 - Neurologic/neuromuscular conditions
 - Pregnancy
 - BMI of 40 or higher
 - Immunocompromising conditions(HIV, cancer, chemotherapy receipt)



Hospitalizations: Highest proportion consistently among older persons



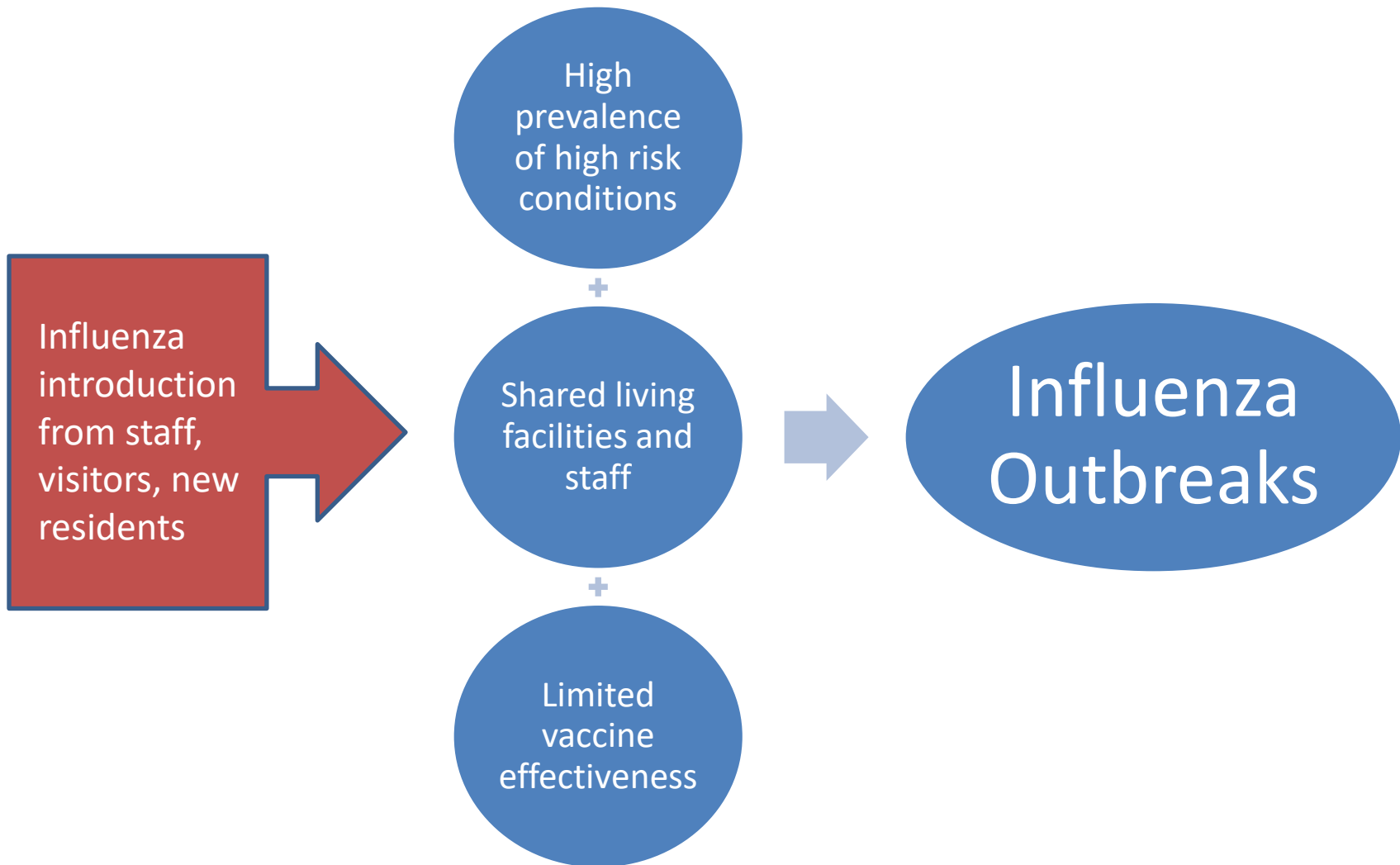
Influenza transmission

- Infects cells along the respiratory tract
- Spread through respiratory droplets
 - Large droplet- spread ~2 meters
 - Aerosol (smaller particles)
 - Contact
- Can spread the virus 1 days BEFORE symptoms begin and up to 7 days after symptoms begin



Residential facilities provide ample opportunity for influenza transmission!

LTCFs and Influenza Outbreaks



Epidemiology

- Estimated burden of influenza among LTCF residents difficult to measure based upon available literature
 - 5.9-85% incidence in one systematic review
- Median attack rate 33% (range 4-94%) for residents and 23% (range 3-58%) for staff
- Case fatality rate 6% (0-55%)
- Respiratory hospitalization risk among flu exposed LTCF residents 1.43 (0.99 – 2.08)

Epidemiology: Philadelphia

- PDPH performs influenza surveillance for:
 - Hospitalized, laboratory-confirmed cases
 - ICU admissions for flu and other respiratory viruses
 - All fatal cases of confirmed and suspected influenza
 - Suspect novel influenza A
 - Institutional outbreaks

Season	# LTCF outbreaks with 1 case	# LTCF outbreaks with 2+ cases	Total Outbreaks
2018-2019	13	20	33
2017-2018	7	38	45
2016-2017	12	18	30
2015-2016	7	7	14

Risk varies by LTCF features

- Retrospective cohort study among Medicare beneficiaries
- Facility characteristics: staff composition, staffing hours, care quality measures
- Risk stratified incidence rate: 2.96 – 51.9 / 100 person-years (long-stay)
- Lower risk among larger facilities with higher acuity, more staffing hours with higher RN / total staff ratios, better care quality and more short-stay time



Identify

Prevent Transmission

Protect Exposed Residents and Staff

PREVENTION AND MANAGEMENT

Prevention Guidance for LTCFs



Surveillance



Specimen testing to confirm diagnosis



Antiviral medications for treatment and chemoprophylaxis



Staff and resident education



Respiratory etiquette



Standard and droplet precautions



Cohorting



VACCINATION

When to suspect an outbreak

- Outbreak definition:
 - 2 or more residents with influenza-like illness occurring within 72 hours and who are in close proximity of each other
 - One case of laboratory-confirmed influenza
- Syndromic surveillance considerations
 - ILI = fever, cough, sore throat
 - Consider influenza if any respiratory symptoms are present
 - Older persons less likely to have fever and may present with atypical symptoms like altered mental status
- If suspected or confirmed outbreak, must continue active surveillance for **2 weeks** from illness onset of last case to make sure outbreak control measures have worked

Diagnostic tests

Method	Types	Test-time	Specimens
Rapid Antigen Detection	A / B	<15 min	Nasopharyngeal (NP) or nasal
Rapid Molecular Assay	A / B	<20 min	NP or nasal
Immunofluorescence antigen detection	A / B	1-4 hrs	NP, bronchial, nasal or endotracheal
RT-PCR	A / B	1-8 hrs	NP, throat, bronchial, nasal, endotracheal or sputum
Rapid Cell Culture (shell vials) Viral Tissue Culture	A / B	1-3 days 3-10 days	NP, throat, bronchial, nasal, endotracheal or sputum

- Nasopharyngeal swab or aspirate
- Collect specimens early in illness
- Adhere to instructions, esp. specimen handling.

Diagnostic tests up close



Rapid Antigen Tests

Limited sensitivity / moderate specificity

Negative result should not drive treatment decision

Cannot detect subtypes; may or may not detect type

RT-PCR

Highly sensitive but take time

May not reflect active infection

Can detect type and sometimes subtype

Viral Culture

Useful in outbreaks when cause is unknown

Necessary for identifying subtypes and new strains

Can help identify other causes of illness

Management: Treatment and Prophylaxis

- Goal of treatment: prevent complications and death
- Goal of Chemoprophylaxis: Prevent diseases in exposed persons

Neuraminidase Inhibitors

- **Oseltamivir (PO)**
- **Zanamivir (Inhaled)**
- Peramivir (IV)

Amantadines

- Amantadine
- Rimantadine
- **Work against Flu A only AND >99% resistant**

Endonuclease Inhibitor

- Baloxavir (PO)
- NOT for chemoprophylaxis

Treatment and Prophylaxis Recommendations

- Antiviral treatment should be initiated as soon as possible → optimally within 2 days but may still provide benefit if started later
- Treatment duration = 5 days
- Chemoprophylaxis should be given to ALL exposed residents even if previously vaccinated
- Chemoprophylaxis should be considered for all unvaccinated or high-risk staff
- Prophylaxis duration = at least 2 weeks or 7 days after illness onset in last case



Does oseltamivir prevent influenza-related complications or prevent transmission?



Reduces rate of hospitalization*



~ 25% reduction in
physician-prescribed
antibiotics

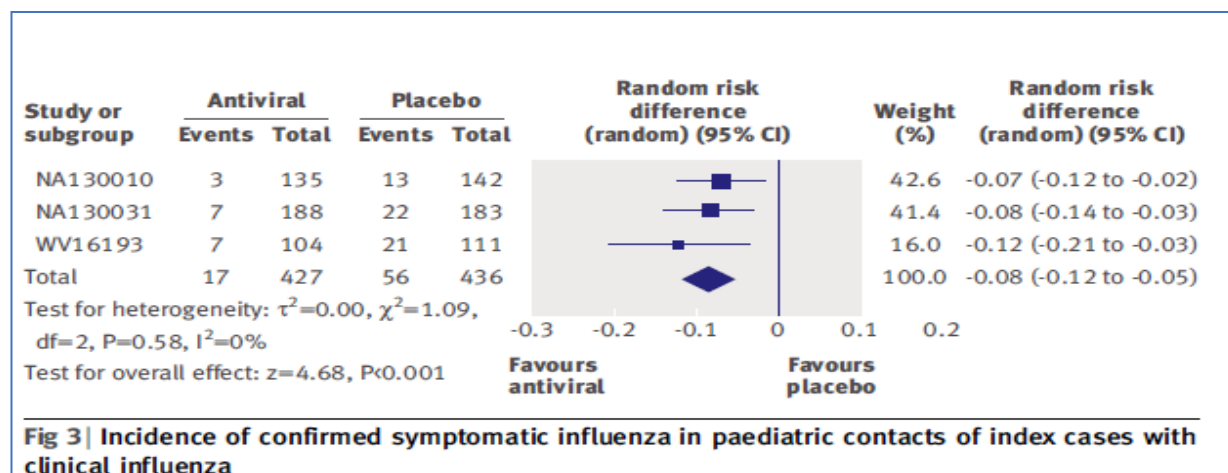
Reduced incidence of influenza-
related respiratory infection
requiring antibiotics (by 55%;
10.3% to 4.6%)



Time to initiation of oseltamivir prophylaxis for
residents associated with outbreak duration

Antivirals and Household Transmission

- Meta-analysis (included 3 RCTs examining post-exposure prophylaxis of household members)



- 10 day course of oseltamivir associated with 8% (CI 5 – 12%) reduction in secondary cases among household contacts

Are there
safety
concerns for
using
oseltamivir /
zanamivir as
prophylaxis?

- Dosing does need to be adjusted for renal function and weight
- Reported adverse events include nausea, vomiting and skin reactions
- Self-reported neuropsychiatric events have also been reported since licensure
- Bronchospasm and sinusitis after zanamivir

Nonpharmaceutical Measures

Respiratory Etiquette:

- Handwashing / hand sanitizer stations with signage
- Masks and tissues for coughing / sneezing residents
- Encourage self-quarantine or social distancing of symptomatic patients

Standard and Droplet Precautions:

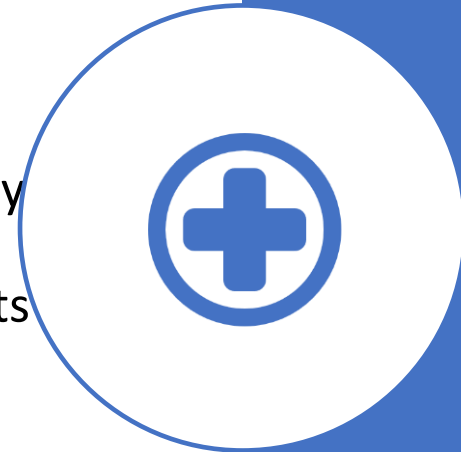
- ALL staff to follow standard precautions when caring for residents
- Droplet precautions for residents after outbreak confirmation for 7 days after illness onset or 24 hours after fever resolution
- Isolate ill resident in private room or cohort
- Mask ill residents for transport outside of room

Other strategies

- Close affected units to new admissions until 5 days after illness onset of last case
- Visit limitation → no symptomatic friends or family until 5 days post-symptoms onset for adults and 10 days post-symptom onset for children
- Monitor healthcare workers for ILI and exclude ill staff from patient care for 5 days post-illness onset

Nonpharmaceutical Strategies: Effectiveness

- Hand hygiene known to prevent healthcare-associated infections
- Reviews suggest nonpharmaceutical interventions may have a modest impact compared to antivirals and vaccination → impact may depend upon how residents and staff use the facility
- Knowledge about appropriate precautions for influenza limited among LTCF staff
- Many HCWs work while sick due to LTCF policies



Prevention: Influenza Vaccination

MOST important prevention strategy

- All LTCF residents should be immunized (goal >90%)
- Staff should be immunized too!
- Offer vaccine by end of October and as long as flu is circulating
- Pregnant women may receive any licensed, recommended and age-appropriate influenza vaccine
- Anyone with history of an egg allergy of ANY severity can receive influenza vaccine
- **ESPECIALLY important for persons with high risk conditions AND healthcare workers**



the **benefits** of **flu vaccination** 2017-2018

The estimated number of flu **illnesses prevented by vaccination** during the 2017-2018 season:

7million

About the population of
New York City



The estimated number of flu **hospitalizations prevented by vaccination** during the 2017-2018 season:

109,000

About the number of vehicles
crossing the Golden Gate Bridge
each day



The estimated number of flu **deaths prevented by vaccination** during the 2017-2018 season:

8,000

Twice the number of hospitals in
the United States



DATA: Journal Clinical Infectious Disease, Effects of Influenza Vaccination in the United States during the 2017–2018 Influenza Season, <https://doi.org/10.1093/cid/ciz075>



get vaccinated
www.cdc.gov/flu

Flu vaccines for older adults

Vaccine Composition	Vaccines	Composition	Age Indication
Quadrivalent Inactivated (IIV4)	Fluarix FluLaval, Fluzone Afluria	intramuscular injection	≥36 mo ≥6 mo ≥ 5 years
Trivalent Inactivated (IIV3)	Afluria Fluvirin Fluad (aIIV3)	intramuscular injection	≥ 5 years ≥ 48 mos ≥65 years
High dose inactivated (IIV3)	Fluzone High Dose	Intramuscular injection	≥65 years
Recombinant trivalent (RIV3)	FluBlok	Intramuscular injection	≥18 years
Intradermal quadrivalent	Fluzone Intradermal	Intradermal	18-64 years
Inactivated cell culture (ccIIV4)	Flucelvax	Intramuscular injection	≥4 years



How well do flu vaccines work: 2018-19 Effectiveness estimates



**Outcome:
laboratory-
confirmed
influenza
associated with a
medically-
attended acute
respiratory
illness**



**Among 14,395
kids and adults
from 3
surveillance
networks,
11/12/18 –
5/13/19**

**Overall VE: 29%
H1N1: 44%
H3N2: 9%**



**VE highest
among children 6
months – 8
years: 49%**

**VE low (12%)
among adults 50-
64 and 65+ years**



**Effectiveness
may decrease
over course of
season**

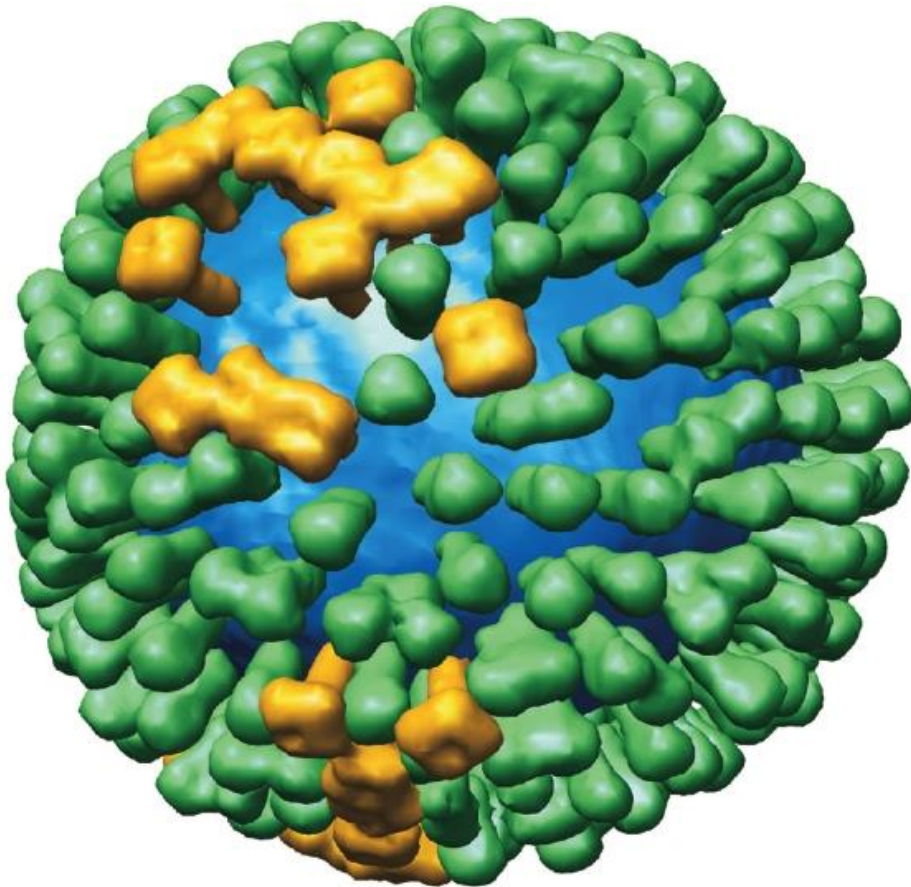
Are high dose or adjuvanted vaccines better in older adults?

- High dose with demonstrated superior efficacy compared to standard dose for lab-confirmed influenza (relative VE 24.2%)
 - Similar results noted in meta-analysis for hospitalization and pneumonia
 - Positive cost-benefit assessment
- Observational studies for adjuvanted and recombinant vaccine suggest improved effectiveness for the prevention of laboratory-confirmed influenza
- Based upon available data, no preference has been communicated by the ACIP

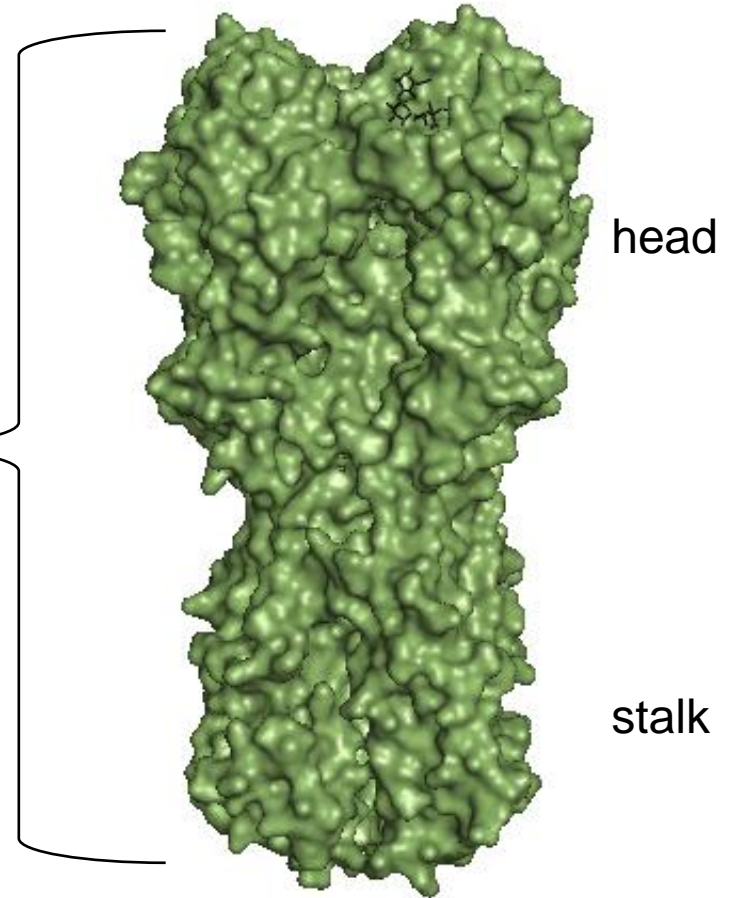


What about a universal flu vaccine?

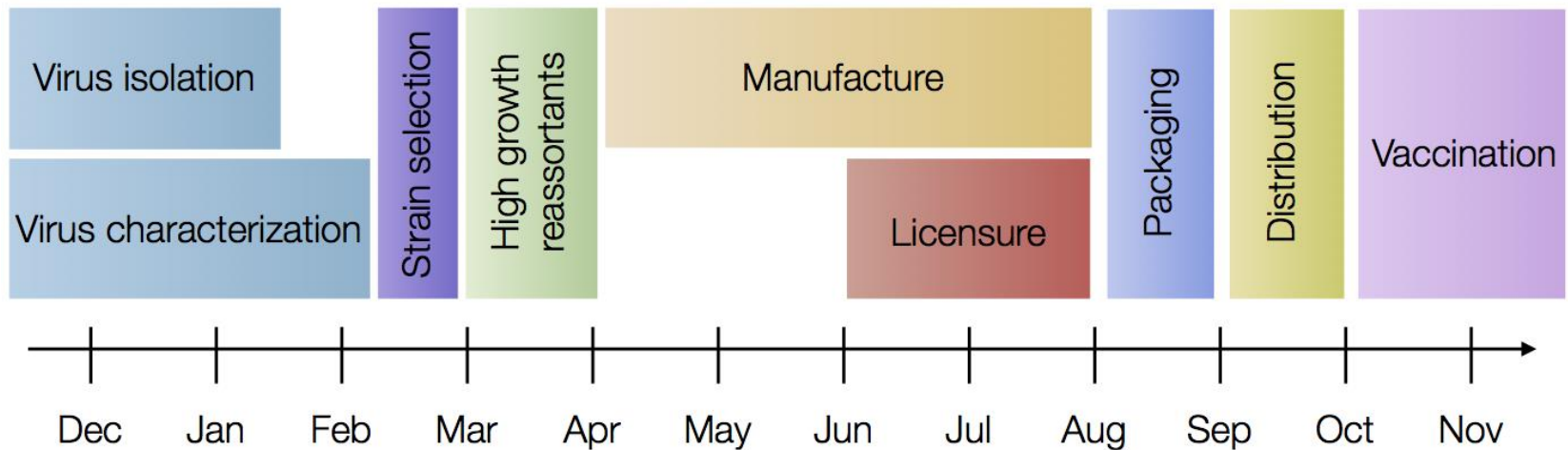
Influenza virus



Hemagglutinin



It takes a long time to make flu vaccines and it is difficult to predict flu evolution



- Sometimes we choose the 'wrong' vaccine strain
- Sometimes the vaccine changes as it is produced

image from:
Trevor Bedford
<http://bedford.io>

Universal vaccines: The ideal

Prevents both clinical disease and infection

Prevents all types of influenza, including antigenic drift variants

Induces life-long immunity

Response is not affected by pre-existing immunity

Rapid immune response

Safe

Affordable



Who gets vaccinated among LTCF residents?

- 2018-19 coverage rates:
 - 6 months – 17 years: 62.6%
 - 18+ years: 45.3%
 - 65+ years: 68.1%
- Higher immunization rates associated with facility ownership (government / non-profit), location in a nonmetropolitan area and higher proportion of dementia patients
- Some studies show disparities in influenza vaccine receipt
 - Black residents less likely to be offered and to receive influenza vaccines
 - Hispanic residents more likely to receive both influenza and pneumococcal vaccines than white residents within same facility
 - Residents of facilities with higher proportion of black residents (>50%) less likely to receive vaccine compared to residents of facilities with <5% black residents

Influenza Vaccination of HCWs Strongly Recommended

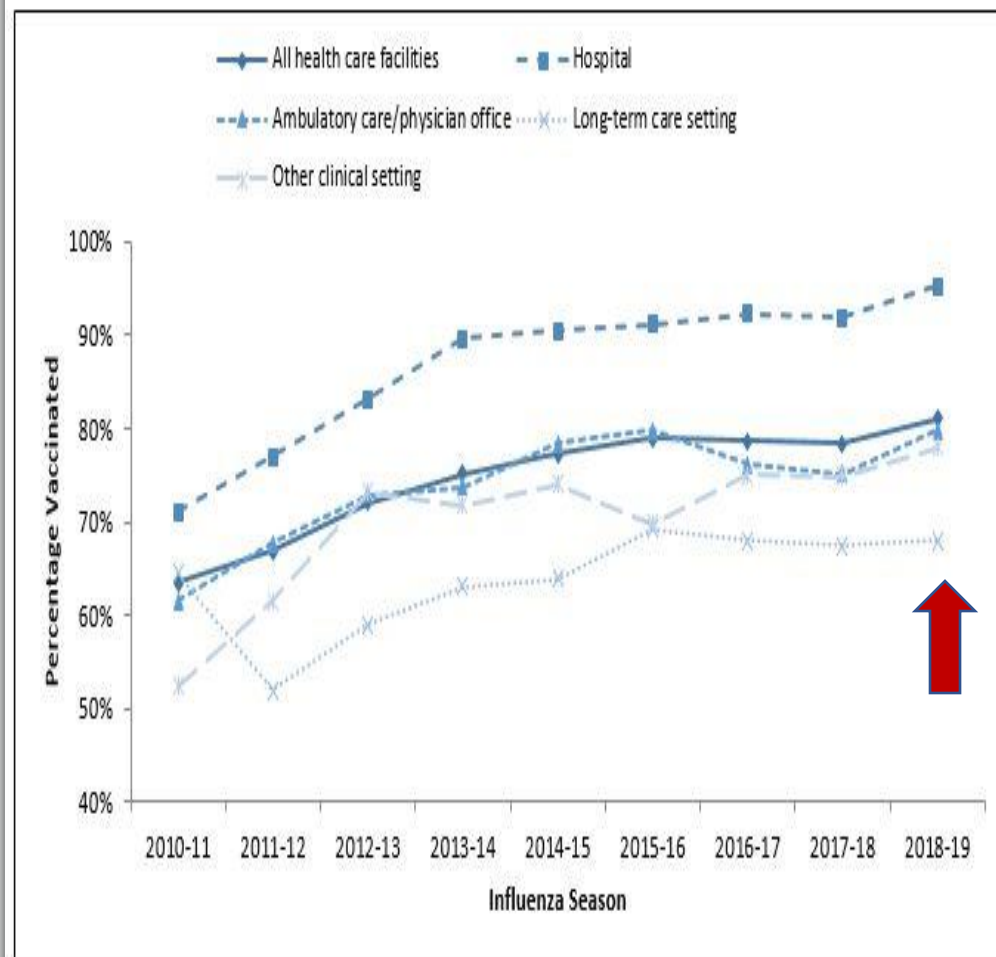
- The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommends annual flu vaccination for ALL people aged 6 months and older
- **The ACIP cites healthcare workers as a priority group for vaccination program development**
- HCW vaccination endorsed by World Health Organization, Society for Healthcare Epidemiology of America, Infectious Diseases Society of America, and other professional groups (www.preventinfluenza.org)
- Included as an accreditation requirement since 2007 (U.S.)

Why immunize HCWs against influenza?

- High transmission risk in healthcare settings
 - Influenza is highly contagious
 - HCW frequently come to work with influenza-like-illness (ILI)
 - Can spread virus even when asymptomatic
 - Vaccine not as effective in older persons
- Available vaccines are safe and effective for healthy individuals
- Vaccination of health care workers (HCW) decreases
 - Healthcare-associated influenza infection
 - HCW absenteeism
 - Secondary infections among HCW's household contacts
- Evidence for prevention of laboratory-confirmed influenza among residents limited but consistent direction of effect

What about healthcare workers?

- Risk of occupational exposures- modelling estimates ~30% for LTCFs and an average of 5.8 exposures per worker per year
- Rates: 81.8% (among a national sample of HCPs, N=2,386)
- 97.7% among HCPs with workplace vaccination requirements vs 42.2% with no requirement



Predictors of HCP Influenza Vaccination

Predictors of vaccine nonreceipt	Predictors of vaccine receipt
<ul style="list-style-type: none">• Side effect concerns• Belief that vaccine is not effective• Low perceived risk of infection• Reliance on other preventive measures• Lack of convenient access or free vaccine• Lack of recommendation	<ul style="list-style-type: none">• Previous receipt of influenza vaccine• Desire to protect self and patients• Desire to protect family members• Belief in vaccine effectiveness• Belief that vaccination is professional responsibility• Peer or strong workplace recommendation• Convenient access to vaccine• Free vaccine

Progressive expansion of efforts to ensure HCW vaccination

- Educational campaigns
 - Easy access to free vaccine for all HCWs
 - Incentives
 - Champions
 - Leaders as role models
 - Use of media
 - Feedback
 - Required declination forms
 - **Mandates**
- AAFP, AAP, ACP, AHA, ANA, AMDA, APHA, APIC, IDSA, NACCHO, NPHO, SHEA, VHA all have policy statements in support of mandatory influenza vaccination for HCWs
 - Immunization Action Coalition's Influenza Honor Roll
 - 848 total organizations
 - 130 LTCFs and Assisted Living facilities




Challenges and Opportunities for LTCF Influenza Outbreak Prevention

- Broad range of skills among staff
- Variability in staffing levels
- Hard to prevent all exposure due to asymptomatic shedding
- Higher likelihood of atypical or nonspecific symptoms
- Availability of diagnostic testing
- Resource limitations and / or facility constraints for outbreak control

BUT...there are resources!!



Resources



Infection Control Guidance for the Prevention, Recognition and Management of Influenza and Influenza-Like Illness (ILI) Outbreaks in Long Term Care Facilities
2018-2019

Last updated September 13, 2018



Prevention, Recognition, and Management of Influenza and Respiratory Viruses in Long Term Care Facilities
Outbreak Checklist

Last updated September 13, 2018

Persons with illness associated with influenza and other respiratory viruses often have fever (>100°F), cough, chills, headache, myalgia, sore throat, or runny nose. Elderly persons may have an atypical clinical presentation, without fever, when they are infected with influenza. Influenza should be considered in residents aged 65 years and older with respiratory symptoms or fever during influenza season.

Outbreak Definition

A suspected influenza or respiratory virus outbreak is defined as two or more residents ill with influenza-like illness (fever, cough, chills, headache, myalgia, sore throat, or runny nose) occurring within 72 hours, who are in close proximity to each other (e.g., in the same area of the facility). A single long-term care facility resident with influenza confirmed by any test method is an outbreak.

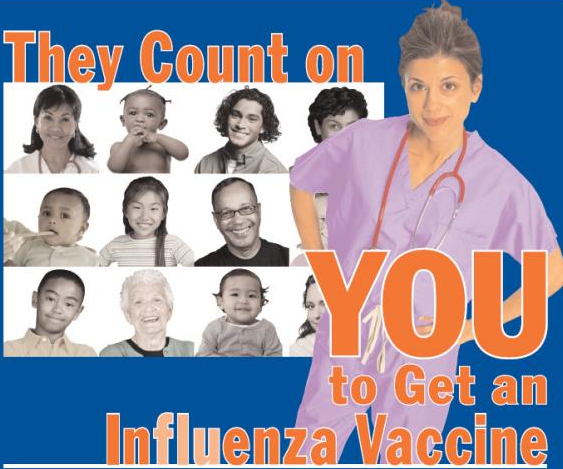
Reporting an outbreak

All suspected and confirmed outbreaks should be promptly reported to the Philadelphia Department of Public Health (DPH) by calling 215-685-6742 during business hours or 215-686-4514 during evenings, weekends and holidays and asking for the Division of Disease Control on-call staff.

Cluster or Outbreak Checklist*

- 1. Inform PDPH within 24 hours of outbreak recognition.
- 2. Confine the first symptomatic residents and exposed roommates to their rooms, restrict them from common activities, and serve meals in their rooms. Staff should wear appropriate PPE, such as a mask, when in an ill patient's room and patients should wear a surgical mask if transferred.
- 3. Implement Droplet Precautions (http://www.cdc.gov/hicpac/2007IP/2007ip_part3.html) for all residents with suspected or confirmed influenza for 7 days after the onset of illness or until 24 hours after the resolution of fever and respiratory symptoms, whichever is longer.
- 4. Implement daily active surveillance and maintain line list for respiratory illness among all residents and health care personnel until at least 1 week after the last confirmed influenza case occurred. Exclude healthcare workers with influenza-like or respiratory illness symptoms from patient care until 24 hours after the resolution of fever and respiratory symptoms.
- 5. Identify influenza virus as the causative agent early in the outbreak by performing rapid influenza virus testing (<http://www.cdc.gov/flu/professionals/diagnosis/index.htm>) of residents with recent onset of symptoms suggestive of influenza. In addition, obtain nasopharyngeal specimens from a subset of residents to confirm rapid test results (both positive and negative) with PCR or culture and to determine the influenza virus type. PDPH Division of Disease Control can assist with testing.
- 6. When influenza is confirmed in either a resident or in healthcare personnel, antiviral prophylaxis with oseltamivir or zanamivir should be started as early as possible in all eligible residents facility-wide (e.g., who have no contraindications), regardless of whether they received influenza vaccination, and should continue for a minimum of 2 weeks. Chemoprophylaxis should be continued until approximately 7 days after illness onset in the last patient. Chemoprophylaxis should be offered to staff that are unvaccinated or have underlying medical conditions. Staff members who are initially vaccinated at the time of an outbreak, and have no underlying conditions, require chemoprophylaxis only for the 2-week period following vaccination.
- 7. If influenza is not identified, submit specimens to PDPH for additional respiratory virus testing (e.g., respiratory syncytial virus, rhinovirus, parainfluenza, human metapneumovirus, and adenovirus). There is no vaccination for these viruses, and they can cause severe and fatal illness in the absence of supportive care.
- 8. If the outbreak becomes widespread, cancel common activities and serve all meals in patient rooms.
- 9. Limit visitation, exclude ill visitors, and consider restricting visitation of children via posted notices.
- 10. Restrict staff and patient movement in and out of the area of the facility having an outbreak.
- 11. Limit or defer transfers and new admissions until 5 days after the symptom onset of the last case.
- 12. Vaccinate any unvaccinated staff or patients with influenza vaccine.
- 13. Educate staff and post signage around building reminding of precautions against the spread of disease.

* (Adapted from the CDC's Infection Control Measures for Preventing and Controlling Influenza Transmission in Long-Term Care Facilities, 2011)



They Count on

YOU
to Get an
Influenza Vaccine

When you get the flu, you expose your family, patients and coworkers to infection. Healthy adults may be able to infect others with the flu up to 1 day before they start having symptoms. And once sick, they can infect others for up to 5 days. That's why it's important for you to prevent the flu by getting your flu vaccine every year.

Protect your patients. Get your flu vaccine.

Contact your Department at 215-674-6740.



Department of Health and Human Services



STOP the COUGH

Need to **COUGH** or **SNEEZE?**

USE A

TISSUE **MASK** **SLEEVE**

and then **WASH YOUR HANDS WITH SOAP AND WATER**

LET'S STAY GERM FREE

Department of Public Health

Hip.phila.gov



Thank you!