Influenza: What can we expect?

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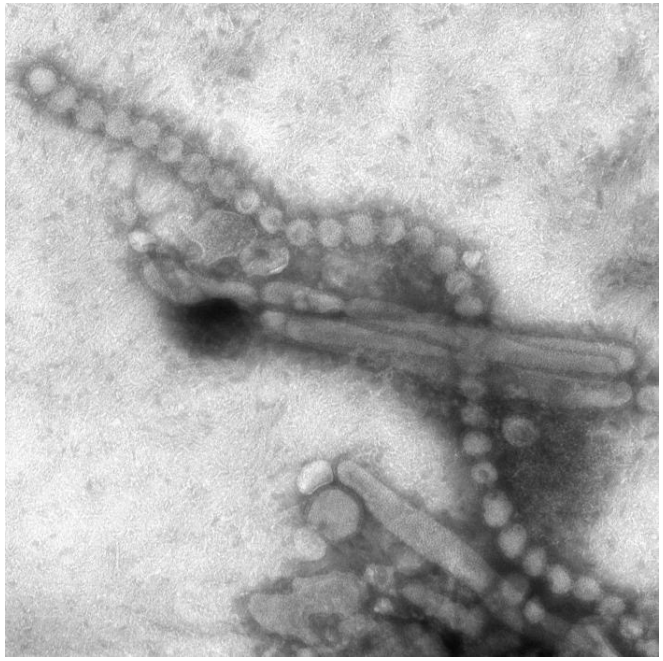
Hosted by Clare Barry

Influenza: What can we expect?

This illustration captured in 2013, is a negative stained transmission electron microscopic (TEM) image captured some of the ultrastructural details exhibited by the new influenza A (H7N9) virus.



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https://phil.cdc.gov/details.aspx?pid=15670

Influenza: What can we expect?

Objectives

1. Describe Influenza (flu) history and background.

2. Summarize the risk factors associated with influenza.

3. Describe the diagnostic microbiology, clinical laboratory role and molecular epidemiology of influenza viruses.

4. Review the changing epidemiology of influenza between the community, healthcare setting and occupational health.

5. Understand infection prevention and control in the environment, including the types of PPE to be utilized.

6. What does the 2022-2023 influenza season look like?

Influenza: What can we expect?

Overview

- History / Background
- At risk populations
- Epidemiology
- Signs / Symptoms / Spectrum of disease
- Diagnosis (with basic lab information)
- Treatment
- Infection prevention / control / PPE
- Environmental cleaning (surfaces, etc.)
- Final thoughts

Influenza: What can we expect?

The latest National Academy of Sciences report investigating the rising tide of new diseases spoke of myriad factors creating the microbial equivalent of a "perfect storm." "However, unlike a major climactic event where various meteorologic forces converge to produce a tempest," it reads, "this microbial perfect storm will not subside. There will be no calm after the epidemic; rather the forces combining to create the perfect storm will continue to collide and the storm itself will be a recurring event."[1244] And there is no storm like influenza.

From: Bird Flu: A Virus of our own Hatching
http://birdflubook.com/a.php?id=56

Influenza: What can we expect?

World Health Organization

INFORMATION NOTE/2009/2
20 May 2009

Summary report of a High-Level Consultation: new influenza A (H1N1) Geneva, 18 May 2009

KEY UNCERTAINTIES

10. The only thing certain about influenza viruses is that nothing is certain.

Influenza: What can we expect?

History and background

- Influenza (flu) is an RNA virus that is notorious, and some might say diabolical, in its ability to mutate from year to year.

- RNA viruses (like flu and SARS-CoV2) are unfortunately very smart and mischievous in this aspect. Flu, like SARS, also has the ability to live as a zoonotic agent.

- The flu virus has long been an inhabitant of swine, fowl, and humans, which continually allow for antigenic drift (small changes in the virus genome) and shift (major changes in the virus genome).

Influenza: What can we expect?

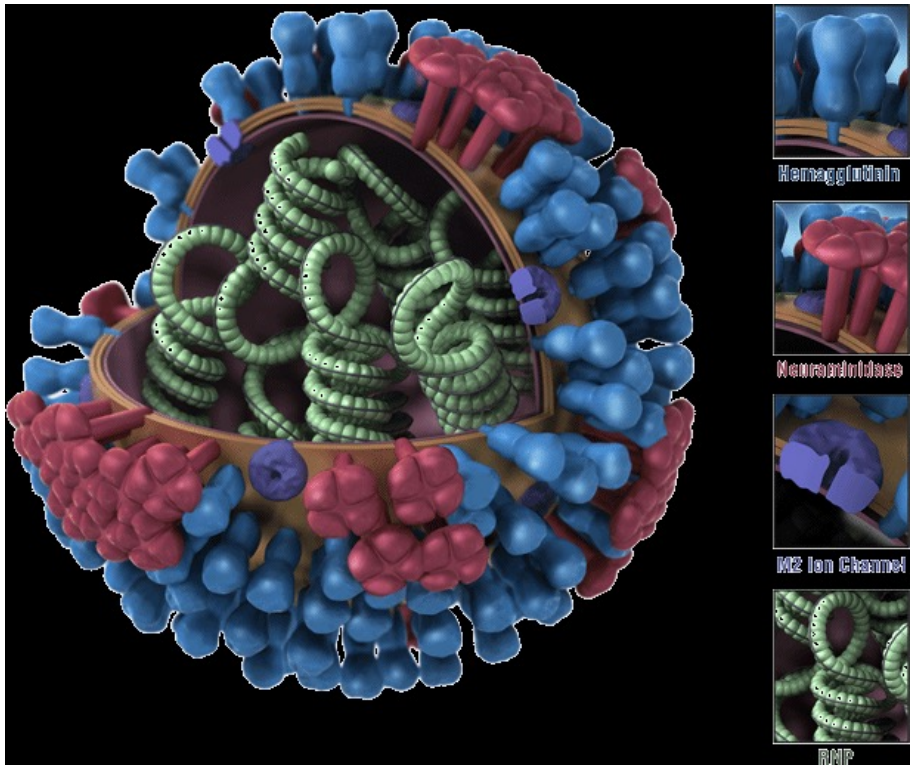
History and background

- It is a contagious respiratory illness, which can cause mild to severe illness resulting in hospitalization or death.

- Some people, such as older people, young children, and people with certain health conditions, are at high risk of serious flu complications.

- There are two main types of influenza (flu) virus: Types A and B. Type C is not clinically relevant to humans and Type D is only found in pigs and cattle. The influenza A and B viruses that routinely spread in people (human influenza viruses) are responsible for seasonal flu epidemics each year. Type A = pandemic strains.

Influenza: What can we expect?



H

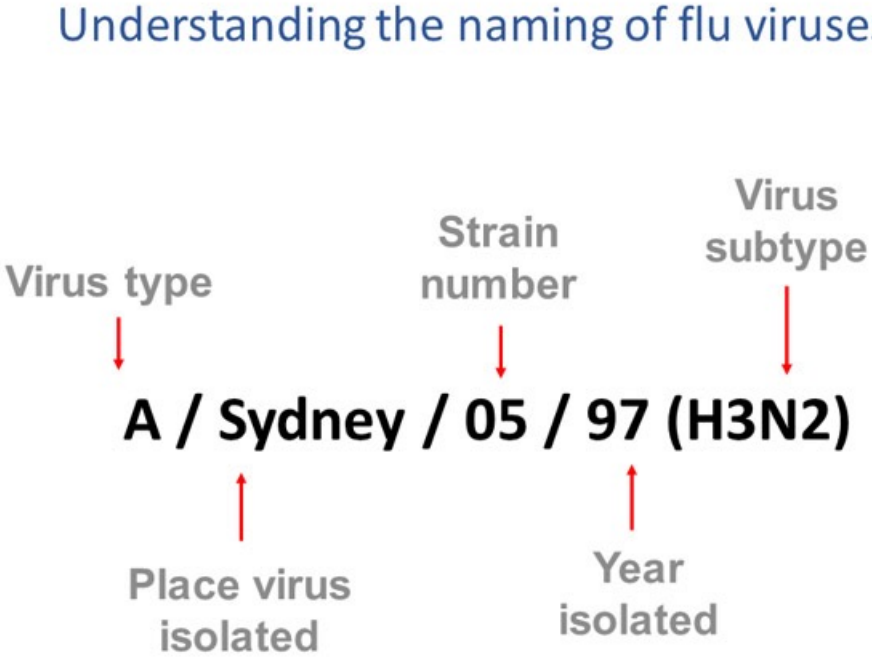
N

M2 Ion Channel

RNP

This is a picture of an influenza virus. Influenza A viruses are classified by subtypes based on the properties of their hemagglutinin (H) and neuraminidase (N) surface proteins. There are 18 different HA subtypes and 11 different NA subtypes. Subtypes are named by combining the H and N numbers – e.g., A(H1N1), A(H3N2). https://www.cdc.gov/flu/about/viruses/types.htm

Influenza: What can we expect?



This image shows how influenza viruses are named. The name starts with the virus type, followed by the place the virus was isolated, followed by the virus strain number, the year isolated, and finally, the virus subtype. https://www.cdc.gov/flu/about/viruses/types.htm

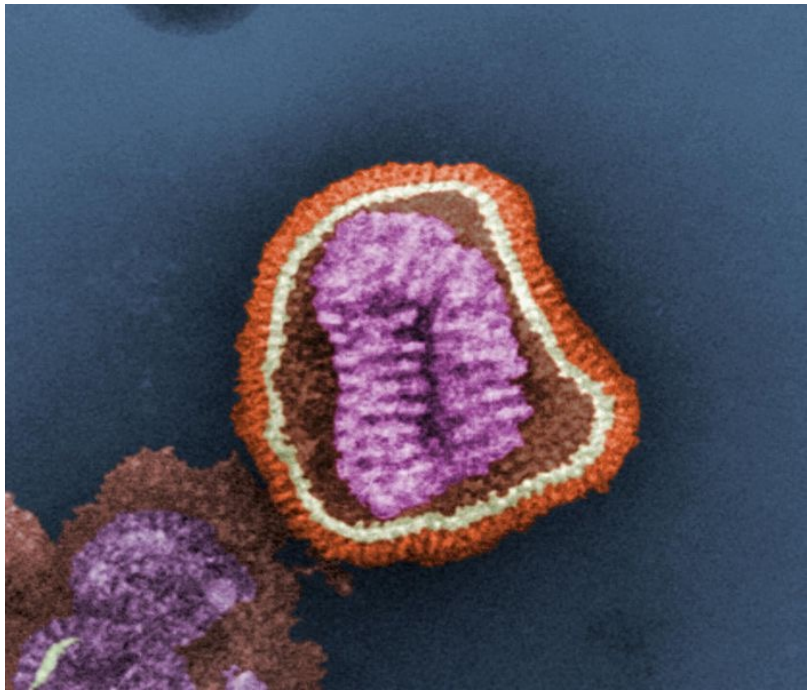
Influenza: What can we expect?

History and background

- Most experts believe that flu viruses spread mainly by tiny droplets made when people with flu cough, sneeze or talk.
- These droplets can land in the mouths or noses of people who are nearby [up to six feet or more].
- Less often, a person might get flu by touching a surface or object that has flu virus on it and then touching their own mouth, nose or possibly their eyes.

Influenza: What can we expect?

The ultrastructural details of an influenza virus particle.



TEM Image from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #10073. This image is in the public domain and thus free of any copyright restrictions. https://phil.cdc.gov/details.aspx?pid=10073

VIDEO:

https://pmdvod.nationalgeographic.com/NG_Video/931/407/swine-flu-overview_4x3_wCredits_SD__781080.mp4

Influenza: What can we expect?

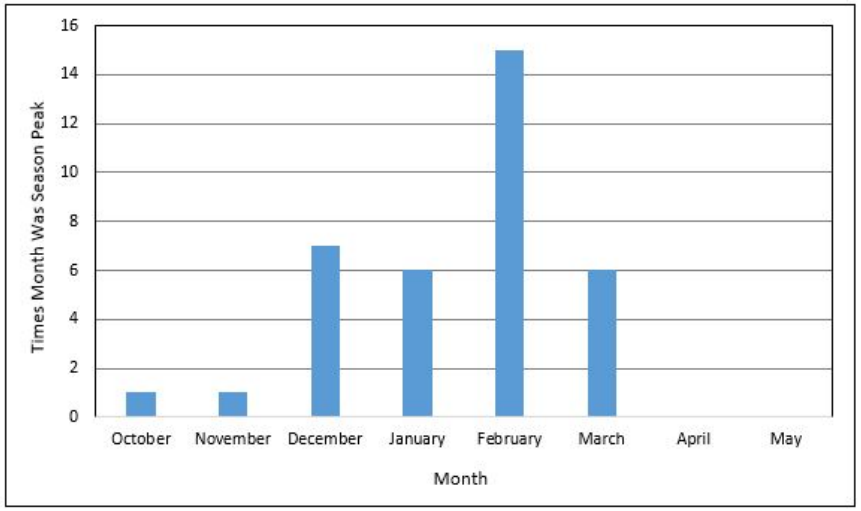
History and background – How flu spreads

- Person to person – direct transmission
- Indirect via “high-touch” surfaces / fomites
- People with flu are most contagious in the first three to four days after their illness begins. *Most healthy adults may be able to infect others beginning 1 day before symptoms develop and up to 5 to 7 days after becoming sick.* Children and some people with weakened immune systems may pass the virus for longer than 7 days.
- You may be able to pass on flu to someone else before you know you are sick, as well as while you are sick.

Influenza: What can we expect?

History and background

- When is the flu season in the United States?
- In the U.S., flu season occurs in the fall and winter. While influenza viruses circulate year-round, most of the time flu activity peaks between December and February, but activity can last as late as May.



https://www.cdc.gov/flu/about/season/flu-season.htm

Influenza: What can we expect?

Risk groups – Flu

- Adults 65 Years and Older

- Adults with Chronic Health Conditions
  - Asthma
  - Heart Disease and Stroke
  - Diabetes
  - Chronic Kidney Disease

Influenza: What can we expect?

Risk groups – Specific High Risk Groups

- HIV / AIDS
- Pregnant Women
- Cancer
- Young children
  - Children younger than 5 years old– especially those younger than 2– are at high risk of developing serious flu-related complications.

Influenza: What can we expect?

Risk groups – Specific High Risk Groups

- Neurologic and neurodevelopment conditions
- Blood disorders (such as sickle cell disease)
- Chronic lung disease (such as chronic obstructive pulmonary disease [COPD] and cystic fibrosis)
- Endocrine disorders (such as diabetes mellitus)
- Immunocompromised [in general]

Influenza: What can we expect?

Risk groups – Specific High Risk Groups

- Liver disorders
- Metabolic disorders (such as inherited metabolic disorders and mitochondrial disorders)
- People who are obese with a body mass index [BMI] of 40 or higher
- People younger than 19 years old on long-term aspirin- or salicylate-containing medications.

Influenza: What can we expect?

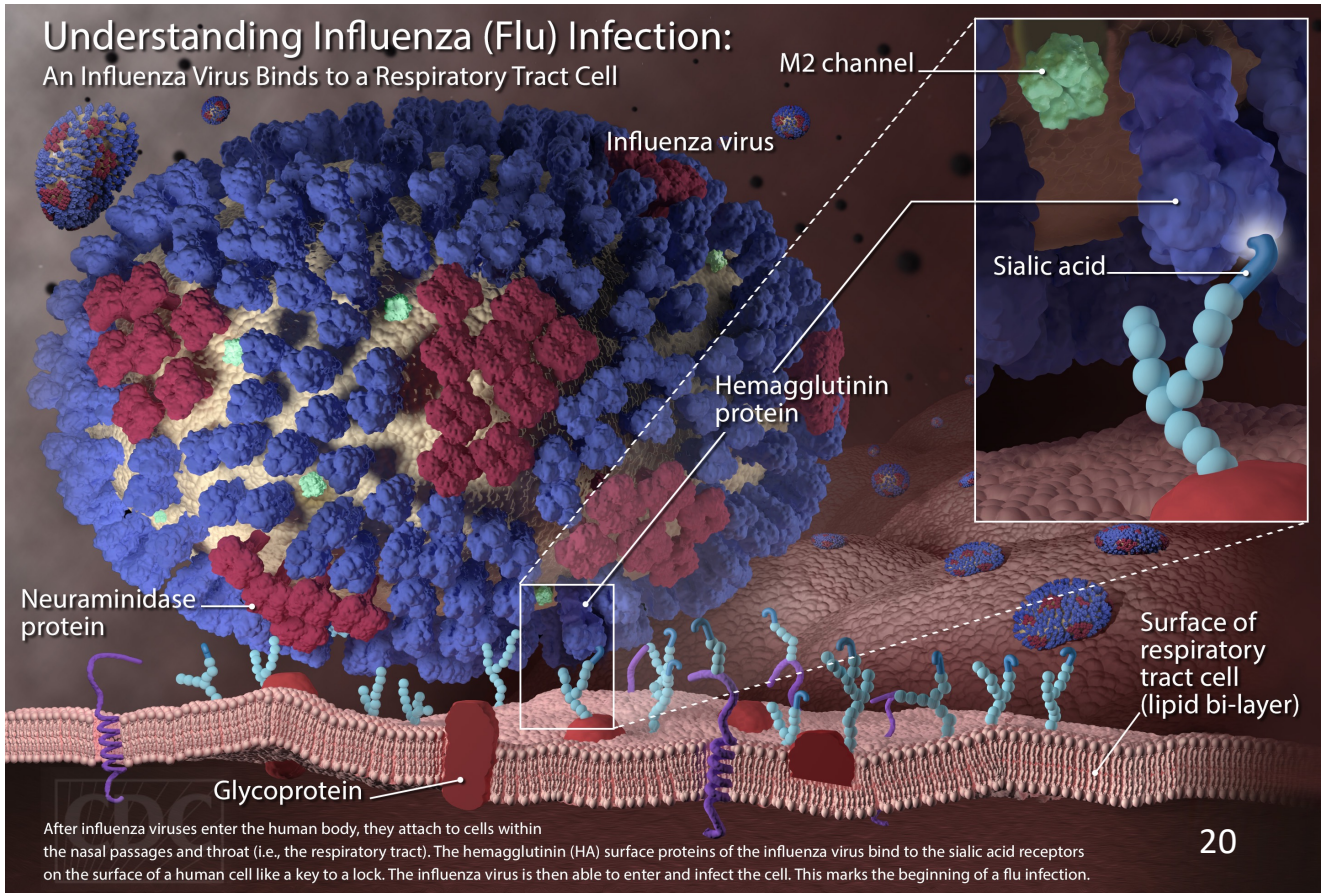
Risk groups – Specific High Risk Groups

- People who live in nursing homes and other long-term care facilities
- People from certain racial and ethnic minority groups are at increased risk for hospitalization with flu, including non-Hispanic Black persons, Hispanic or Latino persons, and American Indian or Alaska Native persons

Influenza: What can we expect?

https://www.cdc.gov/flu/resource-center/freeresources/graphics/images.htm

Epidemiology



Influenza: What can we expect?

Epidemiology

U.S. Influenza Surveillance System: Purpose and Methods

- The Influenza Division at CDC collects, compiles and analyzes information on influenza activity year-round in the United States. FluView, a weekly influenza surveillance report, and FluView Interactive, an online application which allows for more in-depth exploration of influenza surveillance data, are updated each week. The data presented each week are preliminary and may change as more data is received.

Influenza: What can we expect?

Epidemiology

U.S. Influenza Surveillance System: Purpose and Methods

- It is a collaborative effort between CDC and its many partners in state, local, and territorial health departments, public health and clinical laboratories, vital statistics offices, healthcare providers, clinics, and emergency departments. Information in five categories is collected from eight data sources in order to:

- Find out when and where influenza activity is occurring;
- Determine what influenza viruses are circulating;
- Detect changes in influenza viruses; and
- Measure the impact influenza is having on outpatient illness, hospitalizations and deaths.

Influenza: What can we expect?

Epidemiology – Why is this important?

- Flu viruses are constantly changing (referred to as antigenic drift).
- Influenza viruses can also undergo an abrupt, major change (referred to as antigenic shift) that results novel viruses.
- Vaccines must be administered annually and are updated regularly based on surveillance findings.
- Flu treatment is guided by laboratory surveillance for antiviral resistance.
- Flu surveillance and targeted research studies are used to monitor the impact of influenza on different segments of the population (e.g. age groups, underlying medical conditions).

Influenza: What can we expect?

Epidemiology – Surveillance System Components

1. Virologic Surveillance – Virus characterization / Novel A strains.

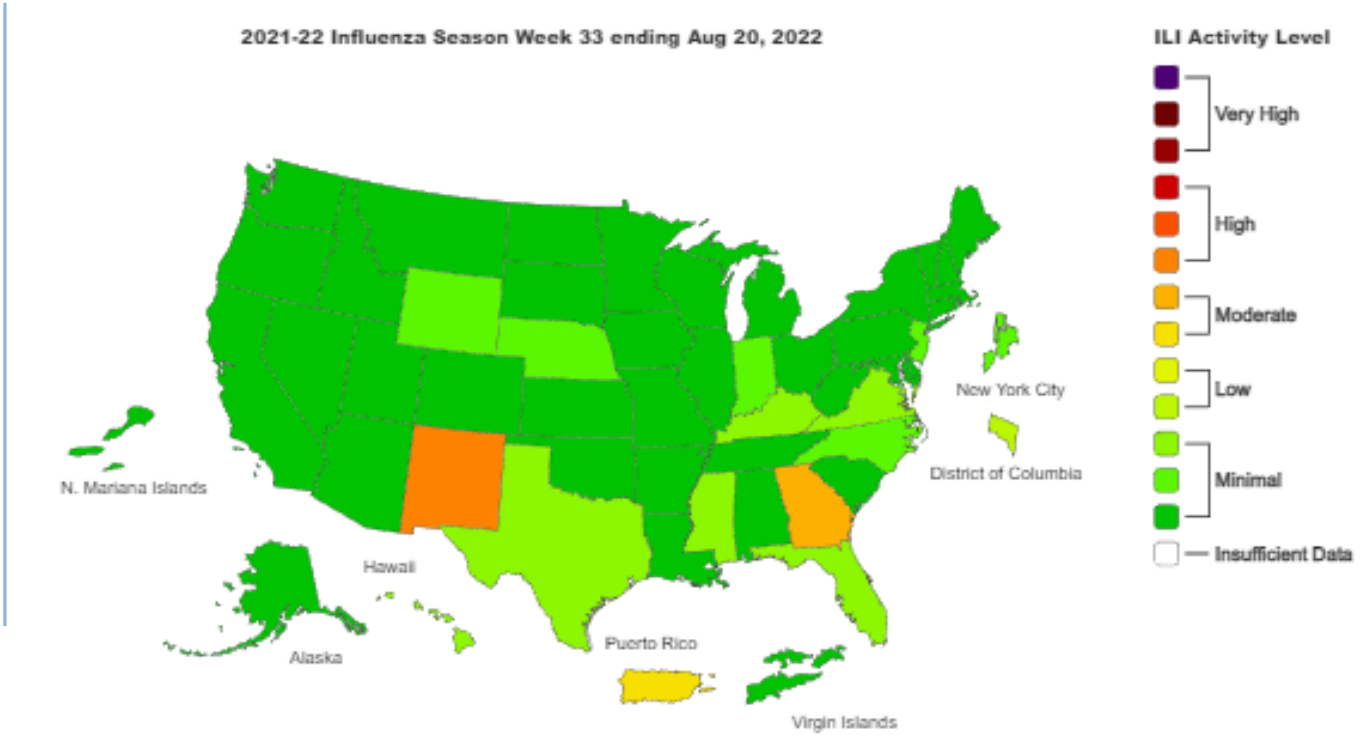
2. Outpatient Illness Surveillance – Influenza-like Illness Surveillance Network (ILINet).

3. Summary of the Geographic Spread of Influenza – Weekly State and Territorial Epidemiologists Report.

4. Hospitalization Surveillance – Laboratory confirmed influenza-associated hospitalizations are monitored through the Influenza Hospitalization Surveillance Network (FluSurv-NET).

5. National Center for Health Statistics (NCHS) mortality surveillance data .

Influenza: What can we expect?

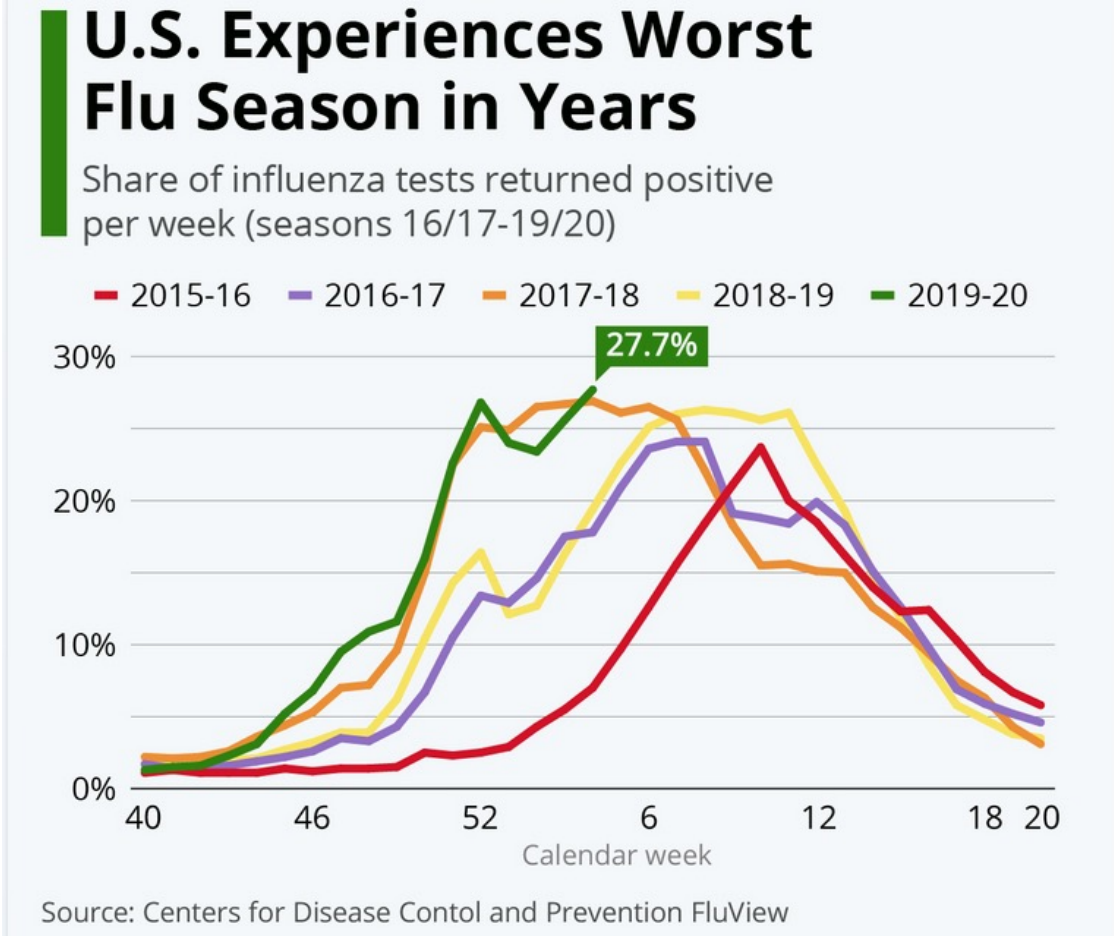


Influenza: What can we expect?

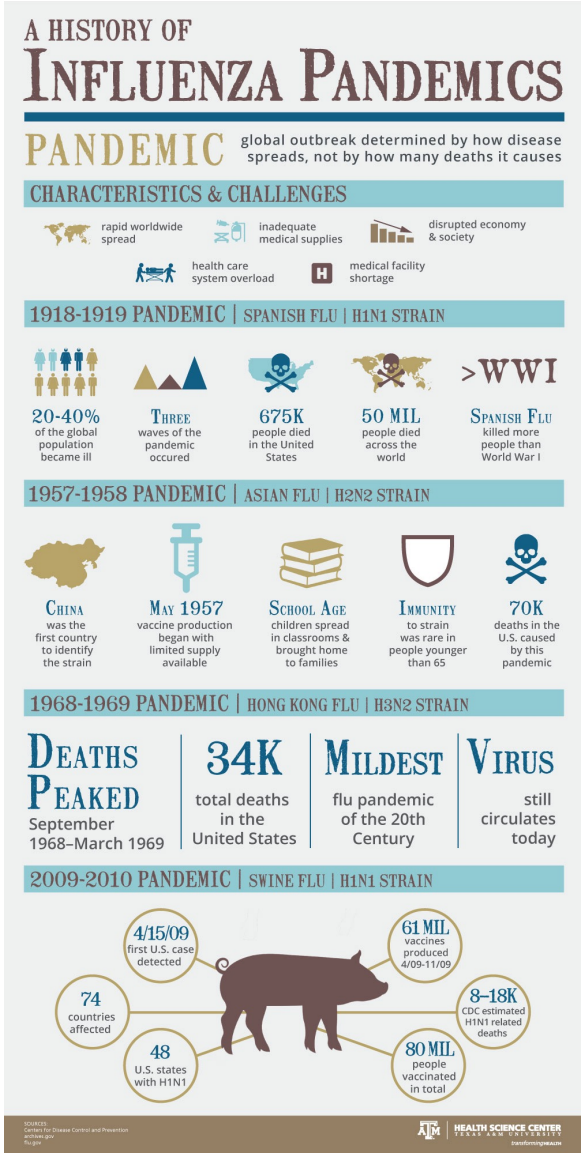
- During the 2021-2022 flu season, influenza activity in the United States was lower than pre-pandemic levels despite increased reporting and testing, possibly owing to COVID-19 precautions, according to a new report from the US Centers for Disease Control and Prevention (CDC).

- Influenza activity continued from October 2021 through mid-June 2022, with A(H3N2) viruses predominating throughout the season.

Influenza: What can we expect?



https://vitalrecord.tamhsc.edu/a-history-of-influenza-pandemics/infographic-11-25-pandemicinfluenzahistory-final/



Influenza: What can we expect?

Signs / Symptoms / Spectrum of Disease

- Flu signs and symptoms usually come on suddenly.

- People who are sick with flu often feel some or all of these symptoms:

- Fever* or feeling feverish/chills
- Cough
- Sore throat
- Runny or stuffy nose
- Muscle or body aches

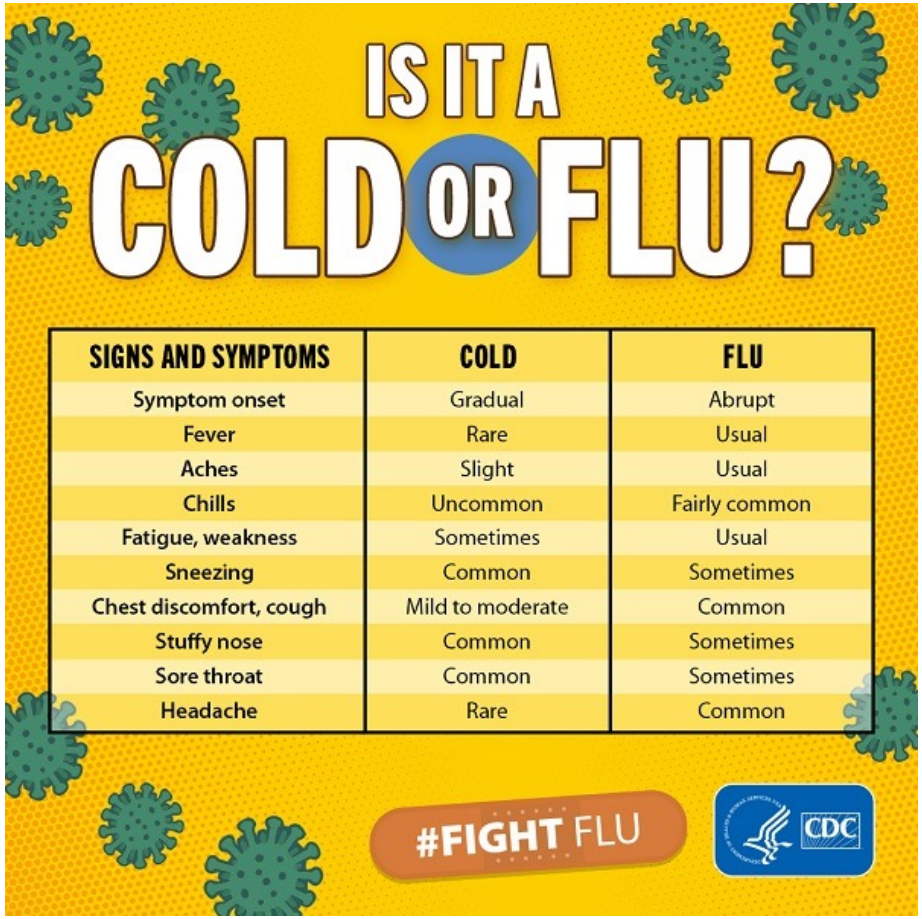
Influenza: What can we expect?

Signs / Symptoms / Spectrum of Disease

- Headaches
- Fatigue (tiredness)
- Some people may have vomiting and diarrhea, though this is more common in children than adults.

- *It’s important to note that not everyone with flu will have a fever.

Influenza: What can we expect?



SIGNS AND SYMPTOMS	COLD	FLU
Symptom onset	Gradual	Abrupt
Fever	Rare	Usual
Aches	Slight	Usual
Chills	Uncommon	Fairly common
Fatigue, weakness	Sometimes	Usual
Sneezing	Common	Sometimes
Chest discomfort, cough	Mild to moderate	Common
Stuffy nose	Common	Sometimes
Sore throat	Common	Sometimes
Headache	Rare	Common

Influenza: What can we expect?

Signs / Symptoms / Spectrum of Disease

- What is the difference between Influenza (Flu) and COVID-19?

- Influenza (Flu) and COVID-19 are both contagious respiratory illnesses, but they are caused by different viruses. COVID-19 is caused by infection with a new coronavirus (called SARS-CoV-2) and flu is caused by infection with influenza viruses.

Influenza: What can we expect?

Signs / Symptoms / Spectrum of Disease

- Key differences:
  - COVID-19 seems to spread more easily than flu and causes more serious illnesses in some people.
  - COVID-19 can also take longer before people show symptoms and people can be contagious for longer.
  - There is a vaccine to protect against flu and COVID-19.

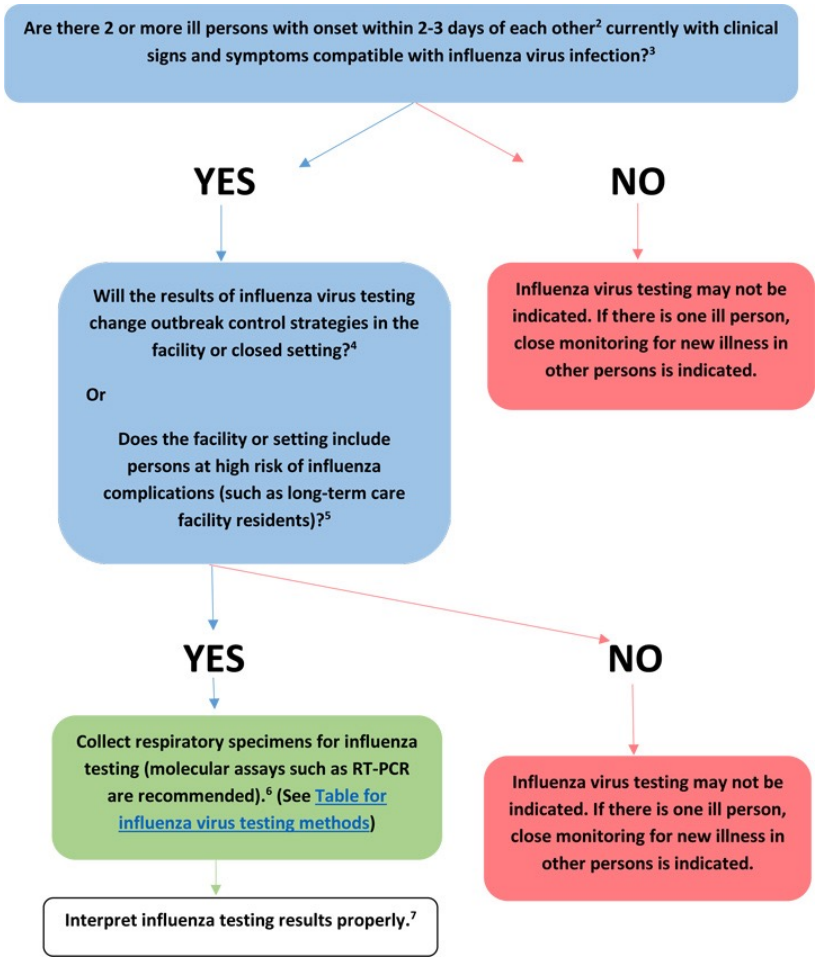
Influenza: What can we expect?

Signs / Symptoms / Spectrum of Disease

- Because some of the symptoms of flu and COVID-19 are similar, it may be hard to tell the difference between them based on symptoms alone, and ***testing may be needed*** to help confirm a diagnosis.

- The best way to prevent infection is to avoid being exposed to the virus.

Influenza: What can we expect?



Infectious Diseases Society of America (IDSA) Influenza Clinical Practice Guidelines.

Figure: Guide to use of influenza virus diagnostic tests in investigating outbreaks in institutional or other closed settings.

https://www.cdc.gov/flu/professionals/diagnosis/guide-virus-diagnostic-tests.htm

Influenza: What can we expect?

Flu testing / Diagnosis

Table 1: 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	15-30 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

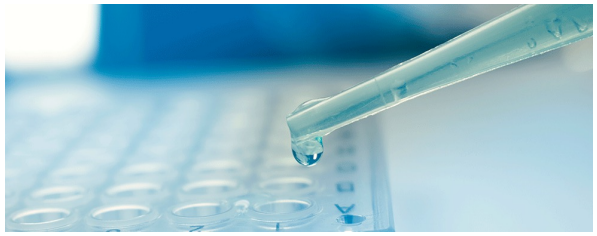
Influenza: What can we expect?

Flu testing / Diagnosis

- The Infectious Diseases Society of America (IDSA) recommends use of rapid influenza molecular assays over rapid influenza diagnostic tests (RIDTs) for detection of influenza viruses in respiratory specimens of outpatients.

- IDSA recommends use of RT-PCR or other molecular assays for detection of influenza viruses in respiratory specimens of hospitalized patients. Consult the IDSA Influenza Clinical Practice Guidelines for recommendations on influenza testing and information on interpretation of testing results.

Influenza: What can we expect?



Flu testing / Diagnosis

- What about testing accuracy?

- Rapid influenza diagnostic tests identify the presence of influenza A and B in respiratory tract secretions.

- The results are ready in as little as 15 minutes, but the rapid tests aren't as accurate as other tests that need to be sent to a lab. Accuracy of rapid flu tests can range anywhere from 50% to 90%, depending on the test, the individual, and the prevalence of the flu in the community.

Influenza: What can we expect?

Flu testing / Diagnosis

Factors that can affect the outcome of the rapid flu test include:

- **Timing**: Tests are most accurate when specimens are collected within 3-4 days of the onset of symptoms, when influenza viral shedding is highest.
- **Collection**: Each test has its own specifications for specimen collection—nasopharyngeal, nasal, throat swab, or aspirate—which *must be followed for accuracy.*
- **Flu type**: Rapid flu tests are better able to detect influenza A than influenza B.
- **Current flu activity**: False negatives are more likely when flu activity is high, but can occur at any time. Similarly, false positives are more common when flu activity is low.

Influenza: What can we expect?

Flu testing / Diagnosis

When interpreting the results of a rapid flu test, your doctor will consider all of this in the context of your symptoms and current flu activity in the community. These tests are available as a tool, but results are not the only deciding factor in making a diagnosis.[2]

False Negative

- You have the flu, but the test did not detect it

False Positive

- The test detected the flu, although you do not have it

****Soapbox statement**: It is CRITICAL for a medical laboratory professional to conduct and interpret all medical laboratory testing.

Influenza: What can we expect?

Prevention and treatment.

CDC VIDEO – How Does Flu Make You Sick?

https://www.youtube.com/watch?v=MfX6xGdQco0

Flu virus infection triggers inflammation in your body. Severe inflammation can cause lung damage and other serious problems. Everyone 6 months and older needs flu vaccine each year.

Influenza: What can we expect?

Prevention and treatment.

The best way to prevent seasonal flu is to get vaccinated every year.

https://www.cdc.gov/flu/images/prevent/get-vaccinated.png

Influenza: What can we expect?

Prevention and treatment.

Different flu vaccines are approved for use in different groups of people – discuss these options with your HCP.

- Flu shots are approved for use in children as young as 6 months old and flu shots approved for use in adults 65 years and older.
- Flu shots also are recommended and approved for use in pregnant women and people with certain chronic health conditions.
- The nasal spray flu vaccine is approved for use in non-pregnant individuals who are 2 years through 49 years of age. People with some certain medical conditions should not receive the nasal spray flu vaccine.

Influenza: What can we expect?

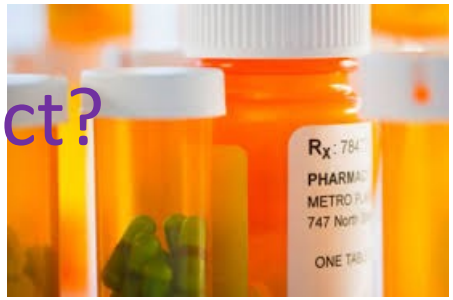
Prevention and treatment.

Make plans to get vaccinated early in fall, before flu season begins. CDC recommends that people get a flu vaccine by the end of October.

However, getting vaccinated early (for example, in July or August) is likely to be associated with reduced protection against flu infection later in the flu season, particularly among older adults.

https://www.cdc.gov/flu/images/prevent/H_PN_CDC-5656.jpg

Influenza: What can we expect?



https://www.cdc.gov/flu/images/flu-antiviral-drugs-sm.jpg

Prevention and treatment.

There are four FDA-approved antiviral drugs recommended by CDC to treat flu this season.

- oseltamivir phosphate (available as a generic version or under the trade name Tamiflu®),
- zanamivir (trade name Relenza®)
- peramivir (trade name Rapivab®), and.
- baloxavir marboxil (trade name Xofluza®).

Influenza: What can we expect?

Infection prevention / control

- Take everyday precautions to protect others while sick
- While sick, limit contact with others as much as possible to keep from infecting them.
- Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it.

Influenza: What can we expect?

Infection prevention / control

- Wash your hands often with soap and water. If soap and water are not available, use an alcohol-based hand rub.

- Clean and disinfect surfaces and objects that may be contaminated with germs like flu.

Influenza: What can we expect?

Infection prevention / control

- Cover your mouth. Teach your children to cover their mouths when they cough or sneeze.

- Don't share personal items. Don't share drinking glasses or eating utensils. Wash dishes in hot, soapy water or in a dishwasher.

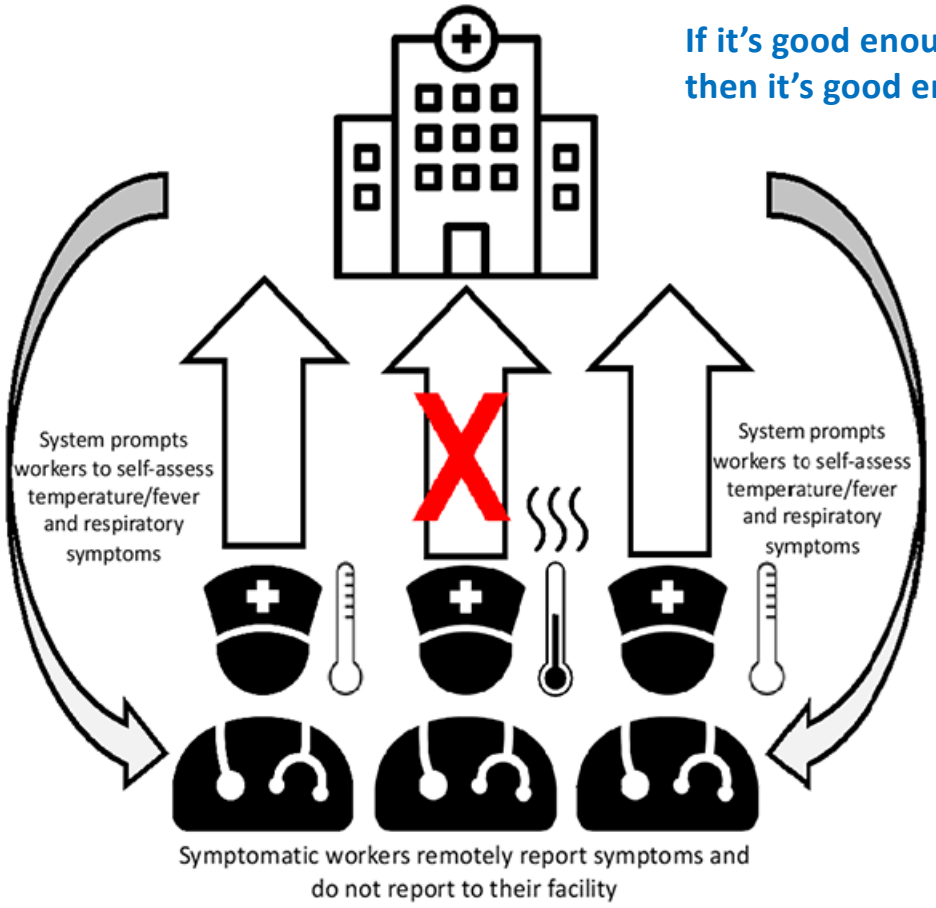
Influenza: What can we expect?

Infection prevention / control

- Stay home until you are better
- 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 without the use of fever-reducing medicine.

Influenza: What can we expect?

If it's good enough for COVID-19, then it's good enough for flu!



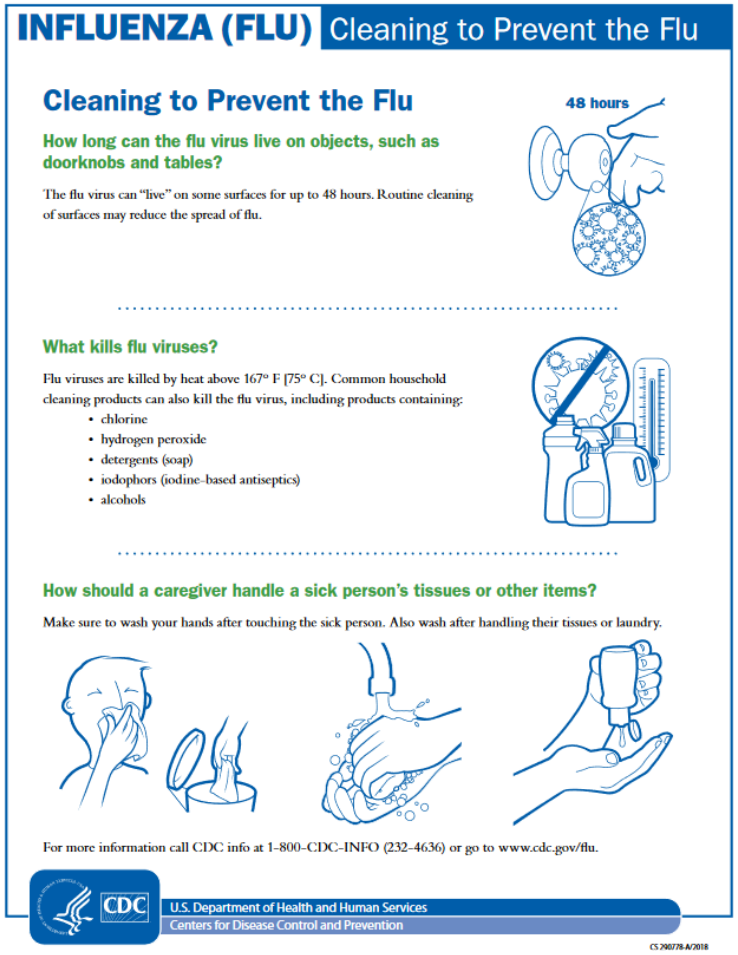
Influenza: What can we expect?

The role of environmental surfaces…

Environmental Infection Control

- Dedicated medical equipment.
- Ensure that environmental cleaning and disinfection procedures are followed consistently and correctly.
- Management of laundry, food service utensils, and medical waste.
- Terminal cleaning of rooms and PPE to be worn by environmental services personnel.

The role of environmental surfaces…



INFLUENZA (FLU) Cleaning to Prevent 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 48 hours. Routine cleaning of surfaces may reduce the spread of flu.

48 hours

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

How should a caregiver handle a sick person's tissues or other items?

Make sure to wash your hands after touching the sick person. Also wash after handling their tissues or laundry.

For more information call CDC info at 1-800-CDC-INFO (232-4636) or go to www.cdc.gov/flu.

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

CS 290778-A/2018

#SurfacesMatter

https://www.cdc.gov/flu/resource-center/images/multi-language-pdfs/contamination_cleaning_english_508.pdf

Influenza: What can we expect?

Infection prevention / control –

- Ongoing Education / transparency
- Standardized education and printable materials for providers and patients.
  - Signage, Video, etc.
- Increased and early case finding (testing use)
- Methods to identify patients at high risk to encourage prompt testing and contact precautions.
- Expanded infection-control measures.

Influenza: What can we expect?

2022–2023

- No one truly knows what to expect! ☺
- The vaccines for the 2022-2023 season have been chosen to match viruses currently circulating during the protracted tail end of the 2021-2022 season
- Receiving a seasonal influenza vaccine each year remains the best way to protect against seasonal influenza and its potentially severe consequences.
- Influenza surveillance reports for the US are published online weekly at https://www.cdc.gov/flu/weekly

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www.webbertraining.com/schedulep1.php

September 20, 2022	*(European Teleclass)* **RESERVOIRS OF PATHOGENS: THE MICROBIOLOGICAL RISKS OF RESPIRATORY MEDICAL DEVICES** Speaker: **Professor Colum Dunne**, University of Limerick, Ireland
October 11, 2022	*(European Teleclass)* **ADDRESSING MRSA BACTERAEMIA IN A HIGHLY ENDEMIC HOSPITAL – A BEHAVIOUR CHANGE APPROACH** Speaker: **Prof. Michael Borg**, Mater Dei Hospital, Malta
October 13, 2022	**BUILDING (ENHANCING) EVIDENCE-BASED ANIMAL-ASSISTED THERAPY PROGRAMS IN HUMAN HEALTHCARE** Speaker: **Prof. Jason Stull**, College of Veterinary Medicine, The Ohio State University
October 20, 2022	*(FREE Teleclass)* **SPECIAL LECTURE FOR CLEAN HOSPITALS DAY** Speaker: **Prof. Didier Pittet**, University of Geneva Hospitals, Switzerland

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