



Infectious Disease Outbreaks in LTC

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Objectives

At the end of this session the participant should be able to:

- Understand the characteristics of Influenza and Norovirus outbreaks
- Understand the epidemiology of Influenza and Norovirus outbreaks
- Implement an appropriate outbreak management strategy

What is an Outbreak?

- Outbreak – the occurrence of more cases of disease than expected among a specific group of people over a particular period of time.
 - Influenza
 - Norovirus
 - MRSA
 - C. difficile
- Cluster – an aggregation of cases in a given area over a particular period without regard to whether the number of cases is more than expected.

Outbreak Investigation

- Establish the existence of outbreak
- Verify the diagnosis
- Develop a case definition
- Implement control and prevention measures
- Communicate findings

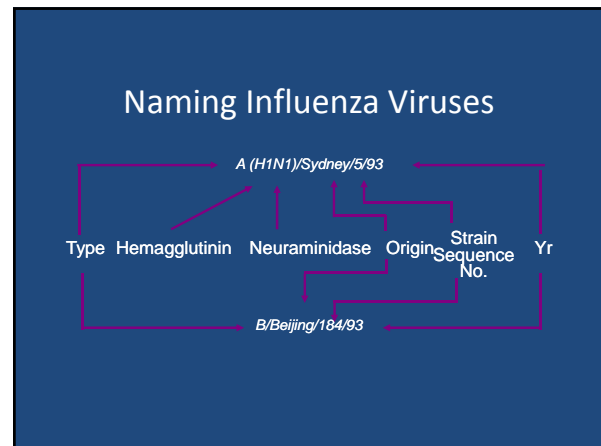
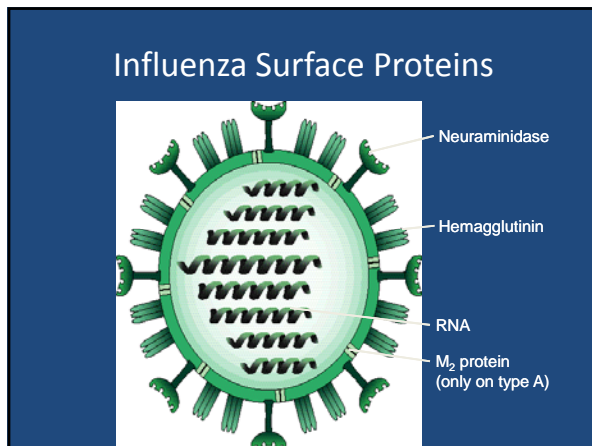
Influenza 2009

Seasonal
 H1N1

Influenza Pandemics in the 20th Century

Years	Flu	Virus	Mortality
1918-19	“Spanish”	Type A (H1N1)	20 million worldwide 550,000 US
1957-58	“Asian”	Type A (H2N2)	70,000 US
1968-69	“Hong Kong”	Type A (H3N2)	34,000 US

Glezen WP. *Epidemiol Rev.* 1996;18:65.
 Centers for Disease Control and Prevention. Influenza Prevention and Control. Influenza. Available at: <http://www.cdc.gov/ncidod/diseases/flu/influnfo.htm>.



- ### Seasonal Vaccine Composition
- A/Brisbane/59/2007 (H1N1)-like, A/Brisbane/10/2007 (H3N2)-like, and B/Brisbane 60/2008-like antigens
 - H1N1 vaccine
 - October 2009
 - One dose
 - Federal distribution
 - No cost

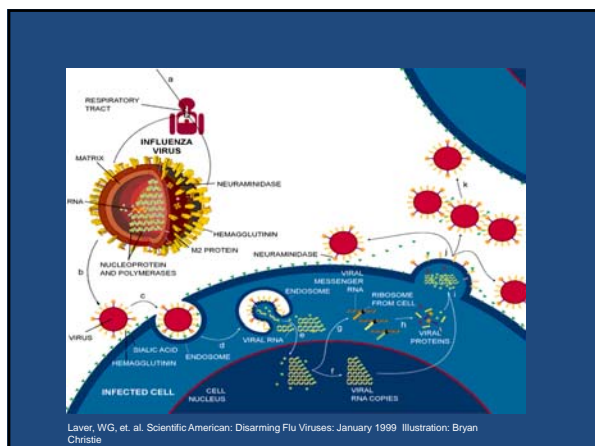
Influenza A (H1N1) 2009 Monovalent Vaccines Approved for Use in the United States, October 6, 2009

Vaccine type	Manufacturer	Presentation	Age group	Route
Inactivated	Sanofi Pasteur	0.25 mL pre-filled syringe 0.5 mL pre-filled syringe 5.0 mL multidose vial	6–35 mos ≥36 mos ≥6 mos	IM
Inactivated	Novartis Vaccines and Diagnostics Limited	5.0 mL multidose vial 0.5 mL pre-filled syringe	≥4 yrs ≥4 yrs	IM
Inactivated	CSL Limited	5.0 mL multidose vial 0.5 mL pre-filled syringe	≥18 yrs ≥18 yrs	IM
LAIV	MedImmune LLC	0.2–mL sprayer	2–49 yrs	Intranasal

MMWR October 9, 2009 / 58(39);1100-1101

- ### Effectiveness of Seasonal Influenza Vaccine in Elderly LTC Residents
- Provides protection against illness in 25%-35%¹
 - Vaccination of both staff and residents reduces incidence of outbreaks²
- ¹Hota S, McGeer A. Antivirals and the Control of Influenza Outbreaks CID 2007;45:1362-8.
²Shugarman et al The influence of staff and resident immunization rates on influenza-like illness outbreaks in nursing homes. J AM Dir Assoc. 2006;7:562-7.

- ### Influenza Transmission
- Aerosolized droplet spread
 - Incubation period 18 - 72 hours
 - Attack rate 10% - 50%
 - Outbreaks generally begin in confined locations
 - After initial cases, numbers usually peak over 2-3 weeks
 - Usually occurs Dec - April



Signs and Symptoms of the Flu

Type of Symptoms	Children <5 yrs	Adults	Elderly
Respiratory	<ul style="list-style-type: none"> Rhinitis Pharyngitis 	<ul style="list-style-type: none"> Nonproductive cough Sore throat 	<ul style="list-style-type: none"> Nasal obstruction
Constitutional or systemic	<ul style="list-style-type: none"> Fever Vomiting Diarrhea 	<ul style="list-style-type: none"> Rapid onset of symptoms Fever, usually >100°F Chills/sweats Headache Myalgia Potentially severe, persistent malaise Substernal soreness, photophobia and ocular problems 	<ul style="list-style-type: none"> High fever, >99.0°F Lassitude Confusion

2009 H1N1 Facts 9/11/09

- 97% of all circulating Influenza strains are H1N1
- Influenza-like-illness (ILI)** is defined as fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat in the absence of a KNOWN cause other than influenza.

www.cdc.gov/flu accessed 9/14/09

Diagnostic Tests for H1N1

- RIDTs – rapid influenza diagnostic tests
- rRT-PCR – real time reverse transcriptase – polymerase chain reaction
- Viral culture
- Test:
 - Hospitalized patients – suspected influenza
 - If needed for outbreak planning
 - Death related to ILI

CDC 9/29/09

Groups at higher risk for seasonal influenza complications

- Children less than 5 years old;
- Persons aged 65 years or older;
- Children and adolescents (less than 18 years) who are receiving long-term aspirin therapy and who might be at risk for experiencing Reye syndrome after influenza virus infection;
- Pregnant women;
- Adults and children who have chronic pulmonary, cardiovascular, hepatic, hematological, neurologic, neuromuscular, or metabolic disorders;
- Adults and children who have immunosuppression (including immunosuppression caused by medications or by HIV);
- Residents of nursing homes and other chronic-care facilities.

Groups at higher risk for H1N1 influenza

- Pregnant women
- Individuals who live with or care for children < 6 months old
- Individuals 6 months – 24 years of age
- Health care workers and emergency personnel
- Individuals between 25 years and 64 with chronic illnesses or immune issues

www.cdc.gov/flu/h1n1, updated 9/8/09; accessed 9/14/09

Outbreak Management

- Provide protection through annual immunization programs
- Recognize when an outbreak exists
- Treat and care for the actively infected residents
- Understand the mode of transmission
- Interventions to prevent cross transmission
- Manage residents and staff to prevent illness and reduce likelihood of cross transmission

General Infection Control: Prevent Cross Transmission

- Standard and droplet precautions¹
- Private room if possible
- Cohort if private room unavailable
- Reinforce hand washing importance
- Distribute alcohol based hand gels to staff
- Limit healthcare personnel entering the room of an isolation patient to those performing direct patient care – N95 and standard masks²


¹CDC December 23, 2005. Infection Control Measures for Preventing and Controlling Influenza Transmission in Long-Term Care Facilities. ²www.cdc.gov/h1n1flu/guidelines_infection_control.htm

Infection Control: Elimination of Potential Exposures

- Limit communal activities and dining
- Limit visitation
- Limit outpatient visits – MD appointments
- Limit admissions to active units
- Limit admissions to the Facility if activity is widespread

CDC December 23, 2005. Infection Control Measures for Preventing and Controlling Influenza Transmission in Long-Term Care Facilities

Staff Management



If you look like this – DON'T GO TO WORK!

Infection Control: Staff Management

- Do not allow ill employees to work
 - Excluded for at least 24 hours after last fever without medications¹
- If outbreak confined to one unit limit staff cross over to other units
- If possible, assign caregivers to only ill or well residents
- If not, instruct staff to provide care to well residents first, then ill residents

CDC Interim Guidance on Infection Control Measures for 2009 H1N1 Influenza. ¹Updated 10/14/09

Infection Control PPE

- N95 respirators for staff providing direct patient care
- Facemasks for non-direct patient care staff entering room
- Standard droplet precautions

Treatment for H1N1

- “Treatment with Oseltamivir or Zanamivir is recommended for all persons with suspected or confirmed influenza requiring hospitalization.”
- “Treatment with Oseltamivir or Zanamivir generally is recommended for persons with suspected or confirmed influenza who are at higher risk for complications (children younger than 5 years old, adults 65 years and older, pregnant women, persons with certain chronic medical or immunosuppressive conditions, and persons younger than 19 years of age who are receiving long-term aspirin therapy.”

www.cdc.gov/h1n1flu; updated 9/8/09; accessed 9/14/09

Treatment for H1N1

- Persons who are not at higher risk for complications or do not have severe influenza requiring hospitalization generally do not require antiviral medications for treatment or prophylaxis. However, any suspected influenza patient presenting with warning symptoms (e.g., dyspnea) or signs (e.g., tachypnea, unexplained oxygen desaturation) for lower respiratory tract illness should promptly receive empiric antiviral therapy.

www.cdc.gov/h1n1flu; updated 9/8/09; accessed 9/14/09

Outbreaks in SNFs

- At this time, no outbreaks of 2009 H1N1 have been reported in such settings. This may be the result of some level of immunity among persons 65 years and older and/or possibly fewer exposures of such persons to 2009 H1N1 thus far. However, if such outbreaks were to occur, it is recommended that ill patients be treated with oseltamivir or zanamivir and that chemoprophylaxis with either oseltamivir or zanamivir be started as early as possible to reduce the spread of the virus as is recommended for seasonal influenza outbreaks in such settings.

www.cdc.gov/h1n1flu; updated 9/8/09; accessed 9/14/09

Chemoprophylaxis in Nursing Homes

- Use of antiviral drugs for treatment and chemoprophylaxis of influenza has been a cornerstone for the control of seasonal influenza outbreaks in nursing homes and other long-term care facilities that house large numbers of patients at higher risk for influenza complications

www.cdc.gov/h1n1flu; updated 9/8/09; accessed 9/14/09

Prevent Cross Transmission: Influenza Chemoprophylaxis

- Who should receive prophylaxis in LTCFs?
- Residents
 - Outbreaks often spread from one unit to another¹
 - The entire facility should receive prophylaxis
- Staff
 - Unvaccinated staff who continue to work should be offered prophylaxis

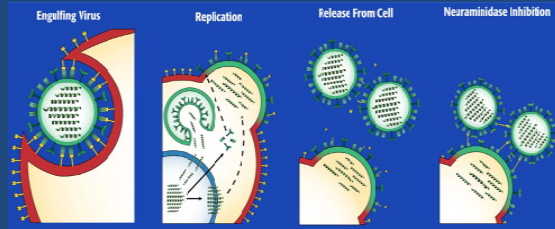
¹Hota S, McGeer A. Antivirals and the Control of Influenza Outbreaks CID 2007;45:1362-8.

Influenza Treatment and Chemoprophylaxis Seasonal and H1N1

Agent/Age Group	Treatment	Chemoprophylaxis
Oseltamivir		
Adults	75 mg capsule twice per day for five days	75 mg capsule once daily
Zanamivir		
Adults	Two 5-mg inhalations (10 mg total) twice daily	Two 5-mg inhalations (10 mg total) once daily

www.cdc.gov/h1n1flu/recommendations.htm

Neuraminidase Inhibition: An Ideal Therapeutic Strategy



Pandemic Influenza Plan

- Additional components
 - Communicate with staff, residents and responsible parties about the status of the pandemic
 - Plan for direct or indirect staff absences
 - Ill or family related absences
 - Plan for obtaining large quantities of antivirals when needed

www.pandemicflu.gov

Pandemic Influenza Plan

- Additional components
 - Be prepared to provide acute care in the Facility if ACFs become overloaded
 - Plan to stockpile consumable resources including medical supplies if evidence suggests that a pandemic will affect the US

www.pandemicflu.gov

GASTROINTESTINAL FLU NOROVIRUS

NOROVIRUS

- Leading cause of viral gastroenteritis¹
- Affects 23 million annually²
- Causes expanding number of outbreaks
 - Hospitals
 - Skilled nursing facilities

¹Centers for Disease Control and Prevention. MMWR 2007;56:842-6

²Mead PS et al. Emerg Infect Dis 1999;5:607-25

NOROVIRUS

- RNA virus
- Multiple genotypes¹
- Genogroups I, II, IV
 - Multiple strains

¹Said MA et al. CID 2008;47 1202

NOROVIRUS

- Clinical manifestations
 - Diarrhea & vomiting
 - Abdominal pain
 - Malaise and low grade fever
- Incubation period 24-48 hours¹
- Median illness duration 12-60 hours
- Usually self limiting
- Benchmark for diagnosis is RT-PCR

¹Kaplan JE et al. Am J Public Health 1982; 72:1329-32

NOROVIRUS Mode of Transmission

- Foodborne
- Person-to-person
- Airborne via vomiting
- Contact with contaminated inanimate surfaces
 - Door handles
 - telephones

Said MA et al. CID 2008;47 1202. Centers for Disease Control and Prevention. MMWR 2007;56:842-6

Norovirus Outbreaks

- 30%-50% - closed facilities^{1,2,3}
 - Hospitals
 - Nursing facilities
 - Retirement homes
- 28% - restaurants and catered meal events
- 16% - cruise ships
- 8% - day care centers

Centers for Disease Control and Prevention. MMWR 2007;56:842-6. ¹Blanton LH et al J Infect Dis 2006;193:413-21. ²Green KY et al J Infect Dis 2002; 185:133-46

Norovirus Outbreaks

- Primary cases result from exposure to a fecally contaminated vehicle
- Secondary and tertiary cases result from person-to-person transmission
 - Fecal viral shedding may be prolonged in the absence of clinical illness

CDC. MMWR "Norwalk-Like Viruses" Public Health Consequences and Outbreak Management. June 1, 2001/Vol.50/No.RR-9

NOROVIRUS Outbreaks

- Low infectious dose (< 10 viral particles)
- Environmental persistence
- Prolonged shedding
- Shared toilets
- Aggregate living conditions
- Immobility of residents
- Incontinence

CDC. Norovirus-like viruses: public health consequences and outbreak management. MMWR 2001;50(No. RR-9): 1-17

Characteristics of NLV That Facilitate Epidemic Spread

Characteristic	Observation	Consequences
Low infectious dose	< 10 ² viral particles	Permits droplet or person-to-person spread, secondary spread, or spread by food handlers
Prolonged asymptomatic shedding	≤ 2 weeks	Increased risk for secondary spread
Environmental stability	Survives ≤10 ppm chlorine, freezing, and heating to 60°C	
Substantial strain diversity	Multiple genetic and antigenic types	Requires composite diagnostics; repeat infections by multiple antigenic types; easy to underestimate prevalence
Lack of lasting immunity	Disease can occur with reinfection	Childhood infection does not protect from disease in adulthood

CDC. Norovirus-like viruses: public health consequences and outbreak management. MMWR 2001;50(No. RR-9): 1-17

Norovirus Outbreak Prevention

- General
 - Ensure hand hygiene-soap and water preferable
 - Clean hands before eating or drinking, after using the bathroom or after contact with an ill patient
 - Do not share equipment between affected and unaffected patients

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202

Norovirus Outbreak Prevention

- Tier 1
 - Use standard precautions
 - Implement contact precautions until patient has been asymptomatic for 48-72 hours
 - Place ill patients in single rooms or cohort
 - Prevent visitation from sick visitors-signs
 - Ill employees should not work until 48-72 hours after symptoms have resolved

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202

Norovirus Outbreak Prevention

- Tier 2
 - Cohort staff members and employees to limit contact with ill patients
 - Screen exposed employees for symptoms-furlough if symptoms develop
 - Cohort employees
 - Unexposed employees should care for unexposed residents

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202

Norovirus Outbreak Prevention

- Tier 3
 - If outbreak confined to one unit-close unit
 - If outbreak in several units consider closing facility
 - Units or facilities should be closed until no new cases are reported for 1-2 incubation periods (48-96 hours)

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202

Norovirus Outbreak Prevention

- Environmental
 - Clean spills with detergent to remove particulate matter
 - Disinfect with a hypochlorite solution (bleach) to all high touch surfaces such as doorknobs, light switches, tables, countertops - Q Shift
 - Clean bathrooms Q Shift-toilets and fixtures
 - Clean rooms every 24 hours and on resident discharge-walls, chairs, ledges etc.

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202

Norovirus Outbreak Prevention

- Environmental
 - Provide different toilet facilities for ill and non-ill residents
 - Clean floors with approved disinfectant, and change solution and mop head every three rooms
 - Resident rooms where vomiting and diarrhea have occurred should be cleaned after all of the rooms have been cleaned
 - Mop head and solution changed after cleaning these rooms

Said MA et al. *Gastrointestinal Flu: Norovirus in Health Care and Long-Term Care Facilities* CID 2008:47 1202



THANK YOU