

Influenza in Hospitals

Dr. Alison McGeer

A Webber Training Teleclass



Influenza in hospitals

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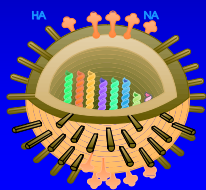


Overview

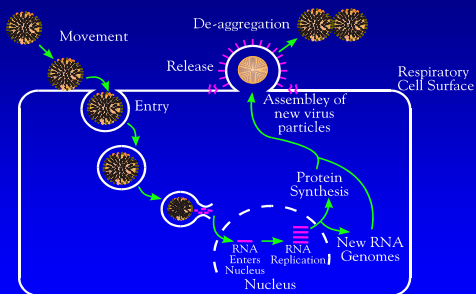
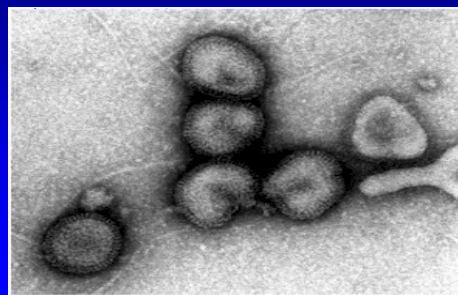
- Influenza/nosocomial influenza
- Preparing for influenza season
- Surveillance during influenza
- Investigation/management of outbreaks

The influenza virus

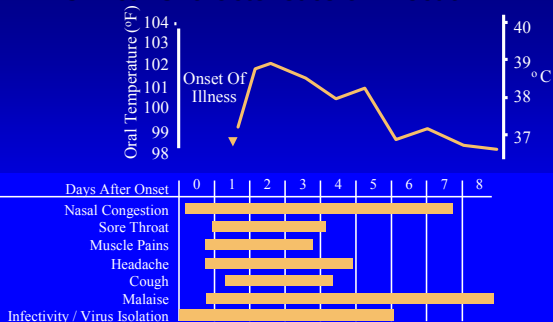
- A single stranded RNA virus with an envelope and a genome with eight segments.
- Each segment codes for a protein:
 - Five internal structural proteins
 - Two non structural proteins
 - Three membrane proteins
- These membrane proteins include:
 - hemagglutinin
 - neuraminidase
 - matrix protein



Electron micrograph of Influenza viruses



Clinical Characteristics of Infection



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Complications of influenza

- febrile convulsions, *otitis media*, **croup**, **bronchiolitis**, *Reye's syndrome*
- **bronchitis**, **pneumonia**, **bacterial pneumonia**
- **exacerbations of asthma**, **COPD**
- **MI**, **CHF**, **sudden death**
- myocarditis, encephalitis



Influenza

Every year

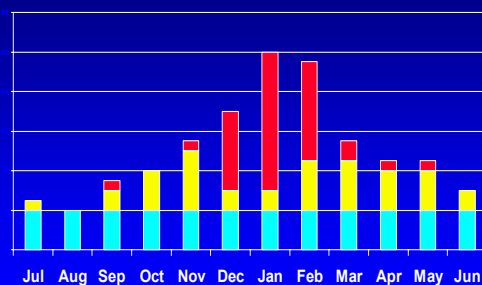
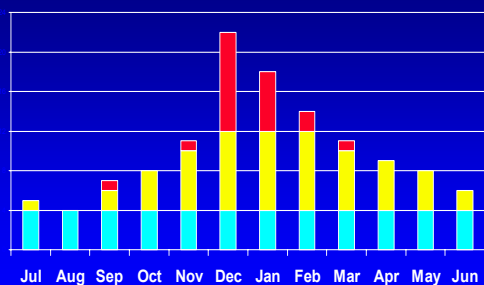
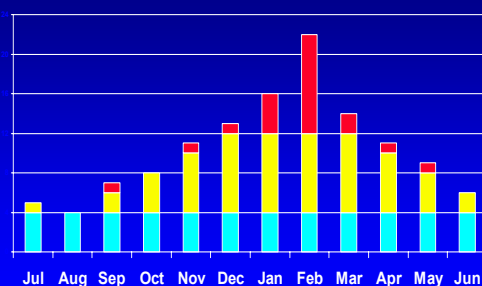
5 million Canadians (1 in 6) will be infected

50,000 will be hospitalized (1:100 >65 yrs)

4,500 people will die

7% of 2-6 yr olds will have acute otitis media

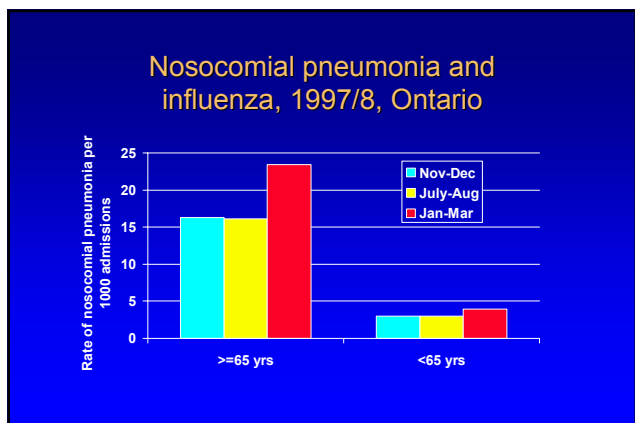
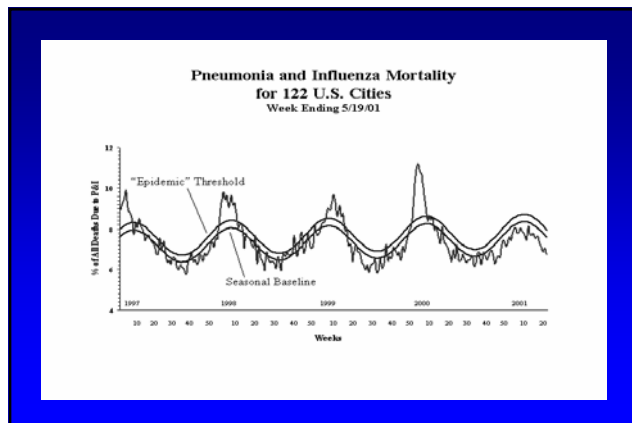
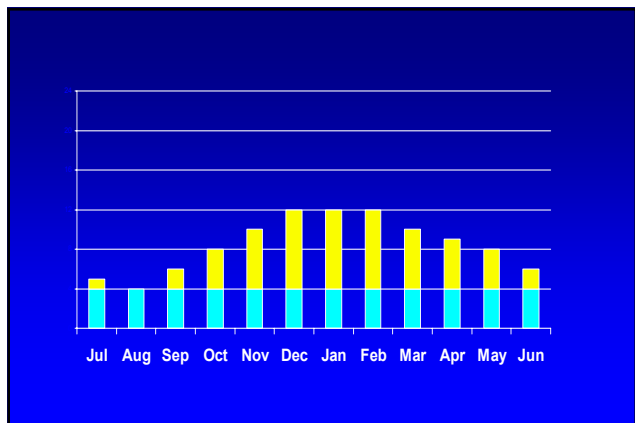
1.5 million work-days will be lost



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Season	Hospital admissions for pneumonia (/1000 pop'n)	Nosocomial pneumonia (/1000 admissions)	No. cases nosocomial pneumonia
May-June	2.5	16.3	796
Nov-Dec	2.6	16.1	772
Jan-Mar (influenza)	4.6	23.4	1114

Nosocomial influenza

Incidence	3/1000 admissions 8/1000 admissions 6/1000 admissions	California, 87 Virginia, 88-94 Houston, 88
Case fatality rate	7% (14/213)	Multiple
Costs	\$4,050/case \$3,622/case	S. Dakota, 93 US, 2000

Influenza outbreaks, acute care

Ref	Ward	Duration	No. patient cases	Patient AR	No. Staff ill
Muchmore	Neurology	30 days	77 (3†)	50%	3
Munoz	NICU	5 days	4 (2†)	27%	Several
Kapila	Acute	7 days	9 (6†)	30%	NR
Meibalane	NICU	7 days	8 (0†)	-	NS
Weinstock	Adult BMT	7 days	7 (4†)	26%	5 ill
Malavaud	Transplant	4 days	4 (0†)	33%	11%
Adal	Acute	30 days	10 (1†)	-	NS

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Protecting your institution (patients and staff)

- Minimize the risk that persons infected with or incubating influenza enter your facility
- Reduce the risk of transmission from sporadic cases
- Recognize and optimally manage individual cases
- Detect outbreaks early, and manage them effectively

Minimizing risk of introduction

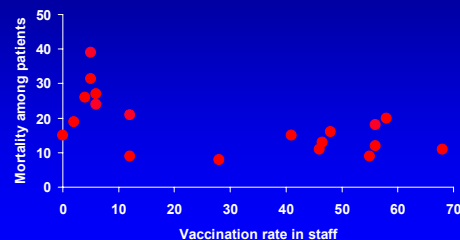
- Vaccination
 - Vaccinate long stay patients
 - Vaccinate patients likely to return (70% of medical patients are readmitted within 6 mos)
 - Vaccinate staff, volunteers, physicians
 - Encourage the vaccination of families, visitors

Effect of influenza vaccine for staff and residents of long term care facilities

	Effect of vaccinating HCW	Effect of vaccinating residents
Mortality	0.56 (.40,.80)	1.2 (0.81,1.6)
Mortality from pneumonia	0.60 (0.37,.97)	0.83 (0.5,1.3)
LRTI	0.69 (0.40, 1.2)	0.67 (0.39, 1.4)

Potter et al. JID 1997;175:1-6

Vaccination uptake and mortality among patients in long term care



Carman et al. Lancet 2000;355:93

Minimizing risk of introduction - II

- Visitor restriction during influenza season
 - signed restriction of ill visitors
 - articles in local papers
- Health care workers - during influenza season
 - Report respiratory illness
 - Rapid screen for influenza (NP swab)
 - Restrict if influenza

Reduce transmission

- Handwashing
 - alcohol handwash outside every door
 - handwashing inservices
 - feedback on amount of alcohol handwash/soap used
 - reminders at beginning of influenza season

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Impact of hand hygiene on infections

Year	Author	Setting	Impact on infections
1982	Maki	ICU	Decreased
1984	Massanari	ICU	Decreased
1990	Simmons	ICU	No effect
1992	Doebbeling	ICU	Decreased
1994	Webster	NICU	MRSA eliminated
1995	Zafar	Nursery	MRSA eliminated
1999	Pittet	Hospital	MRSA decreased
2000	Hammond	Schools	Illness/absenteeism decreased
2000	Dyer	Schools	Illness/absenteeism decreased
2001	Ryan	Army base	URI decreased

Reduce transmission - II

- Identifying infected patients during influenza season
 - rapid testing in ER - all acute RTI
 - notification from LTCF/PHL of outbreaks (isolate suspect)
- Precautions for infected patients
 - Private room
 - Droplet (mask, gloves)
- Duration of precautions
 - 3-4 days routine; until NP negative (neonates, severe IC)

Duration of shedding

- Healthy adults: 3-4 days
- Hospitalized immunocompetent adults: 4-5 days
- Elderly adults: up to 7 days
- Outpatient children: 7 days
- Nosocomially infected infants: up to 21 days
- Severely immunocompromised (advanced HIV, BMT, leukemia): median 7 days, up to 63 days

Outbreaks - I: Preparation

- Policies
 - Re-offer staff vaccine
 - Choice of antiviral for patients
 - Medical directive for antiviral order
 - Antivirals for staff - choice, payment, delivery
 - Work restriction for staff

Outbreaks - I: Preparation

- Communications
 - staff & PH re policies/ union contracts
 - pamphlets for patients, visitors
 - mechanism for rapid identification of vaccinated vs. unvaccinated staff
 - mechanism for identifying location of discharged and transferred patients

Outbreaks - II Surveillance

- Reminders when influenza season starts
- Surveillance
 - Acute respiratory illness in patients
 - during influenza season, obtain NP swabs
 - Clusters of ARI in staff

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Outbreaks - Detection

- Triggers for enhanced surveillance
 - one new onset patient with +flu on NP swab
 - 2 new onset ARI patients in 72 hrs
 - 2 or 3 staff who work together with acute ARI
- activate immediate NP swabs (staff and patients) with any illness
- look for “missed” cases
- notify senior medical and nursing staff

Outbreaks - Confirmation

- Outbreak
 - at least three ARI (broad definition)
 - at least two positive for influenza
 - no other virus identified
- Case definition
 - new illness with at least one of fever, or any respiratory symptom AND no other explanation
 - ?consider stricter definition on floors with younger, competent patients

Outbreaks - Management

- Define areas of the hospital and time period involved
- Consider closing unit
- Identify staff and patients who may carry influenza to other units/hospitals
- Stop transmission on unit
- Surveillance to track course/ensure control

Outbreaks - Management I

- Define areas of the hospital involved
 - experience in LTC is that containment to one unit is difficult
 - acute care should be ok, as long as too many staff are not shared
 - need enhanced surveillance on other units
 - need enhanced surveillance/adequate restriction for staff working on multiple units
- Identify first exposure time

Outbreaks - Management II

- Consider closing unit(s)
 - decide on safest management for most patients
 - never close if it means redeploying staff
 - alternative:
 - starting all newly admitted patients on prophylaxis
 - cohorting patients and care staff within the unit
 - using droplet precautions to protect new patients
 - cohorting staff who work on multiple units (eg. RT, chaplaincy, social work)

Outbreaks - Management III

- Identify staff/patients who may carry influenza to other units/hospitals
 - notify other institutions of recently transferred patients
 - if possible, via infection control
 - if not, with recommendations about duration of droplet isolation/prophylaxis or treatment
 - communicate with all unvaccinated staff who have worked since first exposure
 - activate mechanism for prophylaxis

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Outbreaks - Management IV

- Stop transmission - Patients
 - droplet precautions for symptomatic patients
 - private room or cohort: symptomatic, exposed (roommates), “non-exposed”
 - cancel shared activities
 - restrict transfers (patients may go in isolation, on prophylaxis)
 - consider restricting tests, etc. (depending on medical need)

Outbreaks - Management IV

- Stop transmission - Patients
 - classify patients
 - ill > 48 hours - precautions, no therapy/prophylaxis
 - if uncertain if illness is influenza, use oseltamivir prophylaxis
 - ill < 48 hours - precautions, treatment
 - ONLY use oseltamivir for treatment
 - not ill (yet) - prophylaxis

Why oseltamivir (vs. amantadine)?

- Active against influenza B
- Single dosage regimen, no interactions
 - only adjust dose for creatinine clearance < 10 ml/min
- High toxic/therapeutic ratio
 - amantadine errors can kill people
- Few side effects in patient populations
 - 1% nausea/vomiting, 1% headache
- Don't have to worry about resistance

Rules for amantadine

- Calculate creatinine clearance based on gender, weight, serum creatinine
- Assess chronic illnesses and medications for interactions, risk of adverse events
- DO NOT TREAT symptomatic patients
- DO NOT give as prophylaxis for patients who have had an illness that MIGHT be influenza
- Watch for neurologic adverse events

Outbreaks - Management V

- Stop transmission - Staff
 - classify into vaccinated/unvaccinated
 - if vaccinated, ok (restrict if ill)
 - classify unvaccinated into exposed/ not exposed
 - exposed should be offered prophylaxis ASAP
 - non-exposed can start prophylaxis when they come in
 - offer vaccine again (outbreak may not be controlled; other exposures likely)

Outbreaks - Management VI

- Stop transmission - Staff
 - restrict those unvaccinated who refuse prophylaxis
 - if unexposed, consider policy that permits work elsewhere (CANNOT GO TO UNIT)
 - if exposed, must be off work ANYWHERE until a full 96 hrs after exposure
 - remember, hospital outbreaks occur in setting of community activity - allowing these staff to work anywhere poses a risk

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Outbreaks - Management VII

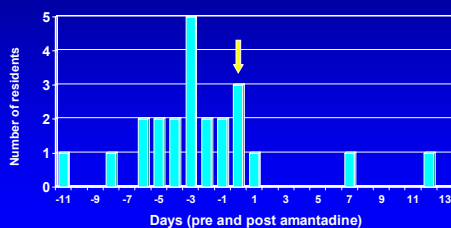
- Stop transmission - Visitors
 - do not permit ill visitors
 - consider restricting visitors overall
 - based on needs of nursing staff
 - nursing staff can make exceptions based on need
 - pamphlets, etc. for explanation

Outbreaks - Management VIII

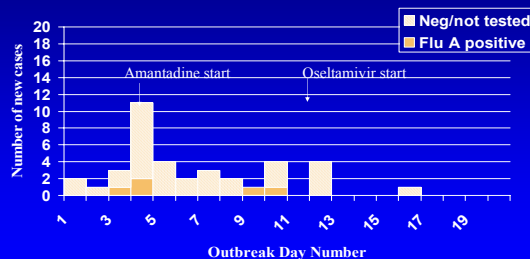
- Discharges - coordinate with PH
 - if going home, ok (need to be aware of risk of illness, take oseltamivir for 2-4 days at home)
 - to other units/hospitals - ok if:
 - transmission has stopped (no new cases >48 hrs)
 - more than 4-7 days after onset of illness
 - taking oseltamivir for >48 hrs and symptomatic

Influenza A in a nursing home

Staynor et al., CJIC, 1994



Influenza outbreak - NH E



When is it over?

- Various definitions
 - usually, 1 incubation periods (ie 4 days) after the last case day of exposure
 - longest case scenario - last case is patient who is not discharged - infectious for 4 days (ie. 8 days after onset of last case)
 - shortest - 5-6 days
 - always balance risk of re-starting outbreak against care compromises occurring because of outbreak