Wisconsin Healthcare-Associated Infections (HAIs) in Long-Term Care Coalition

Infection Prevention and Control in Long-Term Care Conference

Wisconsin Dells, WI – September 20, 2013

Management and Prevention of Outbreaks in Nursing Home

Christopher J. Crnich, MD MS [1, 2]

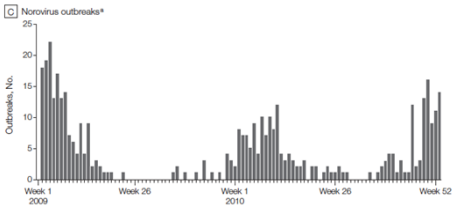
[1] University of Wisconsin School of Medicine and Public Health, Madison, WI
[2] Middleton Veterans Affairs Hospital, Madison, WI

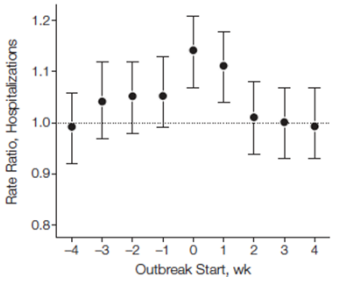
Objectives

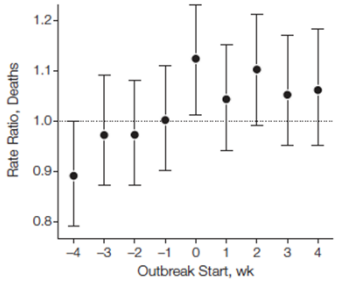
- Why outbreaks matter
- What is an outbreak conceptually
- Respiratory tract infection
- Norovirus
- *Clostridium difficile*

Outbreak, 1995

Outbreaks in NHs: Impact on Resident Outcomes







Trivedi et al. *JAMA* 2012; 308(16): 1668-75

Outbreaks in NHs: Other Consequences

- Employee fear
- Employee illness
- Increased costs
- Public relations impact


Home / News / Local News

LOGIN WITH FACEBOOK AND SI

Ohio Legionnaires' disease outbreaks claims 7th victim

Deaths include six at retirement home, one auto plant employee

UPDATED 3:12 PM EDT Aug 06, 2013


4

Norovirus mostly sickens people in nursing homes; few outbreaks hit restaurants

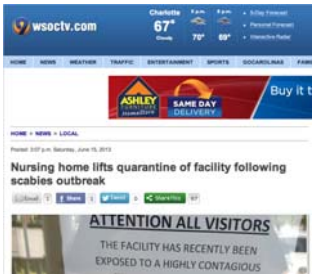
20

By Lynne Terry, The Oregonian

on March 18, 2013 at 2:26 PM, updated March 18, 2013 at 10:50 PM

Print

The norovirus outbreak traced to Andina


wsoctv.com

Charlotte 67°

HOME NEWS WEATHER TRAFFIC ENTERTAINMENT SPORTS GOCAROLINAS FAM

ASHLEY SAME DAY DELIVERY Buy it t

HOME > NEWS > LOCAL

Nursing home lifts quarantine of facility following scabies outbreak

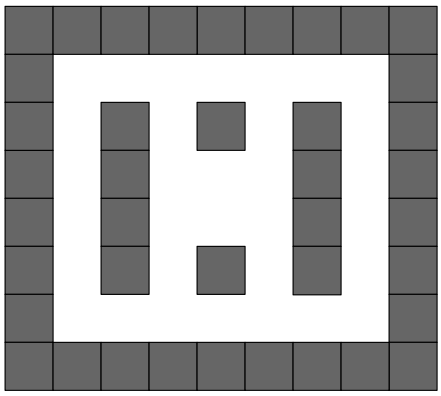
ATTENTION ALL VISITORS

THE FACILITY HAS RECENTLY BEEN EXPOSED TO A HIGHLY CONTAGIOUS

General Control Measures

- Teach staff to recognize an outbreak
  - At employment, annually (URI and GE)
  - Reinforce periodically (during rounds) when there is increased community activity or one unit has already experienced an outbreak
- Notify care staff to:
  - Reinforce importance of hand hygiene
  - Reinforce importance of standard precautions
  - Minimize staff movements across facility
  - Enhance surveillance in other units
- Empirically place symptomatic residents in appropriate precautions
- Initiate furlough plan for symptomatic staff
- For influenza, promptly initiate chemoprophylaxis

Outbreak Threshold?



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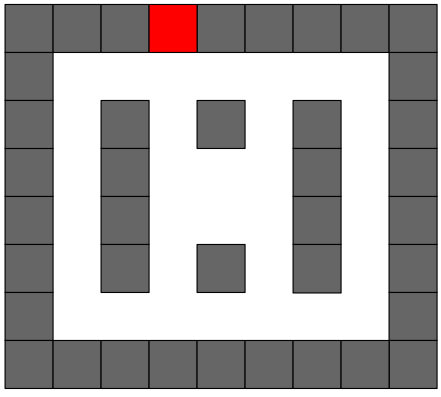
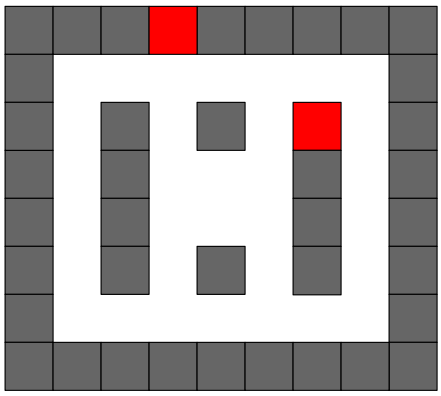
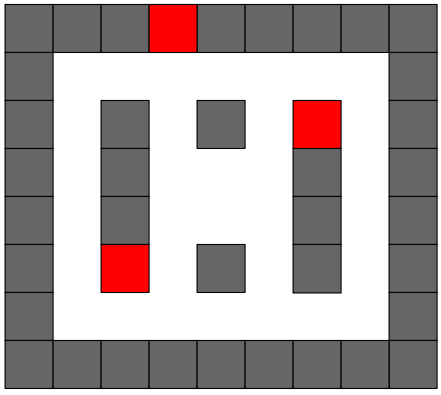


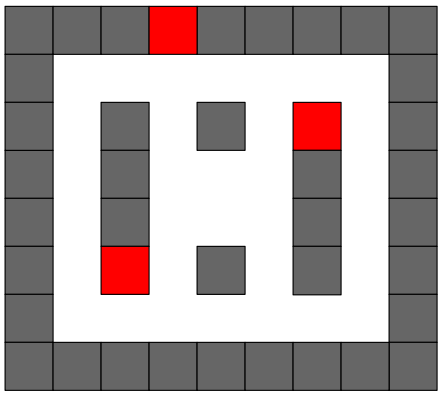
Outbreak Threshold?



Outbreak Threshold?



Outbreak Threshold?



CDC Influenza Example:

1) 3 cases of ILI within 72 hours
2) 1-2 culture confirmed cases of influenza within 5 days

General Control Measures

- Teach staff to recognize an outbreak
  - At employment, annually (URI and GE)
  - Reinforce periodically (during rounds) when there is increased community activity or one unit has already experienced an outbreak
- Notify care staff to:
  - Reinforce importance of hand hygiene
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  - Minimize staff movements across facility
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Respiratory Tract Infections

Burden of RTIs in NHs

- RTIs most common cause of outbreaks in NHs
  - 46% of all outbreaks due to RTIs
  - 9% of residents days associated with RTI outbreak
  - 160,000 – 2.6 million lower RTIs in NHs every year
- Major cause of morbidity and mortality
  - 200,000 hospitalizations and ~36,000 deaths due to influenza
  - Pneumonia leading cause of death and hospitalization in NHs
- Major cost to facilities and payors
  - Influenza: $1435 in NH, ~$9,000 if hospitalized
  - Pneumonia: $580 in NH, ~$11,000 if hospitalized
- Likely a major driver of inappropriate antimicrobial use

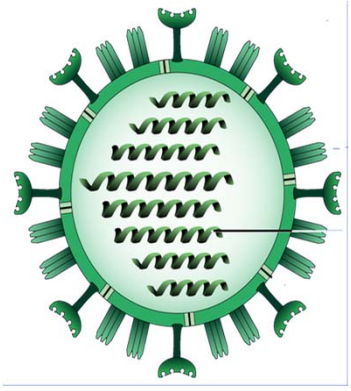
Li et al. *Am J Epidemiol* 1996; 143: 1042–1049
Loeb et al. *Can Med Assoc J* 2000; 162: 1133-1137
Kruse et al. *J Am Med Dir Assoc* 2003; 4: 81-9
Muder J. *Am J Med* 1998; 105: 319-30
Patriarca et al. *Ann Intern Med* 1987; 107: 732-40
Strausbaugh et al. *Infect Control Hosp Epidemiol* 2000; 21: 674-9

Prevention: IC Practices

- NHs should have a standardized surveillance system for monitoring RTIs*
  - Regular ICP review (ideally weekly)
  - Regular ICC review (ideally monthly during influenza/cold season)
- Monitor for the following**:
  - Common cold/pharyngitis
  - Influenza-like illness (ILI)
  - Pneumonia
  - Bronchitis/tracheobronchitis
- Every NH should have a RTI/influenza outbreak control policy/plan*

* Smith et al. *Infect Control Hosp* Epidemiol 2008; 29: 785-814
** Stone et al. *Infect Control Hosp Epidemiol* 2012; 33(10): 965-77

Influenza



- Characterized by:
  - Abrupt onset
  - Explosive outbreaks
- Attack rates range from 25 – 70% in NHs
- Mortality can be >10%
- Signs and symptoms may be atypical or non-specific in NHs

Influenza Prevention

- Educate staff about risks of influenza
- Surveillance system for influenza-like illnesses
- Strict droplet precautions
- Empower nurses to modify activities
- **Use of antiviral prophylaxis**

Value of Chemoprophylaxis

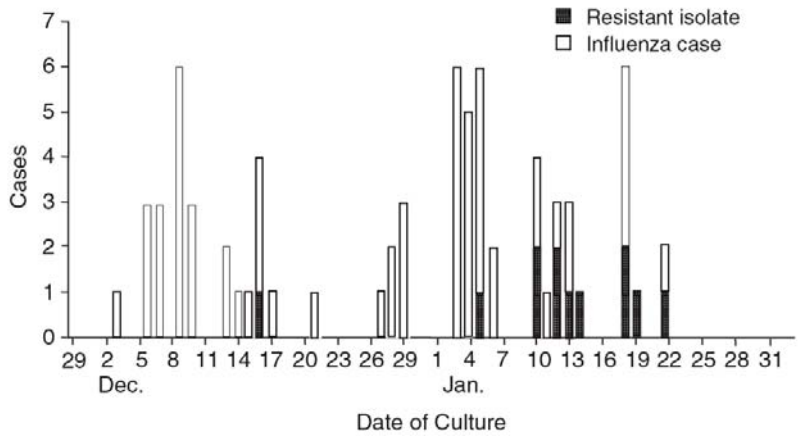
- 8 of 31 NHs in Michigan in 2001-2002 experienced influenza outbreaks
- 5/8 initiated immediate prophylaxis
  - Therapy initiated within 72 hours of recognition of ILI
  - Transmission before prophylaxis started ranged from 1-20%
- 3/8 had delayed recognition of outbreak
  - Delay of 5-30 days
  - Transmission rates varied from 21%-40%
- Transmission after prophylaxis = 0.8%

Monto et al. *Clin Infect Dis* 2004; 39: 459-64

Initiation of Prophylaxis

- Threshold varies
  - 3 ILI within three days
  - 1-2 culture-confirmed ILI within 5 days
- Choice of agents
  - ~~Amantidine/Rimantidine~~
  - Oseltamivir/Zanamivir
- Prophylaxis should continue until no ILI for 5-7 days

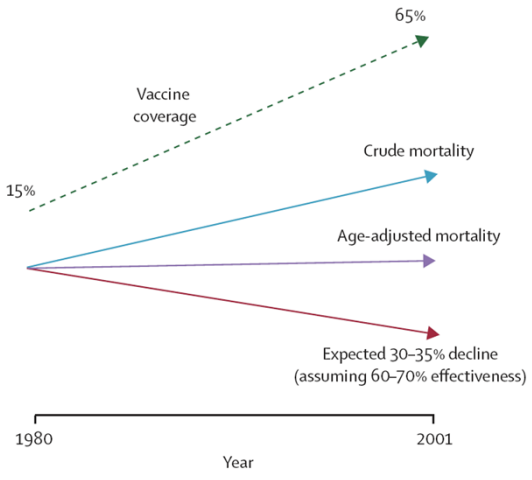
Schilling, JAGS 2004; 52(12): 2069-73



Influenza Prevention

- Educate staff about risks of influenza
- Surveillance system for influenza-like illnesses
- Strict droplet precautions
- Empower nurses to modify activities
- Use of antiviral prophylaxis
- Vaccinate residents (annual order forms)
- Encourage staff vaccination (offer for free if feasible)

Effectiveness of Influenza Vaccine in the Elderly

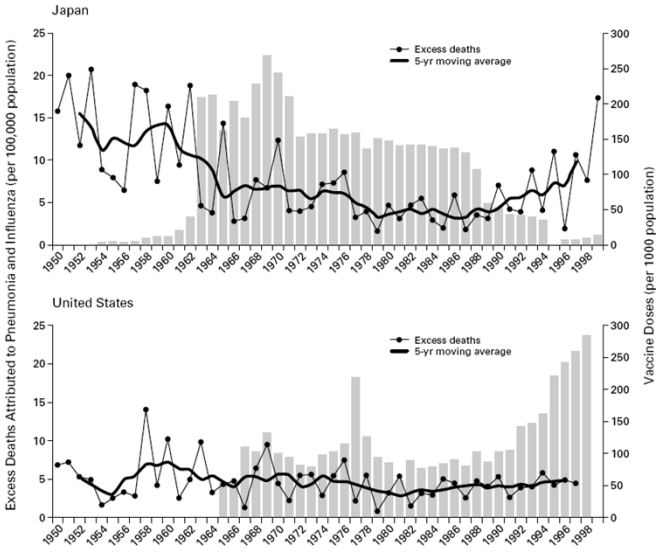


Simonsen et al. *Lancet Infect Dis* 2007; 7(10): 658-66

Effectiveness of Influenza Vaccine in the Elderly

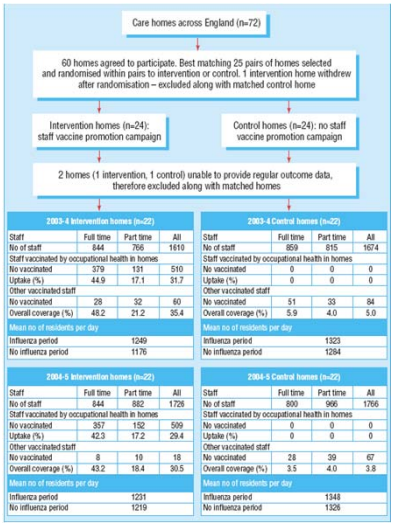
Population	Unadjusted		Traditional		Traditional + Functional Status	
	OR	95% CI	OR	95% CI	OR	95% CI
All Subjects	0.59	0.41 – 0.83	0.45	0.30 – 0.68	0.71	0.47 – 1.06
Community dwelling	0.65	0.43 – 0.98	0.59	0.37 – 0.96	0.74	0.46 – 1.18
1+ comorbidity	0.69	0.44 – 1.10	0.62	0.37 – 1.03	0.82	0.48 – 1.41

Jackson et al. *Int J Epidemiol* 2006; 35(2): 345-52



Reichert et al. *N Engl J Med* 2001; 344(12): 889-96

Influenza Vaccination of HCW: No Longer an Option



2003-4 Intervention homes (n=22)

Staff	Full time	Part time	All
No of staff	844	766	1610
Staff vaccinated by occupational health in homes			
No vaccinated	379	131	510
Uptake (%)	44.9	17.1	31.7
Other vaccinated staff			
No vaccinated	28	32	60
Overall coverage (%)	48.2	21.2	35.4
Mean no of residents per day			
Influenza period			1249
No influenza period			1176

2003-4 Control homes (n=22)

Staff	Full time	Part time	All
No of staff	859	815	1674
Staff vaccinated by occupational health in homes			
No vaccinated	0	0	0
Uptake (%)	0	0	0
Other vaccinated staff			
No vaccinated	51	33	84
Overall coverage (%)	5.9	4.0	5.0
Mean no of residents per day			
Influenza period			1323
No influenza period			1284

2004-5 Intervention homes (n=22)

Staff	Full time	Part time	All
No of staff	844	882	1726
Staff vaccinated by occupational health in homes			
No vaccinated	357	152	509
Uptake (%)	42.3	17.2	29.4
Other vaccinated staff			
No vaccinated	8	10	18
Overall coverage (%)	43.2	18.4	30.5
Mean no of residents per day			
Influenza period			1231
No influenza period			1219

2004-5 Control homes (n=22)

Staff	Full time	Part time	All
No of staff	800	966	1766
Staff vaccinated by occupational health in homes			
No vaccinated	0	0	0
Uptake (%)	0	0	0
Other vaccinated staff			
No vaccinated	28	39	67
Overall coverage (%)	3.5	4.0	3.8
Mean no of residents per day			
Influenza period			1348
No influenza period			1326

Fig A Forest plot for rate differences for death during period of influenza activity in 2003-4

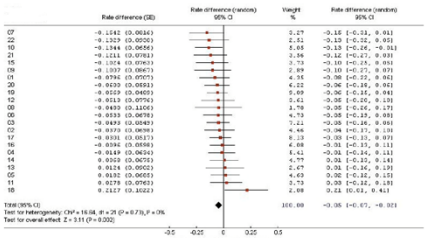
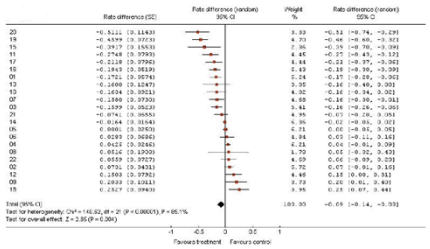
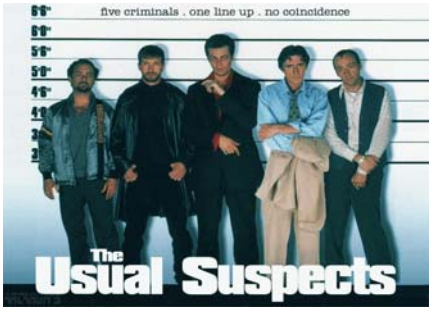


Fig B Forest plot for rate differences for influenza-like illness during period of influenza activity in 2003-4



Hayward et al. *BMJ* 2006; 333(7581): 1241-46

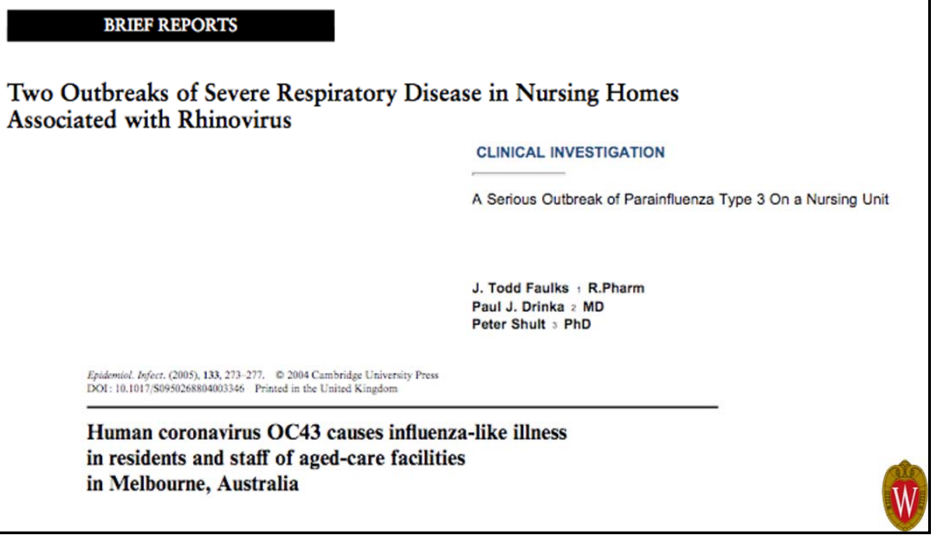
Influenza is only one of ….



- Influenza A & B
- Parainfluenza 1, 2, 3
- RSV
- Adenovirus

- Rhinovirus
- Metapneumovirus
- Coronavirus
- Bocavirus

Not all that coughs is Influenza



BRIEF REPORTS

Two Outbreaks of Severe Respiratory Disease in Nursing Homes Associated with Rhinovirus

CLINICAL INVESTIGATION

A Serious Outbreak of Parainfluenza Type 3 On a Nursing Unit

J. Todd Faulks [1] R.Pharm
Paul J. Drinka [2] MD
Peter Shult [3] PhD

Epidemiol. Infect. (2005), 133, 273–277. © 2004 Cambridge University Press
DOI: 10.1017/S0950268804003346 Printed in the United Kingdom

Human coronavirus OC43 causes influenza-like illness in residents and staff of aged-care facilities in Melbourne, Australia

Diagnostic Methods

Traditional

- Rapid Influenza tests (EIA)
  - Single and combination tests available
  - Cheap, simple, specific
  - Sensitivity 50-70%
- Direct Flourescent Ab (DFA)
  - Quick
  - Insensitive
- Viral culture
  - "gold standard"
  - Expensive, labor intensive

Molecular

- Single Pathogens
  - NASBA
  - LAMP
  - RT-PCR
- Multiplex Assays
  - ProFlu+ Assay (Prodessa)
  - xTAG RVP Assay (Luminex)

Mahoney. *Clin Micro Rev* 2008; 21: 716-47
Nolte. *Clin Infect Dis* 2008; 47(suppl 3): S123-6

Recommendations

- Use rapid EIA-based tests to identify influenza outbreaks
- Consider use of viral culture or multiplex PCR tests if available
  - Helps truly rule out influenza
  - Theoretical can help to reduce inappropriate Abx

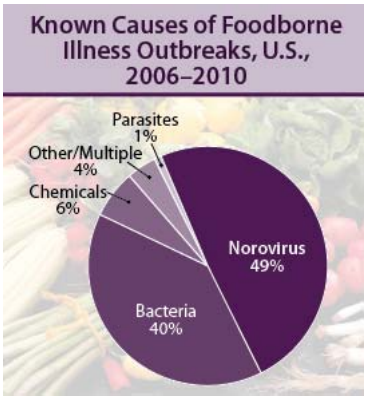
Oosterheert et al. *Clin Infect Dis* 2005; 41: 1438-44

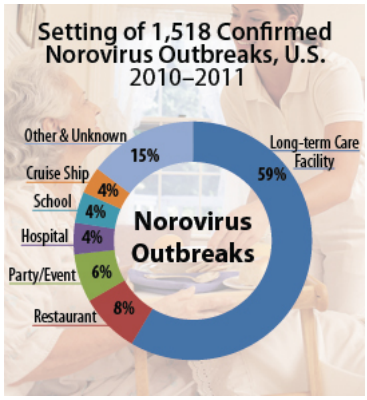
Gastrointestinal Outbreaks

Norovirus: The "Cruise-Ship" Illness

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6003a1.htm

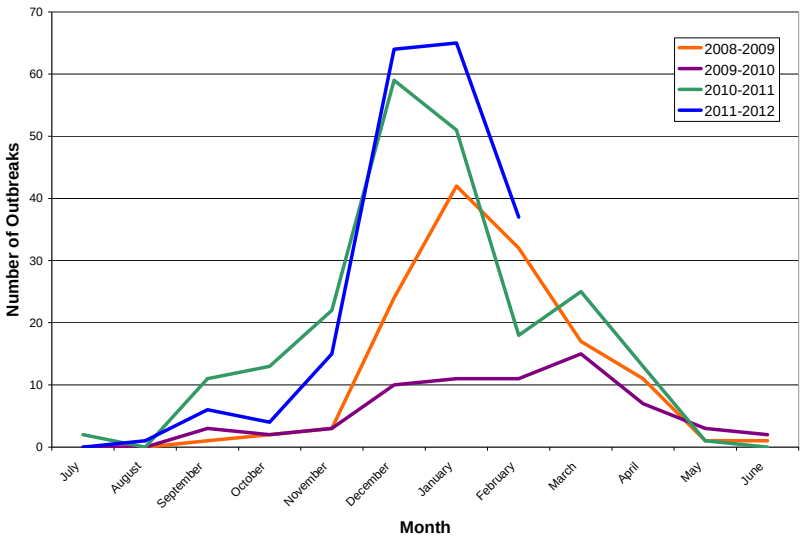
Norovirus: The "Nursing Home" Illness





http://www.cdc.gov/norovirus/

Long-Term Care Facility Acute Gastroenteritis Outbreaks By Season



Norovirus Outbreaks by Year (2008-2012)

Year	# Outbreaks	# Outbreaks Confirmed Norovirus	# Residents Ill	# Staff Ill
2008	95	91	2984	1263
2009	122	98	3395	1834
2010	156	121	3979	2410
2011*	198*	134*	2753*	1235*
2012**	102**	59**		

*2011 data are complete through August. Numbers of ill residents and staff are not included for November and December 2011.

**2012 data is for January and February only. These numbers are preliminary and subject to change.

Characteristics

- 24-48 hour incubation period
- Abrupt onset and rapid resolution (12-60 hours)
- Nausea, vomiting, diarrhea, abdominal pain, and low-grade fevers
- Organism adapts by antigenic drift and rarely recombination
- Seasonality (October to March)

Said et al. *Clin Infect Dis* 2008; 47: 1202-8

Outbreak Potential

- 10-100 virions needed to cause disease
- Transmitted primarily person-to-person
- Environmental spread also common
  - Can survive for up to 3-4 weeks on surfaces
  - Spread easily and ubiquitously in simulation studies
- NH residents can shed virus for up to a month

Atmar et al. *Gastroenterol Clin N Am* 2006; 35: 275-90
Barker et al. *J Hosp Infect* 2004; 58: 42-9
CDC. MMWR 2006; 55: 395-7

Koopmans. *Curr Op Infect* Dis 2008; 21: 544-52
Said et al. *Clin Infect Dis* 2008; 47: 1202-8
Tu et al. *J Clin Microbiol* 2008; 46: 2119-21

Control Methods: General

- Have a plan (designed like influenza/RTI plan)
- Hand hygiene for staff, residents, and visitors on a regular basis
- Dedicate equipment, meticulous disinfection of shared equipment (dilute bleach)
- All employees should be familiar with the signs and symptoms of norovirus (early detection)
- ICP should have a surveillance system
  - Among residents
  - Among staff when infections among residents recognized

Said et al. *Clin Infect Dis* 2008; 47: 1202-8

Control Methods: 1st Tier

- Restrict patients to room for 48-72 hours after illness
  - Contact precautions
  - Do not share equipment between rooms
  - Disinfect surfaces in room with hypochlorite (1:50)
- Initiate enhanced surveillance on wards with an outbreak
- Sick visitors should not be allowed to visit
- Furlough ill employees

Said et al. *Clin Infect Dis* 2008; 47: 1202-8

Control Methods: 2nd Tier

- Cohort staff and limit unit cross-pollination
- Prohibition of all visitors and new admissions
- Symptom screen employees and furlough immediately if screen positive
- Expanded environmental disinfection
  - Disinfect all high-touch areas in common and work areas with hypochlorite (1:50) every shift
  - Clean bathrooms every shift
  - Clean resident rooms every 24 hours

Said et al. *Clin Infect Dis* 2008; 47: 1202-8

Control Methods: 3rd Tier

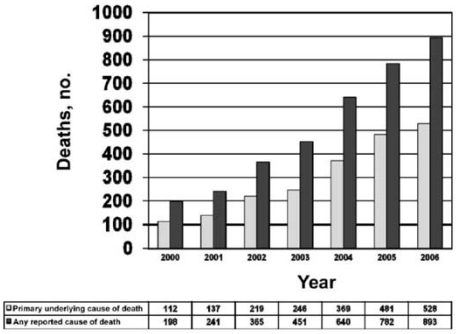
- Unit Closure
- Facility Closure

Said et al. *Clin Infect Dis* 2008; 47: 1202-8

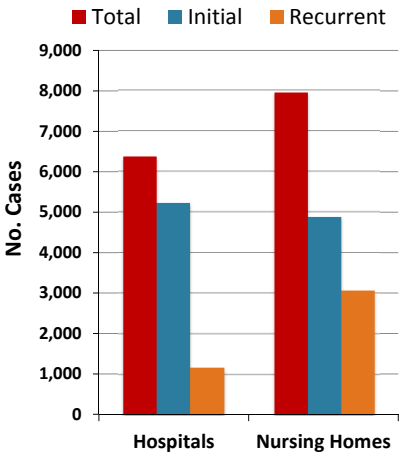
Clostridium difficile

Kelly et al. *N Engl J Med* 2008; 359: 1932-40

Clostridium difficile

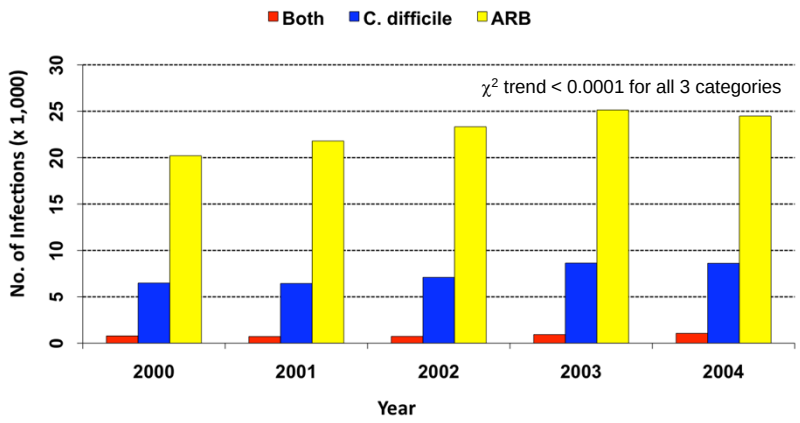


	2000	2001	2002	2003	2004	2005	2006
Primary underlying cause of death	112	137	219	246	369	481	528
Any reported cause of death	198	241	365	451	640	782	893



Campbell et al. *Infect Control Hosp Epidemiol* 2009; 30(6): 526-33

Trends in Antibiotic Resistance in Nursing Homes: 2000 - 2004



Crnich et al. *Infect Control Hosp Epidemiol* 2007; 28(8): 1006-8

IC Management

- Accumulating evidence that NHs are sites of ongoing *C. difficile* transmission
- Surveillance for CDI should be routine in LTCFs
- Manage clusters on wards in a manner analogous to norovirus
  - Isolate symptomatic residents
  - Enhanced environmental cleaning
  - Use soap rather than waterless HH products

Campbell et al. *Infect Control Hosp Epidemiol* 2009; 30(6): 526-33
Guerrero et al. *Infect Control Hosp Epidemiol* 2011; 32(5): 513-5