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

Infection Prevention and Control in Long-Term Care Conference

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Management and Prevention of Outbreaks in Nursing Home

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Objectives

• Why outbreaks matter

• What is an outbreak conceptually

• Respiratory tract infection

• Norovirus

• Clostridium difficile
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

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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CDC Influenza Example:

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

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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

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*

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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%

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

Effectiveness of Influenza Vaccine in the Elderly

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

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

**Influenza Vaccination of HCW: No Longer an Option**

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

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)

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


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)

<table>
<thead>
<tr>
<th>Year</th>
<th># Outbreaks</th>
<th># Outbreaks Confirmed Norovirus</th>
<th># Residents Ill</th>
<th># Staff Ill</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>95</td>
<td>91</td>
<td>2984</td>
<td>1263</td>
</tr>
<tr>
<td>2009</td>
<td>122</td>
<td>98</td>
<td>3395</td>
<td>1834</td>
</tr>
<tr>
<td>2010</td>
<td>156</td>
<td>121</td>
<td>3979</td>
<td>2410</td>
</tr>
<tr>
<td>2011*</td>
<td>198*</td>
<td>134*</td>
<td>2753*</td>
<td>1235*</td>
</tr>
<tr>
<td>2012**</td>
<td>102**</td>
<td>59**</td>
<td></td>
<td></td>
</tr>
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*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)

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
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


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

Control Methods: 2\textsuperscript{nd} 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


Control Methods: 3\textsuperscript{rd} Tier

- Unit Closure
- Facility Closure

**Clostridium difficile**


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**Clostridium difficile**

Campbell et al. *Infect Control Hosp Epidemiol* 2009; 30(6): 526-33
Trends in Antibiotic Resistance in Nursing Homes: 2000 - 2004

\[ \chi^2 \text{ trend} < 0.0001 \text{ for all 3 categories} \]

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