Infection Prevention in Nursing Homes and Palliative Care
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Hosted by Prof. Ruth Lynne Carrico
Columbia University

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Infection Prevention in Nursing Homes and Palliative Care
Prof. Pat Stone, Columbia University, Center for Health Policy
A Webber Training Teleclass

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Today’s Discussion

1. Background/context of nursing homes (NH) and infection prevention in the US
2. Prevention of Nosocomial Infections and Cost-Effectiveness in Nursing Homes (PNICE-NH)
   1. Five analyses
3. Next steps
   1. Integration of Infection Management and Palliative Care
   4. Concluding Remarks

Prevention of Nosocomial Infections and Cost-Effectiveness in Nursing Homes (PNICE-NH)

R01 NR013687, Stone PI
Growing Elderly Living in Nursing Homes (NHs)

Approximately 1.4 million residents in 15,700 NHs
85% are ≥ 65 years

Americans aged ≥ 65 years will ↑ from 47.7 million in 2015 to 83.7 million in 2050

NH residents are becoming more diverse
This may be due to increased options for some

These residents are vulnerable
22% of NH residents experienced adverse events,
59% were preventable

Infections in NHs

765,000 to 2.8 million healthcare-associated infections (HAIs) annually

- Most estimates are old and based on small sample sizes

HAIs are the most common reason of resident transfer to acute care and 30-day readmission and often these admissions come at the end of life

1Vital Health Stat. 2013
2DHHS, OEI-06-00370, 2014
3Strausbaugh LJ, Joseph Cl, ICHE, 2000; Koch AM et al, JHI, 2009; Dwyer et al JAGS 2013
4Koch AM, JHI, 2009
Antibiotic Usage and MDROs in NHs

Antibiotics account for 40% of all medications administered. Between 50-80% of residents receive antibiotics at least once a year.

Antibiotics are often initiated in the absence of clinical evidence of a bacterial infection.

Older persons are susceptible to adverse side effects due to altered pharmacokinetics, polypharmacy, dosing errors and increased risk of *Clostridium difficile*.

In a systematic review, we found up to 63% of residents were infected with a gram negative MDRO.

In 35 NHs in Boston, 67% of advanced dementia patients in a NH were colonized or infected with MDRO.

Aim 1

Estimate trends in infections in NH residents, 2006 – 2013 and a point prevalence of infections in NH residents in 2013.

Minimum Data Set (MDS)

Clinical assessments performed on all NH residents
Upon admission, at least quarterly and with significant change in status
Infection data have a “look back” period
Revised October 2010 (MDS 3.0)

Revised MDS: Infections

MDS 2.0 (2006-9/2010)
- UTI
- Pneumonia
- MDRO
- Wound infection
- Viral hepatitis
- Septicemia
- Tuberculosis
- C. difficile
- Conjunctivitis
- HIV
- Respiratory infection*
- Sexually transmitted diseases

MDS 3.0 (10/2010-Present)
- UTI
- Pneumonia
- MDRO
- Wound infection
- Viral hepatitis
- Septicemia
- Tuberculosis
- C. difficile
- Conjunctivitis
- HIV
- Respiratory infection*
- Sexually transmitted diseases

*Other than pneumonia
Sample

NH residents with a quarterly or annual MDS assessment in 2006 – 2013
30,366,807 assessments
15,000 NHs

Trends in Infection Prevalence

2006 – 2010 (MDS 2.0)
Prevalence of all infection types increased (p-values < .01)

2011 – 2013 (MDS 3.0)
Prevalence of UTI, MDRO, and wound infections decreased (p-values < .0001)
Prevalence of viral hepatitis increased (p-value < 0.0001)
Estimated Number of Infections in US Nursing Homes, 2013

<table>
<thead>
<tr>
<th>Infection type</th>
<th>Assuming 1 week duration</th>
<th>Assuming 1 month duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI</td>
<td>660,553</td>
<td>660,553</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1,071,603</td>
<td>247,293</td>
</tr>
<tr>
<td>MDRO</td>
<td>394,131</td>
<td>90,953</td>
</tr>
<tr>
<td>Wound infection</td>
<td>287,203</td>
<td>66,278</td>
</tr>
<tr>
<td>Septicemia</td>
<td>142,314</td>
<td>32,842</td>
</tr>
<tr>
<td>Viral hepatitis</td>
<td>125,523</td>
<td>28,967</td>
</tr>
<tr>
<td>Total</td>
<td>2,681,327</td>
<td>1,126,886</td>
</tr>
</tbody>
</table>

Aim 2

Obtain a national perspective of infection prevention and control programs in NHs using mixed methods
Qualitative Methods

Purposively sampled 10 NHs across the country
Recruited 6 to 8 employees
Semi structured interviews were audio taped
Directive content analysis conducted to identify themes


Results

73 interviews including administrators, infection preventionists, staff nurses, aids, MDS coordinators and environmental services
5 themes
Resident needs: with tension between the facility being a person’s home and the need for infection prevention and control
Roles and training: multiple responsibilities of staff and lack of formal infection prevention and control training
Using infection data: while there was variations in surveillance methods/definitions, data were used to improve care
External resources: A need for external information and support
Focus on hand hygiene: All NHs focused on hand hygiene, however monitoring compliance was often informal
National Survey of NH Infection Control Programs

Facilities
Certification and Survey Provider Enhanced Reporting (CASPER) data

Eligibility
Free-standing Non-specialized 30-900 beds

Design
Cross-sectional survey Random sample of 2514 NHs

Survey
Paper-based 34 items Open and closed-ended questions Infection preventionist


Geographic Distribution of NHs (n=990)

Key:
Not included
0 – 9 respondents
10 – 25 respondents
26 – 65 respondents

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Percent of NHs that ranked each infection as one of three top challenges

- Urinary tract infection
- Pneumonia/URI
- SSTIs
- Diarrhea outbreaks
- MRSA infections
- Influenza
- MDR GNB
- Sepsis
- Scabies
- VRE infections

Those in charge of infection prevention wore multiple hats

- Director of Nursing
- Staff Education/Development
- Employee health
- Quality Coordinator/Manager
- Assistant Director of Nursing
- Staff nurse
- Disaster preparedness
- NH Administrator
- Physician

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Those in charge of infection prevention wore multiple hats

- Director of Nursing: 40%
- Staff Education/Development: 30%
- Employee health: 20%
- Quality Coordinator/Manager: 15%
- Assistant Director of Nursing: 13%
- Staff nurse: 5%
- Disaster preparedness: 4%
- NH Administrator: 2%
- Physician: 1%

29% of their time on infection control-related activities

Only 39% of respondents had received any specific infection control training or certification

Infection Control Training

- State or local: 26%
- National APIC or company or corporate training: 9%
- CIC: 3%
There was substantial variation in policies related to UTI prevention:

<table>
<thead>
<tr>
<th>Policies/programs for UTI prevention</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydration protocols</td>
<td>80</td>
</tr>
<tr>
<td>Use of portable bladder ultrasound scanner</td>
<td>22</td>
</tr>
<tr>
<td>For men, use of condom catheters</td>
<td>7</td>
</tr>
<tr>
<td>For mobile residents, leg bags for daytime use</td>
<td>65</td>
</tr>
<tr>
<td>Specimen collection prior to initiating antimicrobial therapy</td>
<td>59</td>
</tr>
<tr>
<td>For residents with leg bags, leg bag cleaning</td>
<td>44</td>
</tr>
<tr>
<td>Nurse-initiated urinary catheter discontinuation</td>
<td>33</td>
</tr>
<tr>
<td>Urinary catheter reminder or stop-orders</td>
<td>22</td>
</tr>
</tbody>
</table>

Policies NOT specific to residents with indwelling catheters:

- On average, facilities had 1.1 of these 3 policies (SD=0.6)

Policies specific to residents with indwelling catheters:

- On average, facilities had 2.2 of these 5 policies (SD=1.4)

Aim 3

Evaluate relationships between the adoption of UTI policies and the occurrence of UTI:
- With and without indwelling urinary catheters
Prevalence of UTI among NH Resident Assessments in 2013

n=273,125 assessments:

14,809 (5.4%) UTI

UTI among resident assessments **WITHOUT** indwelling urinary catheters (n=260,920 assessments):

12,628 (4.8%)

UTI among resident assessments **WITH** indwelling urinary catheters (n=12,192 assessments):

2,181 (17.9%)
### Associations between UTI catheter prevention policies and UTI

<table>
<thead>
<tr>
<th>All resident assessments</th>
<th>Resident assessments WITHOUT indwelling catheters</th>
<th>Resident assessments WITH indwelling catheters</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td>For residents with leg bags, leg bag cleaning</td>
<td>0.93 0.83, 1.04</td>
<td>0.94 0.84, 1.06</td>
</tr>
</tbody>
</table>

Note: All models adjusted for: resident age, sex, race/ethnicity, cognitive function, functional status, existing conditions; facility size, payer mix, staffing levels, ownership, location, infection preventionist training.

### Associations between UTI prevention policies NOT specific to residents with an indwelling urinary catheter and UTI

<table>
<thead>
<tr>
<th>Number of policies (ref=no policies)</th>
<th>All resident assessments</th>
<th>Resident assessments WITHOUT indwelling catheters</th>
<th>Resident assessments WITH indwelling catheters</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>1 policy</td>
<td>0.95 0.84, 1.09</td>
<td>0.96 0.84, 1.10</td>
<td>0.93 0.75, 1.16</td>
</tr>
<tr>
<td>2 policies</td>
<td>0.90 0.77, 1.06</td>
<td>0.91 0.77, 1.07</td>
<td>0.86 0.67, 1.12</td>
</tr>
<tr>
<td>All 3 policies</td>
<td>0.73 0.54, 0.99</td>
<td><strong>0.69</strong> 0.50, 0.95</td>
<td>1.08 0.64, 1.84</td>
</tr>
</tbody>
</table>

Note: All models adjusted for: resident age, sex, race/ethnicity, cognitive function, functional status, existing conditions; facility size, payer mix, staffing levels, ownership, location, infection preventionist training.
Aim 4

Examine Isolation Use in MDRO+ Residents

Results: Rate of Isolation Use

191,816 MDRO+ Assessments
138,294 Residents
11,773 NHs

13% are isolated
31% used isolation that year

• Isolation use for MDRO is infrequent
• Majority of NHs do not use isolation for MDRO
• 69% did not use isolation at all

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Aim 5

Examine associations between state HAI reporting efforts in NHs and NHs citations for deficiencies


Few States Have Mandatory or Voluntary HAI Reporting in NHs

*Note: Data were obtained by calling state HAI coordinators when state laws and forms were particularly difficult to discern
NH Statements of Deficiencies (F-tags)

2012-2013 Certification and Survey Provider Enhanced Reporting (CASPER) data¹

37.6% of NHs receive infection control deficiency citation
64.3% of NHs receive quality of care deficiency citation

NHs in states with mandatory or voluntary HAI reporting were less likely to receive

Infection control citation (OR: 0.61; 95% CI 0.49, 0.75)
Quality care citation (OR: 0.75, 95% CI: 0.55, 0.95)
Conclusions about NHs

Some evidence that state department of health policies/investment help
MDS data are useful for identifying infection trends and isolation use
Infections are a major and persistent problem in NHs
Infection preventionists in NHs have little training
Wide variation in infection prevention policies and practices in NHs across the US
Evidence that NHs with more UTI prevention policies had lower prevalence of UTI
Isolation is not being used consistently

MORE NEEDS TO BE DONE!
## Selected USA Federal Efforts

### SURVEILLANCE
- CDC’s NHSN Long-term care module

### NATIONAL ACTION PLAN
- Reducing HAIs in Long-term care
- Combating Antibiotic-Resistant Bacteria
- Improvement of NH Quality

### 42 CFR RULE (§483.80) UPDATES NH INFECTION PREVENTION AND CONTROL PROGRAMS
- System for preventing, identifying, reporting, investigating and controlling infections
- Antibiotic stewardship program
- Designated IP with specialized training
- IP participates on quality assurance committee

### NATIONAL ACTION PLAN
- Combating Antibiotic-Resistant Bacteria
- Improvement of NH Quality
- CMS C.difficile INITIATIVE
- Learning Collaborative

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### Time Frame
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

## Closing Thoughts

NHs and HHC have less infection prevention resources

Infections and HAI are problematic in the community

Patients and visitors live in the community and **infection prevention is a regional issue.**

To decrease the problem of infections in the hospital, we also need to pay attention to the community we are serving

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Infection Prevention in Home Health Care (InHOME)

R01 016865
Multiple PIs: Shang and Stone

The Study of Infection Management and Palliative Care at End-of-Life (SIMP-EL)

Describe the integration of infection management and palliative care (re-survey)

Examine factors associated with antibiotic use in NH residents at End-of-Life (Medicare claims data including Part D, survey, county level data)

Examine factors associated with hospital transfer due to infections at End-of-Life (Medicare claims, MDS, survey, other data)
Thanks to a fabulous interdisciplinary team!

Questions, comments?
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March 14, 2018
(CLIMATE CHANGE AND THE IMPACT ON INFECTIOUS DISEASES)
Speaker: Prof. Mark Birch, University of Otago, New Zealand

March 15, 2018
(CLOSTRIDIUM DIFFICILE ASYMMPTOMATIC CARRIERS – THE HIDDEN PART OF THE ICEBERG)
Speaker: Dr. Yves Longtin, McGill University, Montreal

March 22, 2018
(CHALLENGES AND FACILITATORS TO NURSE-DRIVEN ANTIBIOTIC STEWARDSHIP: RESULTS FROM A MULTISITE QUALITATIVE STUDY)
Speaker: Prof. Eileen J. Carter, Columbia University School of Nursing

April 10, 2018
(FREE Europe Teleclass ... Denver Russell Memorial Teleclass Lecture)
HOPES, HYPES, AND MULTIVALLETE DEFENCES AGAINST ANTIMICROBIAL RESISTANCE
Speaker: Prof. Neil Woodford, Imperial College London and Public Health England

April 12, 2018
(UNDERSTANDING RISK PERCEPTIONS AND RESPONSES OF THE PUBLIC, HEALTHCARE PROFESSIONALS, AND THE MEDIA: THE CASE FOR CLOSTRIDIUM DIFFICILE)
Speaker: Dr. Emma Burnet, University of Dundee, Scotland

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