Infection Surveillance in LTC
Purpose of Surveillance:
- Identify Individuals with Infection Syndromes
- Apply Appropriate Isolation Precautions
uncontained wound drainage, absent hygiene - MODIFIED CONTACT
seasonal influenza - DROPLET
- Consider a Wider Transmission Risk
Situations that Require Institutional Investigation/Response

Single confirmed case of highly transmissible infection - Influenza, TB, GI [Norovirus, Salmonella], acute hepatitis, scabies, legionella Carbapenem R -- Isolate individual, Identify more cases in contacts

Clinical Cases Clustered in Time/Space

Isolates with identical/related PFGE [Genetics], epidemiologically linked
Case Definitions Not Completely Sensitive

Influenza: Culture Proven may be afebrile  
JAGS 2002; 50:1416-1420, Clinical Infectious Diseases 2010; 51:1033–1041

UTI Without Catheter: In dementia urosepsis may present as Systemic Infectious Illness with no localizing S/S  
JAGS 2011 59:567-8

Bacteremia/Sepsis may be afebrile in elderly  
[?hypotension]  

Failure to Meet McGeer Criteria does not Completely R/O Symptomatic UTI or Influenza

Need Monitoring
Presentations of infection in LTC may be atypical. These surveillance definitions may not be adequate for real-time case finding, diagnosis, or antibiotic initiation.
Regulatory Requirements for Surveillance

• F441 Guideline for Infection Prevention: under Documentation: Facilities may use various approaches to gather, document, and list surveillance data.
WDQA Guidance for Surveillance Based on Current Standards of Practice

- Weekly Review of Surveillance Data—minimum
- Surveillance Case Definitions McGeer and/or Loeb Criteria [similar]
- APIC, CDC and SHEA recommend targeted surveillance based on a RISK ASSESSMENT.

What do you Track?
Opposing Principals

• You don’t improve what you don’t measure
• Don’t waste your time measuring what you don’t improve

Surveillance Should be Linked to CQI
New McGeer Paper

• Given limited resources, surveillance may need to be targeted to infections with the most potential for prevention
• Transmissible Highly Virulent—Esp. EXPLOSIVE VIRAL OUTBREAKS “World Series” of Infection Control

Other candidates: Device Assoc., MDRO

ICHE 2012 33:965
How to Target Surveillance Activity: My Experience

- Determine an area in need of QI based on risk assessment, prior problems, motivation [survey crisis]
- Then maintain separate line list of cases before: after intervention to measure efficacy
- Build on pre-existing data system
Surveillance

- May utilize pre-existing Pharmacy Data / Antibiotic Starts
- ICP may review 24 Hour report and designate infections on that document
Outbreaks: World Series of Infection Control

- Clinical outbreaks of GI or respiratory illness may present on nights or weekends. Monthly tabulation *is not* adequate to identify explosive outbreaks

- Frontline staff must be trained to rapidly identify clustered clinical cases [or initial cases when influenza / norovirus circulating]

- Initiate Isolation, Start line listing
Outbreak identification facilitated by review of on-line WDPH updates on outbreak pathogens in the state
Disclaimer

“Listeners should verify all information before employing practices described in this educational activity”

My Opinions
Veteran’s Home Experience
Pattern Recognition Will Help Surveillance

Non Influenza Respiratory Viruses May be Deadly with Outbreaks During Non Influenza Season-Therefore Universal Respiratory Hygiene/Cough Etiquette Important

Universal Respiratory Hygiene / Cough Etiquette is Part of Standard Precautions

- Early application of precautions based on Syndrome Identification; crucial step in containment. Ideally identify the first case.
- Infectious respiratory secretions must be contained with “spatial separation”, tissues, or masks---may prevent outbreak.
- Standard precautions extensive CDC Isolation.
26 parainfluenza 1 isolates over 43 days
Later 11 RSV cases

Number of illnesses cultured = 188
Positive cultures = 22.3%
Additional Experiences: Active Surveillance with Resp. Viral Cultures [WVH]

- Can Not Differentiate Influenza vs. Non Influenza Based on Individual Clinical Presentation Lab Confirmation Optimal

- Roommate of Influenza Positive Case at 3X Risk: prophylaxis
Identification of Clustered Genetically Identical Isolates on Units Using PFGE--Transmission

- Based on Review Clinical Bacteriology Database, 2 Months of Clinical Isolates were listed for each unit.
- Identified 24 “clusters” [at least 2] identical species and antibiotic sensitivity.
- 14 [58%] included genetically identical isolates consistent with transmission.
- The identification of clustered genetically identical bacteria prompts staff to review secretion precautions. If Bacteria NOT related; NOT consistent transmission in facility.
Investigation Of ‘Cluster” With Identical PFGE

• 1. Do the residents have direct contact (socializing, activities, meals, etc.)
• 2. Do the residents share space/environment
• 3. Do the residents share equipment
• 4. Rate the amount of staff contact / assistance in ADLs--measure of 2-way contamination
• 5. At what level do residents share staff [RN, LPN, NAs]
Clustered Genetically Identical Bacteria

E. faecalis [Wound Care Cart or Nurse Scissor]  
2/07  D 330 Wound  
2/27  D 332 Wound

S. pneumoniae [Resident with Bronchiectasis in Lounge]  
1/20  A 536 Sputum  
3/07  A 505 Sputum

K. pneumoniae share Pseudomonas [Urinary Caths]  
11/08  D 302 Urine  
12/14  D 352 Urine

P. mirabilis [Feeding Assistance at Same table]  
8/17  C227 Wound  
8/29  C220 Urine  
10/24  C236 Urine
### Distribution of 26 INITIAL MRSA type A isolates on 14 units over 83 months (# is the Month of isolation)

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5 Clustered Identical Clinical MRSA Isolates on a Unit over 6 Months---Response

Screened Residents
Offer Screening to Staff

2 LPNs with Nasal Colonization/Sinusitis – Treated

• No New case 21 Months
Challenges to detecting clusters of endemic MRSA from clinical cultures

- MRSA may cause Pneumonia, SSTI, UTI

EVIDENCE TRANSMISSION MAY EVOLVE SLOWLY
“2 HITS”
1) COLONIZING EVENT
2) ASPIRATION EVENT OR CELLULITIS DEVELOPS IN NECROTIC WOUND
THEN A CULTURE PERFORMED WEEKS LATER

“LONG CLINICAL INCUBATION” MAY BE HARD TO CONNECT CASES BASED ON CLINICAL CULTURES
Clinical Bacteriology Database: Clusters of Transmission

- All MRSAs Listed together, Sorted by nursing unit, and date of initial isolation; Allow identification of clustering of NH acquired MRSA in Time/Space
- F441: “Determining site of transmission helps identify residents who developed infections in the facility” Mentioned 3X in F441
- Isolates obtained first 3 days following transfer to ER or hospital: Considered NH ACQUIRED if no PMH of that MDRO in individual—You may have more cases acquired in your NH than you think
Construct Antibiogram, :
Example: % Quinolone R (levoflox, cipro)
  Urinary isolates esp. catheter related
  • Include 1 isolate of given type species/sensitivity per resident
  • Serial Analysis: Will Determine Efficacy
    Antibiotic Stewardship Program
  • Assist selection empiric therapy
  • 2008-51% E. coli urinary isolates Quinolone R-North Eastern NHs
    ICHE 2009 30: 790
Clinical Cultures Will NOT ID all MDRO Carriers
6 WISC. NHs: 22% colonized MRSA
21% colonized Quinolone R Gram Neg BT
Crnich/Drinka ICHE 2012 33:
Environment Surveillance in Facilities with 24% point prevalence MRSA similar Crnich

- 16% of 500 High Touch Objects Grew MRSA [tables, handrail, doorknobs]
- Only 22% ultraviolet marks removed during routine cleaning  
  
JAGS 2012 60:1012
MDROs Identified by Clinical Culture; “Tip of the Iceberg”

- Emphasize Known MRSA Carriers
- Unknown Carriers; More Common, >Risk Transmission
- Often Ignore MDRO Gram Negative Carriers
- Potential Solution: More Emphasis on Unknown Carriers and STANDARD PRECAUTIONS

How to Prevent Transmission Unknown MDRO

CORNERSTONE: STANDARD precautions: Review CDC Isolation Guideline: STANDARD precautions are EXTENSIVE

STD precautions include gloves during care resident with uncontained secretions when contact with POTENTIALLY CONTAMINATED INTACT SKIN anticipated.
• Includes residents uncontained wound drainage/incontinent/absent hygiene
• Aspects of “Contact Precautions” recommended based on clinical assessment of secretion containment without culture p94,106
• In Many Facilities Nursing Asst. don Gloves/Gowns providing hygiene assistance for Dependent Residents (hands, forearms (JHI 2010;76:264), torso contaminated)
• Dressing, transferring, bathing, incontinence care, complete PE NOT casual contacts
• ?? Start with universal gloving/gowns for NA care of residents with devices (Foley, G-tube) + Chronic Wounds CID 2011;52:654
Identification of Infected Residents

- Demands sensitive approach
  - Infection may present with nonspecific S/S (falls, functional decline, confusion)
  - fever may be absent
- HOWEVER do not assume that cause of deterioration is infection (UTI) without considering
  - drug toxicity
  - hypoxia
  - metabolic derangement
- Generally like to see localizing S/S to make a Dx of a specific Infection
Over diagnosis of UTI

- If McGeer or Loeb criteria used: Respiratory Infection more common than UTI Penn. Data-AJIC June 2011 pE162, ICHE 2005;26:231-8

- If resident with positive urine culture eating and drinking poorly secondary to bacterial pneumonia or adverse drug reaction, attributing status change to UTI may result in failure to detect real problem
Over diagnosis of UTI

We don’t do sputum culture if no Resp. S/S
We don’t attribute status change to Resp. Illness without localizing S/S
We do urine cultures in residents without Urinary S/S all the time  
And culture reports return after hours
Antibiotics select Resistant Bacteria

Unnecessary Antibiotic Script:
• Antibiotic Resistant “Time Bomb” set to explode 1-2 months later if:
  • INDIVIDUALLY develops serious infection
  • Approx. 25% (ICU) developed resistance to targeted bacteria
  • TMP-Sulfa prophylaxis for 1 mo: R E coli stool: increased 20 to 85%
Retrospective Report: 200 NH residents: had C+S within 1 MO of previous antibiotic - 2/3 BT: R to that antibiotic
AJIC 2000;28:8

Quinolone script within 1 Month Increased Risk: Resistant Symptomatic UTI 27 X
J Hosp Infec 2010 76: 324

In young women, Rx of Asymptomatic BTU increases risk subsequent symptomatic UTI 3X
## Loeb Minimum Criteria Ordering UA-Initiating Antibiotic

**Without Catheter**

- Dysuria alone
- **OR** two of the following:
  - Fever
  - Shaking chills \(^{*}\) CID 2008;2009:149
  - Gross hematuria
  - Flank Pain
  - Suprapubic pain
  - New Frequency,
  - New Urgency
  - New Incontinence

**With catheter**

- One or more of the following:
  - Fever
  - New onset delirium
  - Rigors
  - New CVA tenderness

\(^{*}\) Also see new McGeer
Loeb Criteria Initiating Antibiotic Urinary Indication: Supported Cluster Randomized Controlled Trial-Intense Educational Intervention

31% reduction in scripts for UTI, No adverse events (BMJ 2005; 331: 669-672)

- UA, C+S ONLY OBTAINED IF CLINICAL INDICATION FOR ANTIBIOTIC RX
- Antibiotics stopped If no pyuria or culture negative
- MDs not forced to follow protocol
LTC Fever Criteria: IDSA Guideline Evaluation Infection

- >100F, >2F baseline, repeated >99F
CID 2008;2009:149–171
IDSA Guideline Evaluation Infection LTC: Potential Criteria for Withholding Antibiotics

- Consensus statement: In the absence of fever, LEUCOCYTOSIS / L SHIFT, or focal manifestations of clinical infection, additional diagnostic tests may not be indicated, because of low potential yield. Nonbacterial infections can’t be excluded.

My Bottom Line

NO FEVER, LEUCOCYTOSIS / L SHIFT, FOCAL FINDINGS [Stable VSs], -SERIOUS BT INFECTION UNLIKELY--OBSERVE
SINCE ANTIBIOTICS MAY BE HARMFUL + NO CRITERIA TO DX INFECTION COMPLETELY SENSITIVE

Need protocols to monitor for evolving condition if no specific indication for antibiotic

Patient, family, staff might be reassured when antibiotics are withheld if resident is formally monitored for evolving condition
Revised McGeer--New Criteria

- Fever OR Leukocytosis/L Shift (>14,000 or bands >6% or 1500) (WBC >11,000)
- Delirium OR Acute Functional Decline as defined by MDS 3.0
- Scrotal/Prostate Tenderness/Swelling
- Purulent urethral drainage
- Recent Catheter Trauma (rip mucosa) / Obstruction (blow BT up ureter) can Trigger Urosepsis
- CHANGE IN CHARACTER OF URINE NOT INCLUDED
My Opinion

- Develop Minimum Criteria for Starting Antibiotics using New McGeer / Loeb Criteria
- Input from Staff to get buy-in
- Use Same Criteria To Start Antibiotics AND to Count Infections
Surveillance Staff/Visitors

- Facilities must prohibit employees with transmissible infections + infected skin lesions from direct contact with residents and food [separate federal std. food service]
- LTC facilities should implement active screening programs to identify infected staff / visitors, esp. during community outbreaks of Respiratory or GI illness
- Screening staff and visitors:
  - prominent component of programs to prevent introduction of pandemic influenza
Staff Surveillance

- Staff should be trained to:
  - monitor themselves for S/S of infection
  - exclude themselves from work, or report to employee health
  - I teach this during new employee physical
Response to High Rates Infections Triggered Primarily by Abnormal Function / Anatomy Rather than Transmission of Virulent Bacteria
If excess rates of Pneumonia: Prevention may be possible: dental hygiene, tapering sedatives, mobilization, elevating head of bed if regurgitation/aspiration (studies from ICU)

Drinka JAMDA 2010;11:70-7, JAMDA 2010;11465-7
If excess rates of Skin and Soft Tissue Infection: Prevention may be possible: pressure relief, wound care, debriding devitalized tissue, Rx Foot fungus to prevent cellulitis
Prevention Excess UTI Indwelling Urinary Catheters

Drinka  Complications of chronic indwelling urinary catheters. JAMDA, 2006; 7:388-392

- Insertion-Aseptic
- Maintain Flow---Avoid Obstruction-from Thigh Pressure, Kink, Concretions
- Avoid Traction (pressure necrosis)---Maintain slack
- Avoid Pistoning (? sand paper), Avoid Trauma, Attach to Thigh, Use small cath as possible
- Avoid Introducing New Bacteria; Touch Drainage Spigot to contaminated emptying container, Open Tubing [or disinfect junctions], Don’t Raise Bag above Bladder
If you have questions about your program

- Consult with State Public Health Officials who specialize in LTC Infection control
- Provide good information and medico-legal support if your practices questioned

References:
Reducing Inappropriate Antibiotic Use for UTI

Fever (>37.9°C [100°F] or 1.5°C [2.4°F] increase above baseline temperature) on at least two occasions over last 12 hours?

Yes

Two or more symptoms of signs of non-urinary tract infection*?

Yes

Order urine culture for one or more of the following:
- Dysuria
- Urinary catheter
- Urgency
- Flank pain
- Shaking chills
- Urinary incontinence
- Frequency
- Gross hematuria
- Suprapubic pain

No

Do not order urine culture

No

Urinary catheter?

Yes

Order urine culture for new onset burning on urination or two or more of the following:
- New costovertebral tenderness
- Rigors
- New onset of delirium

No

Results of urine culture?

>10^6 CFU/ml (positive) or pending

Yes

Urinary catheter?

Is there one or more of the following?
- New costovertebral tenderness
- Rigors
- New onset of delirium
- Fever (>37.9°C [100°F] or 1.5°C [2.4°F] increase above baseline on two occasions over last 12 hours)

No

If yes, begin antibiotics. Stop antibiotics if urine culture is negative and no pyuria is present.
If no, do not treat for urinary tract infection.

No

Negative (no growth or mixed)

Urinary catheter?

Yes

No urinary tract infection

No

* Respiratory symptoms include increased shortness of breath, increased cough, increased sputum production, and new pleuritic chest pain. Gastrointestinal symptoms include nausea or vomiting, new abdominal pain, and new onset of diarrhea. Skin and soft tissue symptoms include new redness, warmth, swelling, and purulent drainage.

Loeb et al. BMC Infect Dis 2002; 2: 17-23