

Expanding Infection Surveillance Activities in LTCFs

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Presentation Objectives*

- ❑ Compare and contrast the Revised and Original McGeer infection surveillance definitions for LTCF
- ❑ Identify challenges to applying infection surveillance definitions in a LTCF
- ❑ Describe the National Healthcare Safety Network (NHSN) infrastructure for infection reporting by LTCF

* No conflicts to disclose

Surveillance: Defined by nursing home regulations

INTENT: (F44) 42CFR 483.65 Infection Control

The intent of this regulation is to assure that the facility develops, implements, and maintains an Infection Prevention and Control Program in order to prevent, recognize, and control, to the extent possible, the onset and spread of infection within the facility. The program will:

- *Perform surveillance and investigation to prevent, to the extent possible, the onset and the spread of infection;*

Each facility should develop a system for surveillance, including:

- ❑ Goals of surveillance program
- ❑ Definitions of common infections
- ❑ Surveillance procedures for data collection
- ❑ Analysis of surveillance data to plan infection control efforts

CMS Manual System, Pub 100-07, Transmittal 51, 7-2009;
K. Hoffman, CMS Update on IC in nursing homes, Webinar, 5-2012

Challenges to identifying infections in LTC settings

- ❑ Frail and medically complex population
 - ❑ Atypical manifestations of infections; challenges differentiating colonization from clinical infection
- ❑ Variable access to clinical expertise
 - ❑ RN/patient ratios low; lack of specialized infection prevention expertise
 - ❑ Limited on-site physician presence
- ❑ Challenges to use of diagnostics
 - ❑ Delays in obtaining radiologic and microbiology testing and results
 - ❑ Inappropriate use of diagnostic testing may hinder correct diagnosis

Challenges to analyzing LTC infection data

- ❑ Need for standardized/validated infection surveillance definitions; utilized by all providers
- ❑ Need an accepted surveillance methodology which is feasible and applicable across a variety of facilities
 - ❑ Targeted by type of infection or specific high risk groups
- ❑ Need to establish national benchmarks for HAI data
 - ❑ Must be able to adjust HAI rates for differences in facility size/type and resident population being served
- ❑ Need for validation of surveillance definitions and data collection procedures

Seven core recommended surveillance practices

- ❑ 1. Assessing the population
- ❑ 2. Selecting the outcome or process for surveillance
- ❑ 3. Using surveillance definitions
- ❑ 4. Collecting surveillance data
- ❑ 5. Calculating and analyzing surveillance rates
- ❑ 6. Applying risk stratification methodology
- ❑ 7. Reporting and using surveillance information

Lee TB, et al. AJIC 2007;35:427-40

Standardizing surveillance definitions

- ❑ Well defined data elements applied consistently
- ❑ Standard criteria to ensure accuracy, reproducibility and the ability to trend data over time (even with different people doing surveillance)
 - ❑ Develop a data collection tool to support surveillance activities
 - ❑ Use IT resources to facilitate data collection if possible
- ❑ Use of nationally recognized definitions will enable comparisons of surveillance data with other facilities

Lee TB, et al. AJIC 2007; 35: 427-40

Surveillance definitions for LTCF: "McGeer criteria", 1991



American Journal of Infection Control
Volume 19 Number 1 February 1991

COMMENTARY

Definitions of infection for surveillance in long-term care facilities

- ❑ First published infection surveillance definitions for LTC
 - ❑ Consensus definitions lead by a Canadian researcher, Allison McGeer in the early 1990's
 - ❑ Adapted from CDC hospital infection surveillance definitions by a group of experts in the field
 - ❑ Though widely utilized in research/ state-mandated programs, never systematically validated

CDC/SHEA infection surveillance definitions for LTC, 2012

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2012, VOL. 33, NO. 10

SHEA/CDC POSITION PAPER

Surveillance Definitions of Infections in Long-Term Care Facilities: Revisiting the McGeer Criteria

- ❑ Reviewed and updated the criteria outlined in the original McGeer infection surveillance definition paper
- ❑ Revisions based on a structured review of evidence and consensus opinion of experts in the field
 - ❑ Significant changes to urinary tract and respiratory tract infections
 - ❑ Added norovirus gastroenteritis and *C. difficile* infection
- ❑ Definitions published without validation

<http://www.jstor.org/stable/10.1086/667743>

CDC/SHEA infection surveillance definitions for LTC

Clinical syndromes addressed in the guidance

- ❑ **Constitutional criteria:** Fever, leukocytosis, acute change in mental or functional status
- ❑ **Respiratory tract infections:** Common cold, Influenza-like illness, lower respiratory tract infection, pneumonia
- ❑ **Urinary tract infections:** With and without an indwelling urinary catheter
- ❑ **Skin and soft tissue infections:** Cellulitis, wound infection, scabies, fungal oral/perioral and skin infections, herpesvirus skin infections, Conjunctivitis
- ❑ **Gastrointestinal tract infections:** Gastroenteritis, norovirus, *C. difficile*

Stone et al. ICHE. 2012; 33: 965-977

CDC/SHEA Surveillance definitions: Constitutional criteria

A. Fever	1. A single oral temperature of >37.8°C (>100°F) 2. OR repeated oral temperatures of >37.2°C (99°F) or rectal temperatures >37.5°C (99.5°F) 3. OR a single temperature >1.1°C (2°F) over baseline from any site (oral, tympanic, axillary)								
B. Leukocytosis	1. Neutrophilia (>14,000 leukocytes/mm ³) 2. OR Left shift (>6% bands or >1,500 bands/mm ³)								
C. Acute mental status change from baseline	1. Acute onset 2. Fluctuating course 3. Inattention 4. AND either disorganized thinking or altered level of consciousness								
D. Acute functional decline	1. A new 3 point increase in activities of daily living (ADL) score (0-28) from baseline, based on the following 7 ADL items, each scored between 0 (independent) and 4 (total dependence): <table border="0" style="width: 100%; margin-top: 5px;"> <tbody> <tr> <td>a. Bed mobility</td> <td>e. Toilet use</td> </tr> <tr> <td>b. Transfer</td> <td>f. Personal hygiene</td> </tr> <tr> <td>c. Locomotion within LTCF</td> <td>g. Eating</td> </tr> <tr> <td>d. Dressing</td> <td></td> </tr> </tbody> </table>	a. Bed mobility	e. Toilet use	b. Transfer	f. Personal hygiene	c. Locomotion within LTCF	g. Eating	d. Dressing	
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b. Transfer	f. Personal hygiene								
c. Locomotion within LTCF	g. Eating								
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Stone et al. ICHE. 2012; 33: 965-977

2012 updates to defining constitutional surveillance criteria

- ❑ Sets lower temperature threshold; allows for repeated measures or increase above baseline to define fever
 - ❑ CDC/SHEA 2012: Single temp >37.8°C (>100°F); repeated temp >37.2°C (>99°F); or 1.1°C (>2°F) over baseline
 - ❑ McGeer 1991: >=38.0°C (100.4°F)
- ❑ Provides more specific guidance on defines acute mental status change and decline in functional status
 - ❑ Uses scales found in MDS 3.0 reporting

Assessing mental status and functional status in the Minimum Data Set

Delirium

C1300. Signs and Symptoms of Delirium (from CAM):

Code after completing Brief Interview for Mental Status or Staff Assessment, and reviewing medical record

Enter Codes in Boxes

<input type="checkbox"/>	A. Inattention - Did the resident have difficulty focusing attention (easily distracted, out of touch or difficulty following what was said)?
<input type="checkbox"/>	B. Disorganized thinking - Was the resident's thinking disorganized or incoherent (rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject)?
<input type="checkbox"/>	C. Altered level of consciousness - Did the resident have altered level of consciousness (e.g., vigilant started easily to any sound or touch; lethargic - repeatedly dozed off when being asked questions, but responded to voice or touch; stuporous - very difficult to arouse and keep aroused for the interview; comatose - could not be aroused)?

Coding:

- 0. Behavior not present
- 1. Behavior continuously present, does not fluctuate
- 2. Behavior present, fluctuates (comes and goes, changes in severity)

Section G Functional Status

G0110. Activities of Daily Living (ADL) Assistance

1. ADL Self-Performance

Code for resident's performance over all shifts - not including setup. If the ADL activity occurred 3 or more times at various levels of assistance, code the most dependent - except for total dependence, which requires full staff performance every time

Coding:

Activity Occurred 3 or More Times

- 0. **Independent** - no help or staff oversight at any time
- 1. **Supervision** - oversight, encouragement or cueing
- 2. **Limited assistance** - resident highly involved in activity; staff provide guided maneuvering of limbs or other non-weight-bearing assistance
- 3. **Extensive assistance** - resident involved in activity, staff provide weight-bearing support
- 4. **Total dependence** - full staff performance every time during entire 7-day period

MDS 3.0 Nursing Home Comprehensive (NC) Version 1.00.2 10/01/2010

2012 updates to urinary tract infection (UTI) surveillance definitions

NEW ADDITIONS

- ❑ Acute dysuria now a stand alone criteria defining symptomatic infection
- ❑ Presence of elevated white blood cell count incorporated into criteria
- ❑ Urine culture is required to define UTI

KEY DELETIONS

- ❑ Mental status change/functional decline removed as criteria for UTI in residents without a catheter
- ❑ Change in character of urine (e.g., foul smell) removed as criteria

Comparing UTI definitions

McGeer 1991	Revised McGeer, 2012
For residents without an indwelling urinary catheter:	For residents without an indwelling urinary catheter:
1. At least one of the following signs or symptoms: (a) Fever (>38.0°C) (b) New or increased burning pain on urination, frequency or urgency, (c) New flank or suprapubic pain or tenderness, (d) Change in character of urine*, (e) Worsening of mental or functional status (may be new or increased incontinence).	1. One of the following (A, B or C): A. Acute dysuria or acute pain, swelling or tenderness of testes, epididymis or prostate B. Fever or leukocytosis AND at least one localizing urinary tract sign/symptoms (a) Acute CVA pain or tenderness (b) Suprapubic pain (c) Gross hematuria (d) New or increased urgency, (e) New or increased frequency (f) New or increased incontinence C. Two localizing urinary tract sign/symptoms AND 2. A positive urine culture (a) Voided with ≥ 10 ⁵ cfu/ml <=2 organism(s) (b) Voided with ≥ 10 ³ cfu/ml of any organism(s)
<small>*Note: Change in character of urine could be clinical (new blood, foul odor, sediment) or lab-based change in previous urinalysis, if available)</small>	

McGeer et al. AJIC 1991; 19: 1-6; Stone et al. ICHE. 2012; 33: 965-977.

Comparing UTI definitions

McGeer 1991

Revised McGeer, 2012

For residents with an indwelling urinary catheter:	For residents with an indwelling urinary catheter:
<p>1. At least <u>two</u> of the following signs or symptoms:</p> <ul style="list-style-type: none"> (a) Fever (≥ 38.0 C) or chills, (b) New flank or suprapubic pain or tenderness, (c) Change in character of urine*, (d) Worsening of mental or functional status (may be new or increased incontinence). <p><small>*Note: Change in character of urine could be clinical (new blood, foul odor, sediment or lab-based change in previous urinalysis, if available)</small></p>	<p>1. At least one of the following signs or symptoms:</p> <ul style="list-style-type: none"> (a) Fever, rigors or new onset hypotension* (b) Either acute change in mental status or acute functional decline* AND leukocytosis (c) New onset suprapubic pain or costovertebral angle pain or tenderness (d) Purulent discharge from around the catheter or acute pain, swelling, or tenderness of the testes, epididymis, or prostate. <p><small>*With no other recognized cause</small></p> <p>2. Urinary catheter culture with $\geq 10^5$ cfu/ml of any organism(s)</p>

McGeer et al. AJIC 1991; 19: 1-6; Stone et al. ICHE. 2012; 33: 965-977.

Other guidelines for diagnosing and managing infections in LTC

Clin Infect Dis 2009; 48:149-171

IDSA GUIDELINES

Clinical Practice Guideline for the Evaluation of Fever and Infection in Older Adult Residents of Long-Term Care Facilities: 2008 Update by the Infectious Diseases Society of America

Kevin P. High,¹ Suzanne F. Bradley,^{1,2} Stefan Gravenstein,^{1,3,4} David R. Maki,⁵ Vincent J. Quagliarello,⁶ Chesley Richards,^{1,7} and Thomas Y. Yoshikawa^{1,8}

Infect Control Hosp Epidemiol 2001; 22:120-124

Development of Minimum Criteria for the Initiation of Antibiotics in Residents of Long-Term-Care Facilities: Results of a Consensus Conference

Mark Lusk, MD, MSc; David W. Henley, MD; Suzanne Bradley, MD; Kent Crossley, MD; Richard Garbakh, MD; Nelson Grant, MD; Allison McGeer, MD; Robert R. Musher, MD; Joseph NyAmadi, MD; Lindsey E. Nicolle, MD; Brenda Nurse, MD; Shirley Patten, RN; Andrew E. Simon, MD; Philip Smith, MD; Larry Strassenthal, MD

Challenges to applying surveillance definitions

- ❑ What are explanations for events not meeting criteria?
 - ❑ Incomplete assessment (e.g., physical exam not performed or culture not obtained)
 - ❑ Inadequate documentation
 - ❑ Failure to obtain diagnostic testing (starting antibiotic before a urine culture is collected)
 - ❑ Inappropriate diagnostic testing (e.g., cultures obtained when local signs/symptoms are not present)
 - ❑ Poor specimen collection techniques -- contamination

Standardizing data collection methods and approach

- ❑ Data collection should be performed by individuals who understand the surveillance criteria
 - ❑ Train personnel and others in data collection methods specific to each surveillance objective
 - ❑ Provide data collection tools to support activities
- ❑ Define surveillance measures (process vs. outcome)
 - ❑ Process measures: Hand hygiene adherence, device handling practices, gown/glove use during contact precautions; OR
 - ❑ Outcome measures: MRSA bloodstream infections, UTIs, C. difficile infections
- ❑ Identify approach to surveillance which is feasible given resources but still provides actionable data
 - ❑ Targeted vs. house-wide;
 - ❑ Prevalence vs. incidence

Lee TB, et al. AJIC 2007; 35: 427-40

Comparing surveillance approaches

	House-wide (tracking all infections)	Targeted (tracking select infections)
PROS	<ul style="list-style-type: none"> ❑ Comprehensive ❑ Easier to do in a small facility, or one which provides care to a specialized population 	<ul style="list-style-type: none"> ❑ Focuses your time and resources ❑ Increases time to explore causes and implement prevention activities ❑ More efficient use of time
CONS	<ul style="list-style-type: none"> ❑ Very time consuming ❑ Limits depth of data collection ❑ Less time for data analysis and intervention 	<ul style="list-style-type: none"> ❑ Limits scope of infection surveillance ❑ Needs ongoing review and updating ❑ If too narrow, you may miss important events

Surveillance approaches (cont.)

	Incidence – data for action	Prevalence – scope and magnitude
PROS	<ul style="list-style-type: none"> ❑ Provides “ongoing-data” about select events ❑ Able to see variations over time ❑ Changes in data trends can be connected to interventions 	<ul style="list-style-type: none"> ❑ Snap shot of all infection events during a given time frame ❑ Less time and resource intensive if periods are short (single day, one week)
CONS	<ul style="list-style-type: none"> ❑ Very time and resource intensive ❑ Very hard to do with a “house-wide” surveillance strategy 	<ul style="list-style-type: none"> ❑ Harder to interpret data over time if performed infrequently ❑ May miss important associations or trends ❑ Harder to link back to local interventions

Tracking infection incidence: Multi-facility experience

- ❑ Seventeen LTCFs conducted monthly, "house-wide" infection surveillance for 12 months
 - ❑ Each site had a dedicated staff nurse trained in data collection
 - ❑ All sites used the 1991 McGeer definitions
 - ❑ Aggregated data for all sites to provide "benchmark" pooled mean rate for facility-specific comparisons
 - ❑ Demonstrated the feasibility of prospective, incident surveillance

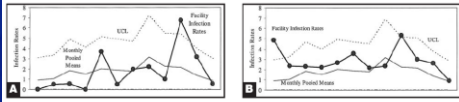
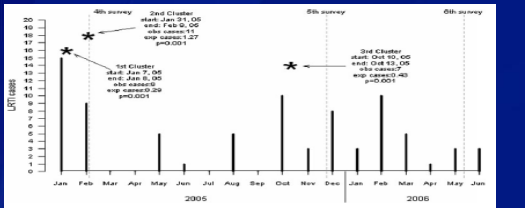


FIGURE 2. Adjusted U charts of respiratory infection rates (solid circles) from July 2001 to June 2002. Upper control limits (UCLs) (dashed lines) and pooled monthly means (the solid lines) were calculated from separate infection sites. Lower control limits were equal to 0 and not plotted. (A) Facility 1. (B) Facility 2.

Stevenson, KB ICHHE 2005, 26: 231-238

Serial infection prevalence: Single facility experience



- ❑ Single facility, 6 prevalence surveys, ~80 residents/survey
 - ❑ Average infection prevalence, 8% (range 0-20%)
 - ❑ Highest prevalence (20%) occurred in 4th survey, which coincided with a cluster of lower respiratory tract infections

Marchi M. Infection. 2012 ;40(5):493-500

Surveillance approaches: Points to consider

- ❑ Incidence data allows for monitoring changes from interventions
 - ❑ Need to determine if capacity to perform house-wide vs. targeted surveillance
 - ❑ If targeted approach is used, which infections will be tracked?
- ❑ Prevalence data provides scope/magnitude of events, but, less clear how to interpret changes over time
 - ❑ How long is the optimum survey period (single day or longer)?
 - ❑ How frequently should infection prevalence be done to obtain meaningful (actionable) data?

Additional points about surveillance

- Surveillance definitions may not be the same as clinical criteria used to make treatment decisions
 - Sometimes diagnosis/treatment decisions are made before all the data is available
- Events defined by surveillance criteria may be more detailed than events captured in the minimum data set (MDS)
- It may be important to evaluate the discrepancies between surveillance data and clinical/MDS data as a process improvement exercise

Gap between MD diagnosis and surveillance criteria

Table 2 Incidence and attributable risk of infection

	Number of infections		Incidence rate (infections/1,000 resident-months)		Relative risk (95%)	p-value
	Device (263 flu-mo)	Non-device (644 flu-mo)	Device (IRd)	Non-device (IRn)		
Total infections ^a	87	110	331	171	1.9 (1.4-2.6)	<0.001
Urinary tract infections ^b	49	54	186	84	2.2 (1.5-3.3)	<0.001
Pneumonia ^c	23	20	87	31	2.8 (1.5-5.4)	0.0004
Other infections ^a	15	36	57	56	1.0 (0.5-1.9)	0.47
McGeer's criteria ^d	8	15	30	23	1.3 (0.5-3.3)	0.27
Minimum criteria ^e	12	39	46	16	2.9 (1.2-7.6)	0.007
McGeer's or minimum criteria ^f	15	18	57	28	2.0 (1.0-4.3)	0.02

^aClinical definition
^bIncludes skin and soft tissue infections, *Clostridium difficile* colitis, conjunctivitis, upper respiratory, and
^cIncludes pneumonia and/or urinary tract infections

- 146 infections, UTI or pneumonia were diagnosed and treated by clinicians
- 33/146 (23%) were also identified by applying either McGeer or Loeb minimum criteria

Wang L, et al. Eur J Clin Microbiol Infect Dis. 2012. 31(8):1797-804

Strategies for decreasing the "gap"

- Standardize the process for assessing a resident when concern about new infection
 - Ensure all pieces of history and physical exam are assessed
 - Improve documentation of change in condition
- Standardize communication of change in condition to medical providers
- Standardize the laboratory data obtained prior to antibiotic start
 - Review existing protocols which might drive inappropriate diagnostic testing (e.g., send a UA for every resident who falls)
- Ensure that clinical staff understand the surveillance criteria used to identify an infection

Integrate surveillance criteria into resident assessments

- This form was developed for front-line staff to record findings when an infection was suspected
- Tools can be used for documentation and/or communication
- These could be educational materials or become part of the resident medical record

Form courtesy of Ellen Bartlett, Houlton Regional Hospital, Maine

What is NHSN?



- CDC supported internet-based system designed for infection surveillance in healthcare facilities
- Data used by facilities for surveillance, benchmarking, and internal quality improvement
- Data used by CDC to establish national benchmarks and monitor success of efforts to prevent healthcare-associated infections (also called HAIs)

NHSN Long-term Care Facility Component: Data for Action



- NHSN infection reporting tailored for LTCF providers, released in September 2012: ~200 NHs currently enrolled
- Offers standardized event criteria and data analysis across facilities
- Reporting options
 - Urinary tract infections,
 - Multidrug-resistant organisms and *C. difficile*
 - Adherence to hand hygiene and gown/glove use



www.cdc.gov/nhsn/ltc

Standardized event definitions

- ❑ Symptomatic UTI events
 - Criteria based on the CDC/SHEA updated infection surveillance definitions for LTC (ICHE 2012)
- ❑ Laboratory Identified (Lab-ID) MDRO/CDI events
 - Positive laboratory cultures used as a proxy for surveillance
 - Definitions will match the Lab-ID event criteria being applied across healthcare settings
- ❑ Criteria and definitions will be assessed and validated for use by LTCFs
 - Feedback from users will be incorporated in changes and updates to data collection forms, instructions, training slides, etc.

Data analysis reports for users

- ❑ Line lists generated to catalogue events
 - Organized by type of event (e.g., catheter-associated, CDI)
 - Includes resident care location to look for clustering of events
- ❑ Rate tables generated for each event type
 - Total UTI Rate/1,000 resident-days
 - Will have separate incidence rates for catheter and non-catheter associated events
 - New in 2015, facilities can also track antibiotic starts for UTIs as a separate process measure for UTI surveillance
 - Long-term care onset CDI Rate/10,000 resident-days
 - Long-term care onset MDRO Rate/1,000 resident-days
 - Percent adherence to hand hygiene or gown/glove use

Benefits of NHSN surveillance: Data for action

- ❑ Standardizes surveillance definitions used by all participating in the system
- ❑ Provides data to inform local quality improvement
- ❑ Demonstrates trends in improvements and/or areas of opportunity for each infection reported in the system
- ❑ Provides comparisons of infection data with adjustments for facility and/or resident characteristics
- ❑ Provides national benchmarks to assess performance in local and national prevention efforts
- ❑ Creates data for validation of surveillance criteria

Take away points

- ❑ Standard criteria and defined data collection methodology are key elements of LTC surveillance programs
- ❑ Evaluating discrepancies between surveillance defined events and clinically defined events can identify opportunities for quality improvement
- ❑ Data submitted into NHSN by LTCFs will provide local data for action while establishing national benchmarks for infection reporting

Thank you!!

Email: nstone@cdc.gov with questions/comments

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636) / TTY: 1-888-232-6348
Email: cdcinfo@cdc.gov Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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