INFECTION PREVENTION AND SURVEILLANCE PRACTICES FOR RESIDENTS WITH SKIN INFECTIONS AND CHRONIC WOUNDS

Faculty
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Objectives Overview

- Discuss components of the Federal Registry that inform the survey process related to infection prevention and control practices in long term care facilities.
- Identify the four types of infections listed by CMS that will be specifically targeted by the survey process.

Overview of Today’s Presentation

- This is the first of two related presentations being given today on infection prevention and control and antibiotic stewardship.
- Part 1 is an overview of scope of problem and resources for framing your infection prevention and control and antibiotic stewardship programs.
- Brief overview of surveillance – primarily resources
- 7 handouts have been provided for you on FADONA’s website related to IPCP and ABS.
- The second part of the program will look at wound related infections.
CMS Final Rule Requirements for Long-Term Care Facilities

- Long-Term Care (LTC) Facilities have health and safety standards that facilities must meet in order to participate in the Medicare or Medicaid Programs.

- These standards includes new mandates and language related to Infection Prevention and Control and Antibiotic Stewardship.

This document is provided for you.

185 page document that informs the Survey Process.
Final Rule-Implementation Time Frames

Correlates to F441

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<th>Implementation Deadline</th>
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<td>Phase 1</td>
<td>November 28, 2016</td>
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<td>Antibiotic Stewardship Program</td>
<td>Phase 2</td>
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<td>Infection Preventionist (IP)</td>
<td>Phase 3</td>
<td>November 28, 2019</td>
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<td>IP participation on QAA committee</td>
<td>Phase 3</td>
<td>November 28, 2019</td>
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§ 483.80 Infection Prevention and Control Program (IPCP)

SNFs are mandated to develop and implement a formal Infection Prevention and Control Program (IPCP) that includes, at minimum:

- “System for preventing, identifying, reporting, investigating, and controlling infections and communicable diseases for all residents, staff, volunteers, visitors, and other individuals who provide services under a contractual arrangement”
- Program reviewed annually
- New language and mandates includes “infection prevention”
- Must follow “national standards” for IPCP
- Implemented in facilities by November 28, 2017 (Phase 2)
Infection Control (§483.80)  
Key Components - 1

- Written standards, policies and procedures that, at minimum, include:
  - “Surveillance, reporting, transmission-based precautions, isolation, when to prohibit staff from having direct contact with residents/food, hand hygiene”
- Staff Training-(see § 483.95)
- Antibiotic stewardship program (November 28, 2017)

Infection Control (§483.80)  
Key Components - 2

- Recording, investigating, and correcting IPCP-related incidents
- Influenza and pneumococcal immunizations
- Linen handling to prevent spread of infections
- Infection preventionist (November 28, 2019)
- New Rules on IPCP have been translated and update in the State Operations Manual Guidance to Surveyors in F441
The Problem

- What are some of the real issues that created the need for more stringent infection prevention and control practices and antibiotic stewardship in all care settings, but specifically for long-term care?

The Problem of Infection Risks for Older Adults

- Older adults and compromised immune systems
- Residents with frequent hospitalizations or recent admissions to acute care facilities...disrupts continuity of care
- Shared and contained living environments
- High rates of comorbidities
  - Diabetes and other chronic illnesses
  - Chronic obstructive pulmonary disease (COPD)
- Overuse use of antibiotics
Why Difficult to Recognizing / Diagnosing Infections in the Elderly?

- Symptoms atypical or non-specific signs and symptoms
  - Altered mental status, function or behavior, and impaired fever response
- Outbreaks may involve multiple pathogens and cause similar clinical syndromes
- Rhinovirus, a significant cause of viral pneumonia
don’t difficult to diagnose & distinguish from other infections
- Potential new pathogens with multiple strains
  (e.g. C-diff)
- Limited ready access to diagnostic tests
- Limited reliability of cultures

Risks Associated with Lack of Preparedness for Infection Prevention and Control Processes

Clinical

Financial

Risks

Regulatory

Legal

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**Infection Control (§ 483.80)**

**Issues**

- Shorter hospital stays
- LTC admitting residents with higher levels of medical acuity and care needs
- Created additional risk of infections for frail elderly residents
- Due to:
  - Increased risk of malnutrition and dehydration
  - Multiple comorbidities
  - Functional limitations and decreased mobility
  - Multiple medications (polypharmacy)
  - Diminished immunity

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**Potential Problem**

- Regulations expectations
  - Providing social activities and events
  - Providing home-like environment
- May increase risk of transmission and exposure to communicable diseases and infections
The Problem with Infections and Antibiotics

- Between 1.6 and 3.8 million infections occur each year
- Cost of infections estimated to be up to $2 billion
- High mortality rate of ~388,000 deaths per year
- Antibiotic overuse has fueled the rise of deadly antibiotic-resistant organisms and is of the world’s most urgent public health threats
- Little or no progress on development of new antibiotics and most experts agree we are entering a post-antibiotic era

Most Common Infections Treated with Antibiotics in LTCFs

- Urinary Tract Infections are the most common infections in facilities
- Respiratory infections are the number 1 infection in which antibiotics are prescribed.

1 Strausbaugh The Burden of Infection in Long-Term Care.
18 Infect Control Epidemiology 2000; 21: 674-679 (1b) AJIC
May 2011, Vol. 39, p.263
Antibiotic Resistance and the Post-Antibiotic Era

1928-penicillin-Alexander Fleming

New rule mandates antibiotic stewardship in nursing homes

Los Angeles Times

A 'slow catastrophe' unfolds as the golden age of antibiotics comes to an end

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Urgency Regarding Infections & Antibiotics Use in Long-Term Care Facilities

- Infections account for up to 50 percent of all transfers to hospitals from LTC
- Death rate can as high as 40 percent when a nursing home resident is hospitalized with a primary diagnosis of infection
- CDC identified hospitals and LTCF’s as THE two major sources of Antibiotic resistance due to high number of infections, shared living environments and high use of antibiotics
- Frequent use of inappropriate antibiotics has produced a variety of multidrug-resistant bacteria (e.g., MRSA and VRE)
- Number one cause of C-diff infection which have become more virulent and harder to treat...due to the use of antibiotics

Antibiotic Resistant Infections in LTCF’s

- Antibiotic-resistant organisms are bacteria & other microorganisms that have developed resistance to antimicrobial drugs
- Also known as Multidrug Resistant Organisms (MDRO’s)
- Examples in LTC include
  - MRSA – *Methicillin-resistant Staphylococcus aureus*
  - VRE - Vancomycin-resistant enterococci
  - CRE – *Carbapenem-resistant enterococci*
  - *Emerging resistant C. Diff Strains*
  - Emerging resistant *Pseudomonas aeruginosa*
Definition of Outbreak According to CMS

Definition

“Outbreak” is the occurrence of more cases of a particular infection than is normally expected, the occurrence of an unusual organism, or the occurrence of unusual antibiotic resistance patterns.

Examples of Facility Outbreaks

- **Influenza outbreak** is defined as:
  - Two or more cases of (ILI) influenza-like illness in a single nursing home unit within a 3-day period OR one case of a confirmed influenza by any testing method

- **Norovirus outbreak** is defined as:
  - Onset of two or more epidemiologically linked cases within a 3-day period

- **C. Difficle outbreak** is defined as:
  - Three or more epidemiologically linked C-Diff Infection (CDI) cases within a period of < seven days
CMS Survey Perspective on Infection in LTC Facilities

- Factors for prevalence of infection in LTC building
  - Understaffed facilities
  - Staff without appropriate training, or time to prevent infections early
  - Overtreatment with antibiotics
  - Increasing clinician complexity of the average nursing home resident
  - Frequent transitions between care settings leading to transmission of HAIs
  - Lack of systematic approach to prevent and identify HAIs
Minimum Elements for Compliance with Infection Control Mandates-F441

- Facility must establish and maintain an infection prevention and control program designed to provide a safe, sanitary and comfortable environment and to help prevent the development and transmission of communicable diseases and infections.
- The facility must establish an infection prevention and control program (IPCP) that must include, at a minimum, the following elements:
  - A system for: preventing, identifying, reporting, investigating, controlling infections and communicable diseases for all residents, staff, volunteers, visitors, and other individuals providing services"

Resource Provided: Advance Copy - Revisions to State Operations Manual (SOM), Appendix PP-Revised Regulations and Tags

F441-Antibiotic Stewardship Mandate

- "An antibiotic stewardship program that includes antibiotic use protocols and a system to monitor antibiotic use.

- Will be implemented beginning November 28, 2017 (Phase 2)

Resource Provided: Advance Copy - Revisions to State Operations Manual (SOM), Appendix PP-Revised Regulations and Tags
Antibiotic Stewardship - Definition

“Antibiotic stewardship refers to a set of commitments and activities designed to “optimize the treatment of infections while reducing the adverse events associated with antibiotic use”

CDC Core Elements of Antibiotic Stewardship for Nursing Homes

“Choosing the right drug for the right infection at the right dose and duration”
Antibiotic Stewardship Clinical Outcomes

- Saves Lives
- Improves Patient Outcomes
- Reduces Antibiotic Resistance
- Reduces Inappropriate Antibiotic Use
- Reduces C-Diff Infections
- Reduces Adverse Drug Events
- Reduces Inappropriate Antibiotic Use

Potential F Tags Related to Antibiotic Medications

- Facility receives F441 related to antibiotic stewardship non-compliance:
  - F329 Unnecessary Drugs
  - F332 and F333 Medication Errors
  - F428 Drug Regimen Review
What to Do to Prepare for Your Infection Prevention and Control and Antibiotic Stewardship Programs???

Start gathering current resources

- CDC-documents—Select documents provided—not the whole series
- Agency for Healthcare Research and Quality—AHRQ—visit website
- CMS-Final Rule and State Operations Manual—Documents provided
- Evidence based infection prevention and treatment guidelines
- Find champions in your buildings who want to grow and mentor others in these areas—may become your infection preventionist
- Get your staff educated and skilled in infection prevention and control practices
- Ensure consultants/contract individuals familiar with IPCP and ABS
- Educate patients and families

Infection Preventionist

- Formerly call Infection Prevention and Control Officer
- New termed Infection Preventionist
“In this final rule, we have modified our proposal to require each facility to designate one individual as the infection preventionist (IP) for whom the infection prevention and control program (IPCP) is a major responsibility.

We have revised the requirement to specify that each facility may designate more than one person as the IP and the IPCP no longer has to be a major responsibility of the individual(s).

“The IP is responsible for assessing the current program, making any changes to the IPCP necessary to comply with the program’s requirements, and implementing and managing the IPCP.

This individual will also be required to be a member of the facility’s QAA committee.

The percentage of a full time equivalent position (FTE) that will be required at each facility will vary greatly.”
483.80(b) Infection Preventionist-F441
Qualifications of Infection Preventionist

IP must:

(1) Have primary professional training in nursing, medical technology, microbiology, epidemiology, or other related field;
(2) Be qualified by education, training, experience or certification;
(3) Work at least part-time at the facility;
(4) Has completed specialized training in infection prevention and control.

Who is currently an IP
Who is interest in becoming an IP

How Do We Prepare to Have or Be an Infection Preventionist?

☐ Will take 1-2 years to get ready for Board Certification as IP
☐ Study the regulations § 483.80 and F441-Free
☐ Study the resources mentioned and provided in this program-Free
☐ Take courses at your state health care association

FADONA Infection Preventionist Board Certification Review Course

Featured Speaker:
Dr. J.Hudson Garrett Jr., PhD, MD, MPH, MBA, FAPA, FAPIC, FHC, FIC, FAPIC, FCHA, FPAI
Chief Clinical Officer
Mater Trainer
Editor-in-Chief, The Director NADONALTC

- Prepare for the NADONA National Infection Prevention Board Certification by taking this the only official prep course for the NADONA certification
- Completion of this course meets the new CMS requirements for infection prevention training and satisfies CCOO guidelines requirements
- Receive complimentary access to online training
- Course is packed with evidence-based resources and an electronic ebook for all participants containing all clinical recommendations for infection prevention and control for LTC healthcare settings.

Date: March 13, 2017
Time: 9:00 AM-5:30
Location: Rosen Plaza Hotel, Orlando, FL
Cost: $195.00 Members and $185.00 Non-Members
Registration Link: http://www.fadona.org/le.aspx
Note: Course size is limited and registrations are on a first come, first serve basis. Register early to reserve your seat.

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2017
Pilot Project to Improve IPCP During Transitions of Care-1

- **Project Overview:** CMS is in the second year of a three year pilot project to improve assessment of infection control and prevention regulations in Long Term Care (LTC) facilities, hospitals, and during transitions of care.
- All surveys during the pilot will be educational surveys (no citations will be issued) and will be conducted by a national contractor.

2017
Pilot Project to Improve IPCP During Transitions of Care-2

- **Second Year Activities:** Using **draft surveyor Infection Control Worksheets (ICWS)** based on the **new Long Term Care regulation** as well as a revised hospital surveyor ICWS.
- 40 hospital surveys will be paired with surveys of LTC facilities, in order to provide an opportunity to assess infection prevention during transitions of care.
- In addition, CMS will pilot technical assistance opportunities for facilities in efforts to improve their infection control programs to meet these new regulations. The draft ICWSs are available to provide transparency of CMS pilot expectations.
- While no citations will be issued, if an **Immediate Jeopardy deficiency** is noted, a referral to the CMS Regional Office (RO) will be made.
This Tool May Assist You in Getting Ready for Future Surveys on IPCP

The pilot survey assessment tool reviews the following domains:

1. Infection Control program infrastructure and Infection Preventionist
2. Infection Preventionist relationship to Quality Assurance Committee
3. Infection surveillance and outbreak response.
4. Influenza and pneumococcal Immunization
5. Linen management
6. Infection prevention during transitions of care

<table>
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<tr>
<th>Section A</th>
<th>Infection Prevention and Control Program (IPCP) Infrastructure</th>
<th>Assessments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1.</td>
<td>The facility has written infection prevention and control policies and procedures which are based on current nationally recognized evidence-based guidelines (e.g., CDC/HICPAC), regulations or standards for its Infection Prevention and Control Program (IPCP).</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>A.2.</td>
<td>The facility has evidence of mandatory personnel infection prevention and control training which includes the IPCP written standards, policies, and procedures.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>A.3.</td>
<td>The facility has documentation of a facility infection control risk assessment conducted according to infection control professional organizations (e.g. APIC, SHEA) guidelines.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>A.4.</td>
<td>Facility has documentation of an annual review of the IPCP using a risk assessment of both facility and community risks, and updates the program as necessary.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
</tbody>
</table>
## Surveyor Infection Control Work Sheet for LTC-2

### Section B

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<th>Infection Preventionist</th>
<th>Assessments</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The facility has designated one or more individuals with specialized training in infection prevention and control as the Infection Preventionist (IP). This individual works at least part-time in the facility. <em>Examples of specialized training may include: Successful completion of initial and/or recertification exams developed by the Certification Board for Infection Control &amp; Epidemiology; Participation in infection control courses organized by the state or recognized professional societies (e.g., APIC, SHEA).</em></td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>B.2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is written evidence that the IP is a member of the facility's quality assessment and assurance committee and reports to the committee on a regular basis.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
</tbody>
</table>

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### Section P

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>0.1. The facility has a written surveillance plan, based on the risk assessment, outlining activities for monitoring/ tracking infections occurring in residents of the facility.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>0.2. The facility has a system in place for early detection and management of potentially infectious asymptomatic residents at the time of admission, including implementation of precautions as appropriate. <em>Examples: Documenting recent antibiotic use, and history of infections or colonization with C. difficile or antibiotic-resistant organisms.</em></td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>0.3. The facility has a system in place (e.g., notification of IP by clinical laboratory) for early detection and management of potentially infectious asymptomatic residents, including implementation of precautions as appropriate.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>0.4. The facility surveillance practices include: a. Use of published surveillance criteria (e.g., 2012 CDC National Healthcare Safety Network [NHSN] Long Term Care Criteria) to define infections. b. Use of a data collection tool. c. Periodic update to QAA (e.g. quarterly). d. Follow-up activity in response to surveillance data (e.g. outbreaks). e. Report summarizing surveillance data annually.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>0.5. The facility has a current list of communicable diseases which are reportable to local/state public health authorities.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>0.6. The facility has a written infection control plan which includes information on communicable diseases, healthcare associated infections (as appropriate), and potential outbreaks.</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
</tbody>
</table>
The IPCP Team

- Administrator
- Medical Director
- DNS/other nursing leader
- Frontline staff
- Infection prevention leader
- Pharmacy
- Laundry
- Housekeeping
- Maintenance
- Dietary services
- Resident/family member
- Dental services

Summary

- Now more than ever, infection prevention and control practices and antimicrobial stewardship is of the utmost importance as an approach to preventing infections initially and optimizing antimicrobial use with the goal of stemming the tide of antimicrobial resistance, and improving resident outcomes.
Take Home Points

- SNFs are expected to develop and implement a formalized program designed to prevent, identify and treat infections appropriately
- In conjunction, an antibiotic stewardship program is mandated to be developed for each facility
- Start your process for editing your IPCP and laying the foundation for development of your antibiotic stewardship program
- You have this year...until November 29, 2017 to get these two program in place
- **Change is coming: The time to prepare is now!!!**

Infection Surveillance
**CDC’s National Healthcare Safety Network (NHSN)**

- Nation's most widely used healthcare-associated infection tracking system
- Provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcare-associated infections
- In addition, NHSN allows healthcare facilities to track blood safety errors and important healthcare process measures such as healthcare personnel influenza vaccine status and infection control adherence rates
Eliminating infections, many of which are preventable, is a significant way to improve care and decrease costs.

CDC’s National Healthcare Safety Network provides long-term care facilities with a customized system to track infections in a streamlined and systematic way.

When facilities track infections, they can identify problems and track progress toward stopping infections.

On the national level, data entered into NHSN will gauge progress toward national healthcare-associated infection goals.

NHSN’s long-term care component is ideal for use by: nursing homes, skilled nursing facilities, chronic care facilities, and assisted living and residential care facilities.

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**Surveillance**

- Standardizes event criteria and data reporting for all facilities
- Reporting options:
  - Urinary tract infections
  - Multidrug-resistant organisms
  - C. difficile
  - Adherence to hand hygiene and gown/glove use
Whether you join the NHSN or not, this website provides great education and templates for creating your surveillance program in your facility.

- **57.140 UTI Event for LTCF January 2017**  [PDF - 114 KB]
  - Customizable form  [DOCX - 40 KB]
  - Table of Instructions - UTI Event for LTCF  [PDF - 337 KB]
- **57.142 Denominators for LTCF January 2017**  [PDF - 41 KB]
  - Customizable form  [DOCX - 29 KB]
  - Table of Instructions - Denominators for LTCF  [PDF - 166 KB]
- **57.141 Monthly Reporting Plan for LTCF January 2017**  [PDF - 43 KB]
  - Customizable form  [DOCX - 28 KB]
  - Table of Instructions - Monthly Reporting Plan for LTCF  [PDF - 115 KB]
- **57.137 Annual Facility Survey for LTCF January 2017**  [PDF - 73 KB]
  - Table of Instructions - Annual Facility Survey for LTCF  [PDF - 497 KB]
Surveillance Take Away Points

- LTC facilities are expected to take action in tracking and preventing the spread of HAIs
- NHSN can be a resource to support prevention effort by providing templates, education and data to support your IPCP and identify gaps and measure the impact of your IPCP
- Facilities actively involved in surveillance and prevention programs will be identified as leaders within the healthcare communities
- Facility programs will be in place to meet CMS regulations and future quality incentive programs
- It will take TIME and COMMITMENT on everyone’s part
- This is not easy…it will require multiple people in your facility…collaborating and working together as a TEAM
- Start NOW…the freight train is coming and its coming fast!!!

Action / Next Steps

What will you do with this info in your building/company? What is one action you can do in one week?

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Thank you!!!
Objectives

- Discuss bioburden in chronic wounds (e.g. planktonic bacteria, biofilms);
- Identify wound treatment considerations in the context of infection control practices (e.g. dressing changes, clean field);
- Explain when and why antimicrobial interventions are a valid treatment choice rather than systemic antibiotics;
- Determine best practice assessment parameters for the identification of specific bacteria for antibiotic stewardship.

Bacteria in Wound Bed and Chronic Inflammation

- Bacteria in wound often at greater levels than host’s ability to control
- Produce proteases (e.g. matrix metalloproteases [MMPs]) - destructive to new tissue
- MMPs being released from inflammatory cells that digest normal collagen scaffold in wound bed
- Bacteria and chronic inflammation damage cells needed for wound healing
- Interfere and delay chemical reactions needed for wound closure
Bacteria and Biofilms

- Bacteria grow in 2 primary forms:
  1. **Planktonic**
     - Free floating
     - Antibiotics destroy fairly easily
     - Most antibiotic testing is on planktonic
  2. **Biofilms**
     - Complex communities of bacteria, yeast, fungi
     - Adhere to solid surfaces
     - Embedded in self-generated extracellular polysaccharide matrix
Biofilms in the Bioburden Continuum

~80% of Chronic Wounds Have Biofilms

Medical Related Biofilms

chronic sinusitis
CNS shunt infection
contact lens associated keratitis
chronic otitis media
cochlear implant infection
burn infection
catheter infection
prosthetic valve endocarditis
pacemaker infection
biliary stent infection
peritoneal dialysis catheter infection
breast implant infection
ventilator associated pneumonia
pulmonary infection in CF patient
intravascular stent infection
urinary stent infection
prosthetic joint infection
peritoneal dialysis catheter infection


Wound Biofilm Characteristics in Open Wounds

- Unable to see it with naked eye
- Polymicrobial
- Aerobic + non-aerobic bacteria
- gram pos+ gram neg
- Fungus + virus
- Hydrophilic polymeric protective coating
- Quorum sensing
- Attached 2mm below wound bed surface
- Grows back in 48-72 hours
- Why repeated debridement important

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**Bacterial Burden Continuum**

- **Contaminate/Colonization**
  - Wound stalled/not healing.

- **Critically Colonized/Local Infection**
  - Bacteria spread deeply into wound and to surrounding tissues.

- **Deep Infection**
  - Invasion & multiplication of microorganisms in body tissues.
  - Sepsis and death may result if not appropriately recognized & treated.

- **Systemic Infection**
  - Invasion & multiplication of microorganisms in body tissues.
  - Sepsis and death may result if not appropriately recognized & treated.

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**Signs of Critical Colonization**

- Progression towards closure **stalls**
- Granulation tissue
  - Absent or abnormal
  - Color-red/purple
  - Friability
- Odor – subtle or dramatic change
- Increased/high exudate levels in presence of granulation tissue
  - Wounds attempt to “flush out” foreign particles, bacteria
Antimicrobial Stewardship:

<table>
<thead>
<tr>
<th>Contamination</th>
<th>Colonization</th>
<th>Critical Colonization / Localized Infection</th>
<th>Spreading Infection</th>
<th>Systemic Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical antimicrobial dressings are not indicated because bioburden is not causing clinical problems</td>
<td></td>
<td>Topical antimicrobial dressings indicated</td>
<td></td>
<td>Combined systemic antibiotics and topical antimicrobial dressings indicated</td>
</tr>
</tbody>
</table>

Bacteria Housed in Biofilm Difficult to Kill

- Bacteria live comfortably in dormant or semi-dormant state within biofilm
  - Antibiotics cannot penetrate biofilm
  - Antibiotics not effective again bacteria in dormant/semi-dormant state
  - After antibiotic use, where some bacteria may be killed on periphery of biofilm, dormant bacteria begin to proliferate more aggressively to rebuild and grow bacteria community
Infection Definition

- Invasion by and multiplication of pathogenic microorganisms in a bodily part or tissue, which may produce subsequent tissue injury and progress to overt disease through a variety of cellular or toxic mechanisms

Types of Infection Disease

- Most infections caused by one of four types of organisms
- **Bacteria** – single-celled organisms that reproduce themselves, by themselves.
- **Virus** – microorganisms that cannot reproduce themselves; they take over the cells they infect in order to reproduce and spread.
- **Fungi** – look like plants, but live off of animals, people and plants (examples are mushrooms and yeast).
- **Protozoa** – small parasites that live in the water and live off of other organisms, such as humans (examples include malaria and giardia).

Infected Wounds

- Superficial pseudomonas infection
- Deeply infected diabetic foot

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Cellulitis

- Common, potentially serious bacterial skin infection
- Dermis and subcutaneous tissues affected
- S&S erythema, edema, pain
- More commonly seen on feet and hands; can occur anywhere on body
- Most often has a pre-existing lesion or ulcer
- Break in the skin barrier and a portal of entry for infection

Cellulitis-Bacterial Load Diving Deep and Spreading Out into Soft Tissues
What to Do?

1. Stalled wound with excessive MMPs - treat persistent inflammation
2. Superficial local wound infection-topical antiseptics
3. Deep local wound infection – topical antiseptics, systemic antibiotics
4. Systemic infection-systemic antibiotics and local antiseptics

NOTE: Continue debridement and excellent local wound care

NERDS and STONEES acronym may be helpful
Not Introducing Additional Microbes From Outside Environment

- Clean work area
- Clean hands before and after each task during dressing changes
- Clean/sterile gloves
- Sterile instruments
- Appropriate handling and disposal of soiled dressings, instruments, supplies
- Appropriate isolation technique when highly infectious organism identified (PPE, private rooms, visitation control with education for family regarding isolation rules)

Effect of Wiping Only on Total and Biofilm Bacteria

Greg Schultz
NPUAP.org
Biofilm Webinar
Free
Larval Debridement Therapy

![Graph showing CFU/5mm biopsy comparison with treatment](image)

**Greg Schultz**
NPUAP.org
Biofilm Webinar
Free

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**Question:** What effects do microbicidal wound dressings have on mature biofilms grown on pig skin explants?

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**Answer:** Most microbicidal wound dressings can reduce mature biofilms by 1-log (90%) to 2-logs (99%) except cadexomer iodine dressing that eliminated 7-logs (99.99999%) of biofilm bacteria

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**Greg Schultz**
NPUAP.org
Biofilm Webinar
Free
How Quickly Can Planktonic Bacterial Reform Protective Biofilms After Wound Debridement?

3 days

Greg Schultz
NPUAP.org
Biofilm Webinar
Free

ASSESSMENT OF BACTERIAL BURDEN
Antibiotics

- Antibiotics or antibacterials - type of antimicrobial used against bacteria for bacterial infections
- Potential for resistance
- Overgrowth of non-target bacteria
- **Cultures and tissue biopsy** help identify which bacteria growing to target specifically with antibiotics
- Must be used with deep tissue and systemic infections
- Topical versions available for local superficial infections

Nerds and Stones Mnemonic for treatment of bacterial burden

NERDS (3 or more, treat topically)
- Nonhealing wounds
- Exudative wounds
- Red and bleeding wound surface granulation tissue
- Debris (yellow or black necrotic tissue) on the wound surface
- Smell or unpleasant odor from wound

STONEES (3 or more, treat systemically)
- Size is bigger
- Temperature of 3°F or more versus mirror image
- Os (probe to or exposed bone)
- New or satellite areas of breakdown
- Exudate, erythema, edema increased
- Smell increased

Infection: Clinical Picture

- Swelling
- Induration
- Erythema >3cm beyond wound edge
- Warmth
- Pain
- Odor

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Methods of Wound Culture

- Biopsy
- Levine’s Swab
  Culture Technique

Lab assessing culture growth
Quantitative Tissue Biopsy

- Historically “gold standard” - at least best practice
- Painful (may need anesthetic)
- Skill Intensive
  - Unavailable in many settings
- Used more in research than clinical practice
- Greater than $10^5$ (100,000) colony-forming units (CFU) per gram of tissue considered to be infected

3 mm Punch Specimen

Know the lab’s preference/requirements for transport of specimen
Improve Swab Technique

- Thoroughly cleanse wound surface with non-preserved saline/cleanser
- Do not cleanse with antimicrobial wash
- Don’t swab:
  - Through dressing residue
  - Old exudate
  - Necrotic tissue
  - Blood
- i.e. SWAB VIABLE TISSUE ONLY!!
- Don’t bother with dry surfaces
- Place in carrier, transport ASAP

Do NOT swab this stump in this uncleansed condition!!

Levine’s Technique

- Surface swab of a one cm$^2$ area of healthy tissue in the wound
- Press & roll swab into wound bed to obtain culture fluid
- Cultures and biopsies tell which drugs to use for which bacteria

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Location, Location, Location….

Swab viable, clean tissue ONLY

Swab here after thorough cleansing

Photo Courtesy: Dot Weir, RN, CWON

Repeated Sharp/Surgical/Mechanical Debridement

- Very few products penetrate biofilms
- Critically important to perform adequate debridement to remove necrotic tissue and biofilm
- Necrotic tissue feeds bacteria and contributes to biofilm formation
- Sharp/surgical debridement removes biofilm
- Have 3-day window to treat with antimicrobials before biofilm reforms
**Question:** Can you see biofilms on the surface of wound beds?

**Answer:** YES or NO

Best answer is that some biofilm may be visible on the surface of a wound bed, but much of the biofilm is deeper in the wound bed and is very inflammatory!

**Treating Chronic Wounds with Infections**

It’s ALL about the biofilm!!!
Mechanically Removing the Biofilm

- Debridement-sharp/surgical-BEST (not readily available in all care settings)
- Low frequency non-contact ultrasound-Q 3 days-BEST-penetrates biofilm
- Low frequency contact ultrasound-BEST-(not available in all care settings)
- Wipe daily + surfactant (surfactant + antibiotic)-GOOD – not readily available in LTC
- Maggot debridement therapy - BEST
- Autolytic-Poor- particularly in older population
- Enzymatic-Poor for removing biofilm-excellent for removing slough

Ladder of Debridement by Skill Set/Credentials/Invasiveness

- Surgical-scalpel, hydrotherapy
- Sharp-scalpel, curette, scissors
- Ultrasound-contact
- Mechanical-wound scrubbing, pulsed lavage/irrigation
- Biologic-maggots
- Enzymatic

Attribution: Dr. Lisa Gould

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How to Treat Local Infections and Biofilms

- Potential Treatment Interventions
  - Vashe wound wash-good
  - Cadexomer iodine-best
  - Contact Low Frequency Ultrasound-best
  - Non-contact low frequency ultrasound-best with iodine solution
  - Pulsed Lavage with antimicrobial solution-good
  - Sharp debridement-best
  - Wound scrubbing-good
  - Negative pressure with antimicrobial instillation-good
  - Maggots-best

Adapted from Greg Schultz’s-NPUAP Biofilm Webinar NPUAP.org

Antibiotic Use

- General overuse of antibiotics has created super bugs which have mutated causing common antibiotics to become ineffective
- Growth of resistant strains (MRSA, VRE)
- Morbidity associated with overuse of antibiotics
Topical Antimicrobials

- Include both antiseptics and antibiotics
  - Antibiotics should be used with caution
  - Culture/biopsy for specificity for growing organisms whenever possible
- In the absence of advancing cellulitis, bacteremia fever or pain, **topical treatment** may provide best first-line therapy

Antimicrobial Sodium Hypochlorite

- Solution
- Hydrogel
- Effective against antibiotic resistant strains CRE, MRSA & VRE, fungicidal, virucidal and sporicidal properties
- Not the same as Dakin’s solution
- Dakin’s cytotoxic to wound healing cells
Dakin’s Does NOT Penetrate Biofilm

- 60 minutes of exposure to Dakin’s solution-bleach and water
- Many bacteria in this biofilm were dying (green cells)
- Many cells in the interior of the biofilm were still alive (orange cells)
- Costerton, SciAm, 2001

Cadexomer Iodine

- Cadexomer starch as a carrier of 0.9% iodine
- 1 gram absorbs up to 6 ml of fluid
- Slow release of iodine during uptake of fluid
- No evidence of resistance
- **Penetrates biofilm–eliminates/kills 99.9999% of biofilm bacteria**
- Active against MRSA, S. aureus, P. aeruginosa, and other relevant pathogens
- Changed every 1-3 days

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Silver

Antimicrobial Action of Ag+

- Broad spectrum of antimicrobial action
  - Gram Positives
  - Gram Negatives
  - Aerobes / Anaerobes
- Ag+ can kill antibiotic-resistant bacteria
  - MRSA, VRE
- Effective against fungi
- Anti-inflammatory
  - Loss of rubor/redness
Medical Grade Honey

- Specific plants from New Zealand, Australia
- From Manuka plant – Tea Tree
- Studies show honey from New Zealand and Australia most effective in penetrating biofilms
- Grocery store honey ineffective...more like using high fructose corn syrup


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CMS Infection Control Pilot

Wound Management Tracer

Important you use this document to help you get ready for survey around wounds in 2018.

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Wound Management Tracer-Surveyor Checklist-1

- Hand hygiene is performed before a wound procedure.
- Gloves are worn during the dressing procedure.
- A gown is worn if healthcare personnel contamination is anticipated during the dressing procedure (e.g., excessively draining wounds).
- Reusable dressing care equipment (e.g., bandage scissors) must be cleaned and reprocessed (i.e., disinfected or sterilized according to manufacturer’s instructions) if shared between residents.
- Refer to current CDC guidelines

Wound Management Tracer-Surveyor Checklist-2

- Clean wound dressing supplies are handled in a way to prevent cross contamination between residents (e.g., wound care supply cart remains outside of resident care areas; unused supplies are discarded or remain dedicated to resident).
- Dressing change conducted per physician/practitioner orders.
- Multi-dose wound care medications (e.g., ointments, creams) should be dedicated to one resident whenever possible.
- **NOTE:** If multi-dose wound care medications (e.g., ointments, creams) are used for more than one resident, then the medications should be stored in a central medication area and should not enter the resident treatment area. For example, a small *aliquot* of medication should be dispensed into a clean container for single-resident use.
Wound Management Tracer-Surveyor Checklist-3

- Wound care documentation in resident’s medical record reflects the condition of the wound and includes the following:
  a. Type of dressing
  b. Frequency of dressing change
  c. Wound description (e.g., measurement, characteristics)

NOTE: F314 has many more parameters listed for complete wound care documentation. Take your guidance from F314.

Summary

- It’s all about the biofilms
- Present in >80% chronic wounds
- Impair healing
- Stimulate ongoing chronic inflammation causing elevated levels of MMPs that degrade proteins and cells receptors essential for healing
- Complex communities of microbes encased in self-produced polysaccharide matrix with high tolerance of innate antibodies, antibiotics, and antiseptics
- Topical dressings reduce biofilm except sustained release cadexomer iodine dressings penetrates and kills biofilm
References


References

- NPUAP.org
  - Battling Biofilms: Winning the War Against Pressure Injuries
  - November 17, 2016
  - Presenter: Gregory Schultz, PhD
DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland  21244-1850

Center for Clinical Standards and Quality/Survey & Certification Group

DATE:    November 18, 2016
TO:      State Survey Agency Directors
FROM:    Director
          Survey and Certification Group
SUBJECT:  Infection Control Pilot: 2017 Update

Ref: S&C 17-09-ALL
Antibiotic Stewardship Program Supports Goals mandated in the Final Rule: Content includes antibiotic use protocols and a system to monitor and track antibiotic use.

https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
Literature and Tools on the CDC Website

- [https://www.cdc.gov/longtermcare/prevention/](https://www.cdc.gov/longtermcare/prevention/)
- Core Elements
- Checklist of Core Elements
- Leading Antibiotic Stewardship in Nursing Homes [PDF - 379 KB]
- Creating A Culture to Improve Antibiotic Use in Nursing Homes [PDF - 331 KB]
- Infection Prevention in Aging: Resources

These infection prevention and control resources were created for a patient-centered research study in nursing homes.

- A Targeted Infection Prevention (TIP) Intervention in nursing home residents with indwelling devices; a randomized clinical trial.
- AHRQ's Nursing Home Antibiotic Stewardship Tools and Guide Project

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Resources

- Advancing Excellence infection control toolkit: https://www.nhqualitycampaign.org/goalDetail.aspx?g=inf
- Centers for Disease Control (CDC) toolkit for long-term care facilities: http://www.cdc.gov/longtermcare/index.html
- Centers for Disease Control (CDC) Core Elements of Antibiotic Stewardship for Nursing Homes http://www.cdc.gov/longtermcare/prevention/antibioticstewardship.html

Federal Initiatives for Antibiotic Resistance

- White House Forum on Antibiotic Stewardship
- National Action Plan for Combating Antibiotic-Resistant Bacteria
- Executive Order - Combating Antibiotic-Resistant Bacteria
- National Strategy to Combat Antibiotic-Resistant Bacteria
- PCAST Report on Combating Antimicrobial Resistance
Action / Next Steps

What will you do with this info in your building/company?

What is one action you can do in one week?

Thank you!!!