



Objectives

- Identify potential causes of HAI's in the long-term care setting.
- Discuss financial & psychosocial costs associated with HAI's

Definitions

- HAI- healthcare associated infections
- CLABSI-central line-associated bloodstream infection
- CAUTI-catheter-associated urinary tract infection
- VAP-ventilator-associated pneumonia
- MRSA-methicillin-resistant Staphylococcus Aureus
- C. Diff-Clostridium difficile

- GAS-Group A Streptococcus
- VRE-Vancomycin-resistant Enterococci
- VRS-Vancomycin-resistant Staphylococcus
- SHEA-The Society for Healthcare Epidemiology of America
- CDC-Centers for Disease Control & Prevention
- CMS-Centers for Medicare & Medicaid
- QAPI-Quality Assurance/Performance Improvement

Statistics



- 1.5 million Americans live in LTC
- 765,000-2.8 million infections/year in LTC
- 380,00 deaths/year related to HAI's
- HAI cost- \$45 BILLION(!!) in preventable costs

- Antimicrobials account for ~40% of meds in LTC
 - Of which, 25-75% may be inappropriate
- 50-70% of LTC residents are likely to be on at least 1 antimicrobial during a one-year period



Trends

- 44% decrease in CLABSI (2008-2012)
- 4% decrease in MRSA (2008-2012)
- 2% decrease in C.diff (2011-2012)
- 3% INCREASE in CAUTI (2009-2012)**

Magill, SS et al. New England Journal of Med, 2014;370:1198-208

Why More in LTC?

- Limited physiologic reserves
- Decreased/suppressed immune systems
- Chronic illnesses, organ decline
- Poor nutrition/hydration
- Loss of mobility
- Vague or atypical S/S infection

Common Organisms in LTCF's

- Acinetobacter
- Burkholderia cepacia
- Clostridium difficile
- Clostridium sordellii
- Klebsiella
- Hepatitis
- E. Coli
- HIV
- Influenza
- Mycobacterium
- Norovirus
- Pseudomonas aeruginosa
- Staphylococcus aureus

Drug-Resistant Bacteria

- MRSA
- VRE
- VRS
- Carbapenem-resistant Enterobacteriaceae
- Fluoroquinolone-resistant gram negative bacilli
- GAS

Antibiotic use in LTC

- Patients are treated longer compared to those in the community
- Poly-pharmacy is very common, but less likely to benefit LTC pt.
- Increase in MRSA, VRE, & Fluoroquinolone-resistant gram negative bacilli

Types of HAI

- CLABSI
- UTI/CAUTI
- VAP & LRI
- Skin & Wound Infections
- Influenza
- C. Diff



CLABSI

Central Line Associated Blood Stream Infections

- More than 250,000/year
- 24% of non-ICU patients



Who has a Central Line?

- Hemodialysis
- Chemotherapy
- GI disorders
- Pulmonary hypertension
- Osteomyelitis

Pathogenesis of CLABSI

- Healthcare personnel hand contamination
- Hub contamination
- Contaminated insertion site
- Extraluminal contamination
- Contaminated infusate (least likely)

Healthcare Provider Issues

- Poor hand hygiene
- Appropriate skin antiseptic
- Maintain sterility
- Non- compliance with maintenance practices
- Leaving CL's in after therapy is finished

Prevention of CLABSI

- Remove CL as soon as possible
- Proper insertion/maintenance techniques
- Hand hygiene
- Adequate hub cleansing
- Pt. education

QAPI

- Measure adherence to:
 - Hand hygiene
 - Proper Universal/standard precautions
 - Proper maintenance
 - Number of CL, location (site)
 - Number of lumens

Associated Costs

- PICC insertion- \$485 + mileage
- Midline insertion- \$385 + mileage
- Dressing change kit- \$6.36 each
- Zyvox (treats MRSA)- \$3285.15/10 days

UTI/CAUTI

- Urinary Tract Infection
- Catheter-associated UTI
 - Indwelling only



Prevalence

- >30% of HAI's
- >560,000 UTI/CAUTI annually
- \$0.4-0.5 Billion additional cost annually
- Women > men
- 5-year target= 25% decrease

UTI vs.

ASB

- Prolonged catheterization
- Female
- Older age
- Impaired immunity
- Disconnection of drainage system
- Professional competency
- Incontinence
- Chronic illnesses

When Are Catheters Appropriate?

- Acute urinary retention or obstruction
- Need for accurate measurement of output
- Perioperative in certain circumstances
- Assist in healing of sacral or perineal wounds in incontinent patients
- Prolonged immobilization
- End of life comfort care

Pathogenesis of CAUTI

- Extraluminal
 - Insertion technique
 - Handwashing
- Intraluminal
 - Break in closed drainage system
 - Contamination of collection bag

Prevention of UTI/CAUTI

- Appropriate use
- Remove ASAP
- Hand hygiene
- Securement devices
- Obtain urine sample aseptically
- No kinks in tubing
- Keep bag lower than bladder
- Empty regularly
- Alternatives to indwelling catheters

QAPI

- Measure adherence to:
 - Hand hygiene
 - Documentation
 - Peri-care
 - Insertion/removal competencies
 - Appropriate diagnosis

Associated costs

- Sulfatrim (Bactrim)- \$ 13.68/10 days
- Nitrofurantoin- \$50.37/10 days
- Indwelling catheter- \$1.30 each
- Drainage bag- \$4.16 each
- Insertion kit- \$2.71 each

VAP & LRI

- Ventilator associated pneumonia
- Lower Respiratory Infections (pneumonia)



Statistics

- The case-fatality rate of pneumonia in NH residents is 6% to 23%
- Bacterial > viral
- VAP-Late onset pneumonia
 - Chronic vents
 - Higher incidence of MDRO's

Pathogenesis

- Aspiration
- Colonization of pharynx
- Chronic illnesses
- Possible contamination from the stomach
- Poor oral hygiene

Prevention

- Hand hygiene
- Secretion management
- Aspiration prevention
- Oral hygiene
- Aseptic equipment
- Use non-invasive ventilation when possible

QAPI

- Monitor adherence to:
 - Hand hygiene
 - Proper positioning
 - Regular oral care
 - Trach care/suctioning competencies
 - Ventilator competencies

Associated Costs

- Ipratropium/albuterol neb- \$58.46/75ml
- Masks- \$2.13/box
- Piperacillin-Tazobactam (Zosyn)-\$766.60/10 days
- Ceftriaxone (Rocephin) IM- \$489.00/7 doses plus \$56.28/7 doses for Lidocaine diluent

Skin & Wound Infections

- Surgical wounds
- Pressure Ulcers
- Necrotizing Fasciitis
 - “Flesh-eating bacteria”



Pathogenesis

- | | |
|-----------------------------------|-----------------------|
| ◦Endogenous | ◦Exogenous |
| ◦Patient flora | ◦Healthcare personnel |
| ◦Seeding from a distant infection | ◦Physical environment |

Prevention

- Hand hygiene
- If surgical wound-keep primary dressing intact for 24-48 hours
- Control blood sugar
- Proper identification of at-risk patients
- Proper positioning
- Accurate & frequent wound assessments

QAPI

- Monitor for adherence to:
 - Hand hygiene
 - Peri-care
 - Positioning
 - Wound assessment & dressing change competencies

Associated Costs

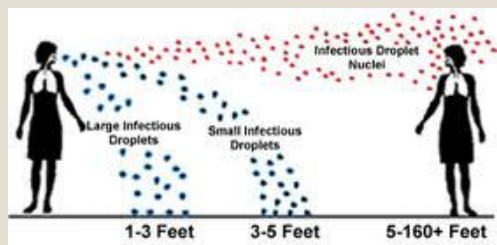
- Polymem Silver (non-bordered) 4x4- \$16.50 each
- Biatain Silver 4x4- \$17.04 each
- Aquacel Ag 4x5- \$17.14 each
- Medihoney 2x2- \$8.89 each
- Medihoney gel- \$18.60/1.5 oz tube
- SeaClenz wound cleaner- \$4.96 each
- Santyl- \$74.10/25 gm tube

Influenza

- 8th leading cause of death in the US
- 90% of these are over age 65



Pathogenesis



Prevention

- Administration of influenza vaccine
- Implementation of respiratory hygiene & cough etiquette
- Appropriate management of ill HCP
- Adherence to infection control precautions for all patient-care activities and aerosol-generating procedures
- Implementing environmental and engineering infection control measures.

QAPI

- Monitor for adherence to:
 - Hand hygiene
 - Positioning
- Influenza vaccine rates
 - Staff
 - Patients

Associated Costs

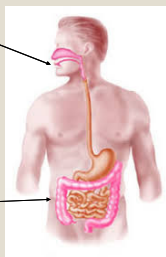
- Tamiflu (post-exposure) - \$119.21/10
- Masks - \$2.13/box

Clostridium Difficile

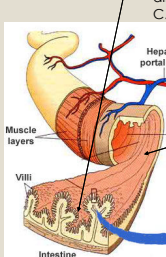
- 50% of all gastroenteritis in LTC
- Historically uncommon – epidemic since 2000
- More resistant to fluoroquinolones
- More virulent

Pathogenesis

1. Ingestion of spores transmitted from other patients via the hands of healthcare personnel and environment



2. Germination into growing (vegetative) form



3. Altered lower intestine flora (due to antimicrobial use) allows proliferation of *C. difficile* in colon

4. Toxin A & B Production leads to colon damage +/- pseudomembrane

Prevention

- Implement an antimicrobial stewardship program
- Contact Precautions for duration of diarrhea
- Hand hygiene with soap & water
- Cleaning/disinfection of equipment & environment
- Laboratory-based alert system for immediate notification of positive test results
- Educate HCP, housekeeping, administration, patients, families

Spores may be difficult to eradicate even with hand washing!!



Environmental Cleaning

- Bleach can kill spores, whereas other standard disinfectants cannot
- Limited data suggest cleaning with bleach (1:10 dilution prepared fresh daily) reduces C. difficile transmission

QAPI

- Monitor for adherence to:
 - Hand hygiene (soap & water)
 - Antibiotic use
 - Environmental sanitation
 - Contact Isolation/precautions
 - Timeliness of lab reporting

Associated Costs

- Oral Vancomycin- \$200.55/100 ml
- Isolation gowns- \$22.05/case
- Exam gloves- \$85/case

CMS Initiatives

- Nursing Home Compare
- Quality Measures for Long-stay Residents
- Quality Measures for Short-stay Residents

QM for Long-stay Residents

- 1. Falls with injury
- 2. UTI**
- 3. Mod-Severe Pain
- 4. High risk pt. w/pressure ulcer**
- 5. Low risk pt. with incontinence
- 6. Antipsychotic meds

QM, con't

- 7. Indwelling catheter**
- 8. Physical restraints
- 9. Increase in ADL assistance
- 10. Weight loss
- 11. Symptoms of depression
- 12. Annual flu vaccine**
- 13. Pneumococcal vaccine**

QM for Short-stay Residents

- 1. Moderate to Severe Pain
- 2. New/worsening pressure ulcer
- 3. Annual flu vaccine**
- 4. Pneumococcal vaccine**
- 5. Antipsychotic meds

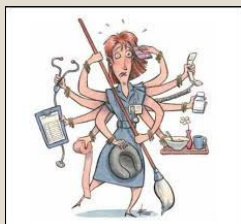
Survey Citations

- F315-Urinary Incontinence
- F334-Influenza & Pneumococcal immunization
- F441-Infection Control program
- F444-Handwashing



Healthcare Professional Costs

- Unnecessary exposures
- More time-consuming treatments
- Less reimbursement for higher cost therapies



Patient & Family Costs

- Pain & Suffering
- Additional medications
- More side effects
- Additional hospitalizations, tests, etc.
- DEATH
- Copays



Available Tools

- CDC
- SHEA
- Policies & Procedures



CDC Guidelines

- Hand Hygiene
- Universal Precautions
- Immunization of Healthcare Workers
- Isolation
- Visit www.cdc.gov

CDC

- Assessment of Appropriateness of
 - Inpatient antibiotics
 - Inpatient antibiotics for resistant gram (+) infections
- Checklist for prevention of CLABSI

INTERACT 3

- Stop and Watch
- Change in condition
- SBAR
- Care Paths
- Medication Reconciliation Worksheet

SHEA

- The Society for Healthcare Epidemiology of America
- Mission -prevent and control healthcare-associated infections and advance the field of healthcare epidemiology.

SHEA Initiatives

- White papers
- Patient education guidelines
- Pocket guidelines

www.shea-online.org

Antibiotic Stewardship

- National initiative
- Focus-improving antibiotic use
 - Right antibiotic
 - Right dose
 - Right time
 - Right duration

References/Resources

- Agency for Healthcare Research and Quality (AHRQ)
- Centers for Disease Control and Prevention (CDC)
- Division of Healthcare Quality Promotion (DHQP)
- Epi Info
- National Prevention Information Network (NPIN)
- National Institute of Allergy and Infectious Diseases (NIAID)
- National Library of Medicine's PubMed (Medline Searches)
- Occupational Safety and Health Administration (OSHA)

Organizations

- | | |
|--|---|
| ◦ American Society for Microbiology (ASM) | ◦ International Federation of Infection Control (IFIC) |
| ◦ American Society for Quality (ASQ) | ◦ The Joint Commission |
| ◦ Association for Professionals in Infection Control and Epidemiology (APIC) | ◦ Maryland Hospital Association Quality Indicator Project |
| ◦ Association of State and Territorial Health Officials (ASTHO) | ◦ National Association for Healthcare Quality (NAHQ) |
| ◦ Council of State and Territorial Epidemiologists (CSTE) | ◦ National Committee for Quality Assurance (NCQA) |
| ◦ Hospital Infection Society (HIS), UK | ◦ National Foundation for Infectious Diseases (NFID) |
| ◦ Infectious Diseases Society of America (IDSA) | ◦ Trust for America's Health (TFAH) |
| ◦ Institute for Healthcare Quality Improvement (IHI) | ◦ World Health Organization (WHO) |

www.cdc.gov
www.cms.gov
