Nosocomial Infections

7/25/18 Noon Conference
Dan Van Aartsen
PGY3 Internal Medicine
Learning Objectives

• Define Nosocomial Infections
• Identify common hospital acquired infections
• Know the common causes and understand basic pathophysiology of nosocomial infections
• Learn the fundamentals of prevention of hospital acquired infections and basic management
Definition – Nosocomial Infections
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• “Nosocomial”– from the Greek
  • nóstos (disease, illness) + koméō (“to take care of”) (nosokomeión = “hospital”)
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• Definition??

Engraving by Peter Paul Rubens, 1638. Taken from https://en.wikipedia.org/wiki/Hippocrates
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  - This can be important! Some treatment guidelines are based on community-acquired vs. hospital acquired
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• Definition?? Not universally agreed upon
  • “An infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission.” (WHO)
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  • Frequently used synonymously with hospital-acquired infections

• Definition?? Not universally agreed upon
  • “…This includes infections acquired in the hospital, but appearing after discharge, and also occupational infections among staff of the facility.”
First, A Little Bit of Background…

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• Three landmark events ignited the field of infection control…
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  - “Health care in the United States is not as safe as it should be--and can be. At least 44,000 people, and perhaps as many as 98,000 people, die in hospitals each year as a result of medical errors that could have been prevented”
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  • Focused on preventable medical errors of all types, but popularized the concept of *preventable* hospital-acquired infections
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  • “Deaths linked to hospital germs represent the fourth leading cause of mortality among Americans, behind heart disease, cancer and strokes, according to the federal Centers for Disease Control and Prevention. These infections kill more people each year than car accidents, fires and drowning combined.”

7/25/2018
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  • Brought mainstream attention to HAI and forced action within the health care community
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  - Paradigm shift from infection control to infection prevention
Healthcare-Associated Infections
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• The most commonly seen healthcare-associated infections?
Healthcare-Associated Infections

• Catheter-Associated Urinary Tract Infections
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• Central Line-Associated Bloodstream Infections
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• Central Line-Associated Bloodstream Infections
• Hospital-Acquired Pneumonia
• Ventilator-Associated Pneumonia
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• Surgical Site Infections
Healthcare-Associated Infections

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- Central Line-Associated Bloodstream Infections
- Hospital-Acquired Pneumonia
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- *Clostridium difficile*
- Surgical Site Infections
- Others: Surgical site infections, hospital-acquired hepatitis, herpesvirus, transfusion- and transplant-related infections, etc.
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HAI

- CAUTI
- CLABSI
- HAP/HCAP
- VAP
- SSI
- Cdiff
HAI

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- VAP
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CAUTI
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  • Look for signs/symptoms of a typical UTI, eg fever, dysuria, flank pain, leukocytosis to differentiate
    • And don’t check unless there’s symptoms
CAUTI - Prevention
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• REDUCE UNNECESSARY CATHETERIZATION
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  • ONLY place catheters when they are indicated (not urinary incontinence)
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  • Consider alternatives to indwelling catheters, (eg condom catheter, intermittent catheterization, suprapubic catheterization)
CAUTI - Management
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• Antibiotics – take into account risk factors for resistance
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  • Prior urine cultures
  • Prior antibiotic use
  • Health care exposure
  • Prevalence of resistance
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  • Prevalence of resistance

• No great evidence for duration of antibiotics; 7-14 days is considered appropriate depending on severity
  • Typically can be PO if tolerated
CLABSI

Non-Tunneled Central Venous Access Device

CLABSI

• “CLABSI” only includes central lines, but infections can be also be associated with peripheral IVs
  • tunneled lines, PICCs, ports, etc
• Suspect when bloodstream infection occurs with no other apparent source
• **Staph aureus**, CONS, *Candida* bacteremia in the absence of other sources should raise suspicion
  • Increasingly multi-drug resistant gram negative bacteria
CLABSI – Prevention

- Many “Bundles” have been shown to reduce CLABSI rates
  - Standardized procedures, checklists, educational training, maximal sterile barriers
- MICU initiative to reduce CLABSI
- (remove lines when they’re not needed!!)
CLABSI - Management

• Remove the line!
  • Possible exceptions include CONS, +/- enterococcus and GNBs if stable
• Obtain catheter cultures (but only if infection is suspected)
• Also get peripheral cultures
• If CONS grow – keep checking
• Antibiotics
  • Vancomycin (high MRSA rates)
  • Empiric Gram negative coverage IF critically ill, neutropenic, femoral catheter, or known GN infection
    • Tailor to patient and local susceptibilities (here - Zosyn)
  • Also cover *Candida* species if femoral line is suspected source
HCAP/HAP/Nosocomial PNA, VAP
HAP/VAP

- HAP = pneumonia that occurs ≥48 hours after admission
- VAP = pneumonia that occurs ≥48 hours after intubation
- Suspect in patients with new infiltrates, increasing O2 or ventilator requirements, fevers, chills, etc
- MRSA, *Pseudomonas*, *Acinetobacter*, *Klebsiella*
- Resistance is common
  - Risk factors for MDR organisms: recent antibiotics, prolonged hospitalization, poor functional status, hemodialysis, severe illness
HAP/VAP - Management

• Establish microbiologic diagnosis!
  • Blood and respiratory cultures indicated in all patients
  • Consider Pneumococcal and *Legionella* urine ag testing
  • Viruses can account for up to 1/3 of severe pneumonia – even hospital acquired
  • Deep respiratory cultures may be necessary

• Antibiotics
  • Depends MRSA and MDR risk factors – empiric coverage may entail simple broad spectrum respiratory fluorquinoline up to double antipseudomonal + MRSA coverage
Prevention of HAI

• “Standard Precautions”
  • HAND HYGIENE HAND HYGIENE HAND HYGIENE
    • Gloves when touching blood, body fluids, secretions, etc,
    • Injection safely

• Sterile technique
• Avoid unnecessary medical devices
• Remove unneeded medical devices
• Isolation Precautions
Isolation

• Who, why, when, how??
Isolation

• Who, why, when, how??

• 7 types of transmission based precautions at UH:
  • Contact
  • Contact plus
  • Airborne
  • Droplet
  • Protective
  • Special Alert Precautions
  • Special precautions: Droplet/Contact (peds only)
  • Combos of above
Isolation

- Contact
  - Gown/gloves
  - MRSA
  - Highly resistant organisms
  - HSV, disseminated or severe
  - Major wounds not contained by dressing
  - Others, eg head lice, viral conjunctivitis, etc
Isolation

• Contact
• Contact plus
  • Gown/gloves + hand-washing
  • C diff
  • (also norovirus, cryptosporidium)

STOP Contact Plus Precautions STOP

WASH OR SANITIZE HANDS TO ENTER
MUST WASH HANDS WITH SOAP AND WATER TO EXIT:
EVERYONE MUST WEAR GOWN & GLOVES TO ENTER:
FOR PATIENT TO LEAVE ROOM:
  • Check with nurse
Isolation

- Contact
- Contact plus
- Airborne
  - N-95 Respirator
  - TB, Avian flu, others

Airborne Precautions

- Keep Door(s) Closed
- Negative Pressure Room

DO NOT ENTER
BEFORE CHECKING WITH NURSE

WASH OR SANITIZE HANDS TO ENTER AND EXIT ROOM:

To ENTER this room Health Care Staff MUST wear:
- Visitors: MUST wear surgical mask when in patient’s room

FOR PATIENT TO LEAVE ROOM:
- Must wear surgical mask
- Cover rash if present

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Isolation

• Contact
• Contact plus
• Airborne
• Droplet
  • Mask
  • Influenza, H flu, bacterial meningitis

Droplet Precautions

WASH OR SANITIZE HANDS TO ENTER AND EXIT ROOM:

EVERYONE MUST WEAR MASK TO ENTER:

FOR PATIENT TO LEAVE ROOM:
• Must wear mask
Isolation

• Contact
• Contact plus
• Airborne
• Droplet
• Protective
  • For neutropenic patients
  • Mask – only if respiratory symptoms
  • For patient protection, not prevention of transmission
Isolation

• Contact
• Contact plus
• Airborne
• Droplet
• Protective

• Special Alert Precautions
  • Localized zoster shingles in an immunocompetent patient
  • Only providers with immunity can care for patient
Isolation

• Contact
• Contact plus
• Airborne
• Droplet
• Protective
• Special Alert Precautions
• Special precautions: Droplet/Contact (peds only)
Isolation

- Contact
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- Protective
- Special Alert Precautions
- Special precautions: Droplet/Contact (peds only)
- Many combos of above
Isolation

• Questions on Isolation? See UH Isolation policies (on intranet)

<table>
<thead>
<tr>
<th>Viral Hemorrhagic Fevers (due to Lassa, Ebola, Marburg, Crimean-Congo fever viruses)</th>
<th>Contact and Airborne</th>
<th>Airborne Isolation requires negative pressure; HCW must wear N-95 respirator. Single patient room. Appropriate waste handling. Largest viral load in final stages of illness when hemorrhage may occur; additional PPE, including double gloves, leg and shoe covers may be used. Face and eye protection required. See <a href="http://www.cdc.gov">www.cdc.gov</a> for most current recommendations. Use “High Alert Precautions” sign (brown)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRE (Vancomycin Resistant Enterococcus); NOT labelled as highly resistant. See also MDRO.</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>Viral Respiratory Diseases (Adult)</td>
<td>Standard</td>
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<tr>
<td>West Nile – See Arthropodborne viral encephalides</td>
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<tr>
<td>Whooping cough – See Pertussis</td>
<td></td>
<td></td>
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<tr>
<td>Wound infections</td>
<td>Contact</td>
<td>Duration of illness</td>
</tr>
<tr>
<td>Major – no dressing or not contained by dressing</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>Minor – contained by dressing</td>
<td></td>
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<tr>
<td>Yersinia – See Gastroenteritis</td>
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<tr>
<td>Zika</td>
<td>Standard</td>
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<tr>
<td>Zygomycosis (phycomycosis, mucormycosis)</td>
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