The Jigsaw Puzzle of CDI & ASP

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The presenters do not have (nor does any immediate family member have) actual or potential conflict of interest, within the last twelve months; a vested interest in or affiliation with any corporate organization offering financial support or grant monies for this continuing education activity; or any affiliation with an organization whose philosophy could potentially bias their presentation.
Healthcare Facility Profile

- Joint Township District Memorial Hospital, part of the Grand Lake Health System
- DNV Accreditation / ISO Certification
- Rural community hospital; full-service comprehensive healthcare
  - ED - 11 beds
  - Med/Surg - 32 beds
  - ICU - 6 beds
  - Obstetrics - 9 beds
  - Newborn Care - 10 beds
  - Transitional Care - 15 beds
  - Inpatient Rehab - 4 beds
  - Geriatric Psych Unit
  - By the end of 2017
GLHS Local Drivers
Boarder Approach to Solving the Puzzle

* Development of Infection Control Committee
  * DNV regulatory OFIs
* Hospital Engagement Network (HEN)
  * CDI and ASP initiatives
* Hospital Improvement Innovation Networks (HIIN)
Objectives – CDI Prevention

- Review the epidemiology & impact of Clostridium difficile infection (CDI).
- Discuss assessment of infection prevention strategies to reduce the incidence of healthcare-associated CDI.
- Identify process measures impacting CDI in the hospital setting & special approaches implemented to advance basic practice.
**Clostridium difficile** Background

- *C. difficile*, a Gram-positive, spore-forming anaerobic organism, causes disease by producing two toxins.
  - A third binary toxin (BI/NAP1/027) - epidemic strain.
- Spore producer – spores survive on environmental surfaces for months.
- Spread by transfer directly from the contaminated environment to the patient or by transfer on the hands of HCP.
- Any hospitalized patient can acquire *C. difficile*, but for CDI to occur, must receive antimicrobials to disrupt the normal bacterial flora.

Epidemiology Host Risk Factors

- Advancing Age
- Incidence higher among persons >65 years
- Underlying illness
- Immunosuppression
- Exposure to antibiotics
- Exposure to healthcare facility
- Gastric acid suppression

We know how *C. difficile* spreads...

68 yr. old diagnosed w/pneumonia. Antibiotic Rx – he is now at risk for CDI (for several months)

One Month Later

Hospitalized for a leg fracture. HCP caring for a CDI patient, spreads it with contaminated hands

Two Days Later

Transfer to Rehab Facility. Onset diarrhea; but not tested. HCP infects other patients.

Citation: http://www.cdc.gov/vitalsigns/hai/stoppingcdifficle
Estimated CDI Burden

* 453,000 CDI cases\(^1\)
  * 293,000 healthcare-associated
  * 160,000 Community-associated
  * 94% of CDI cases were related to healthcare

Estimated U.S. Burden of CDI, According to the Location of Stool Collection and Inpatient Health Care Exposure.

CO-HCA: Community onset healthcare-associated
NHO: Nursing home onset
HO: Hospital onset

Inpatient Quality Reporting

CDI Rates – Local Epidemiology

<table>
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<tr>
<th>Year</th>
<th>CDI HO EVENTS</th>
<th>TOTAL CDI PREVALENCE</th>
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<tr>
<td>2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td>SIR 1.071</td>
</tr>
<tr>
<td>2015</td>
<td></td>
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<td>2016</td>
<td></td>
<td>10</td>
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SIR - Standardized Infection Ratio
HO – Healthcare Onset
CDI Prevention Initiative Begins

- Journey up the CDI Prevention Initiative
- HEN 2.0
- Multidisciplinary work group
- OHA CDI Gap Analysis:
  - General infrastructure/processes
  - Antibiotic Stewardship
  - Early recognition/testing
  - Isolation precautions/hand hygiene
  - Environmental cleaning & disinfection
Current State “in pieces”

* Gap analysis captured awareness & perceptions of current practice
* Prioritized core strategies
  * OHA HEN 2.0 CDI Driver Diagram & Change Ideas
* Action plan- focus on key prevention targets:
  * Antimicrobial exposure
  * Acquisition of C. difficile
Strategies to Prevent CDI

Antimicrobial Stewardship

Early detection, isolation, & appropriate testing

Educate patients, visitors, & staff

Transmission Prevention
Implemented special approaches for CDI prevention:

* Actively assess every patient every shift for evidence of clinically-significant diarrhea without identified cause. Nurse-driven protocols.
* Initiate presumptive Contract Precautions PLUS while CDI results are pending.
* If positive result, Contact Precautions PLUS continues for the duration of hospitalization.
* Special circumstances for skilled nursing unit
**Appropriate Testing**

- Rapid diagnostic technology
  - NAAT – PCR test
- Established rules for testing
  - Stool chart Types 6-7
  - Restrictions
- Avoid repeat testing or “test of cure”
- Lab-based alert system
Transmission Prevention

- Contact Precautions PLUS
  - Signage - visual cues
    - Improved Communication
  - Private room
  - Gown & gloves required
  - Bleach clean
  - Soap & water hand hygiene required
  - Dedicated care equipment

- Wear gloves **before** entering this room
- Wear a gown **before** entering this room
- Clean with BLEACH
- **REQUIRED** soap & water wash
- **DO NOT** use hand sanitizer

ALL Visitors: Please **STOP** at the Nurse's Station **BEFORE** entering
Contact Precautions PLUS

Enteric contact precautions PLUS for clinically-significant diarrhea (3 or more within 24-hour time period). Examples: C. diff, Norovirus, Rotavirus.

1. Place patient in a private room
2. Post Contact Precautions PLUS sign
3. Don Gown & Gloves for every encounter
4. Hand washing with soap & water for 15-20 seconds is required. (Alcohol hand rubs are not effective).
5. Patient care equipment dedicated to the room.
6. Alert Housekeeping for additions to routine cleaning & discharge cleaning.
7. Use bleach wipes to clean & disinfect equipment

If the patient MUST leave the room:

- Communicate Contact Precaution PLUS status to receiving unit &/or transport staff
- Place clean gown on the patient
- Instruct patient to wash their hands with soap & water (if not able, provide hand sanitizer).
- Make sure diarrhea is contained
- Place clean linens on cart or wheelchair. If ambulatory, instruct patient not to touch the environment.
- Staff remove PPE & perform hand hygiene before transport. Don clean PPE to handle patient at transport destination.
- After transport/at point of use, bleach wipe all non-dedicated equipment used (wheelchair, monitors, etc.)

Transmission Prevention, cont’d

- Contact Precautions PLUS
- Reverse side
- Quick reference guide
- Patient transport information
- Communication – receiving & transport staff
Transmission Prevention - Hand Hygiene

- Soap & water **required** with known or suspected CDI
- Alcohol-based hand rubs not effective against C. difficile
  - **STOP!**
- Hand hygiene observations (OHA & internal secret shoppers)
- Engage patients & visitors
  - Post discharge survey
Transmission Prevention - Environmental Hygiene

* Adequate environmental hygiene protocols
  * Daily & Terminal
  * Product & Process
* EVS unit specific checklists
* Modified amount of time to terminally clean
* “Patient-Ready Room Sign”
* Methods to evaluate & validate environmental cleaning
  * ATP
  * Fluorescent gel marker
Fitting Pieces Together to Prevent Transmission

**R – I – G – H – T Bundle**

- **Rapidly identify**
- **Isolation – presumptive enteric precautions**
- **Gown & gloves universal**
- **Hand hygiene – soap & water required**
- **Time to use bleach**

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**Implement the R - I - G - H - T Bundle to prevent C. diff**

- **R**apidly recognize & identify clinically-significant diarrhea
  - Assess every patient, every shift for clinically-significant diarrhea (3 or more unformed loose-watery stools within a 24-hour time period). If no known medical reason & C. diff testing is ordered, place in Contact Precautions PLUS.

- **I**solation **Contact Precautions PLUS**
  - When C. diff testing is ordered & if clinically-suspected, patient should be in a private room, post enteric precautions sign & isolation cart outside the room. Place bleach wipes, dedicated equipment (disposable stethoscope, thermometer, blood pressure cuff) in the room. Place an isolation trash can & Dinamap in the room (remove all unnecessary supplies).

- **G**own & Gloves required for every encounter
  - Universal gown & gloves required. Don all PPE outside the isolation room & doff all PPE before exiting the room. Dispose in isolation trash can.

- **H**and hygiene: soap & water required
  - Put **STOP** sign on foam.
  - Strict use of antimicrobial soap & water for at least 15 seconds. Engage patient & visitors as partners in prevention.

- **T**ime to use **BLEACH**: daily & terminal cleaning
  - Alert Housekeeping for special additions to daily cleaning (high touch areas cleaned twice daily with bleach-based cleanser) and terminal bleach clean at discharge or transfer.

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**Contact Precautions PLUS** for entire hospitalization. Physician may discontinue isolation if an effective course of treatment is completed and > 48 hours without clinically-significant diarrhea or other associated symptoms.
Education Piece

- New CDI education module for HCP
- Simulations with nursing/clinical HCP
- Media blitz topic-specific campaign – facility wide
- Added CDC FAQs resource for patients & family

Citation:
Antimicrobial Stewardship

- Early detection, isolation, & appropriate testing
- Educate patients, visitors, & staff
- Transmission Prevention
Objectives - ASP

- Define an antimicrobial stewardship program (ASP) and understand the significance in the healthcare environment
- Identify the core basics of an ASP program and how to apply them in a small to medium sized facility
- Identify key approaches to implementing strategies to improve reduce antibiotic utilization to include potential strategies for deployment in your organization
- Describe a variety of methodologies in which you can evaluate the outcomes associated with ASP initiatives
Antimicrobial Stewardship Program (ASP)

* Acronyms: AMS, AS, ASP
* Definition: The optimal *selection, dose,* and *duration* of an antimicrobial that results in the best clinical outcome for the treatment of infection, with minimal toxicity to the patient and minimal impact on subsequent development of resistance.

Antibiotic Timeline

Antibiotics Timeline

Antibiotic introduced

Penicillin 1943
Tetracycline 1950
Erythromycin 1953
Gentamicin 1967
Imipenem and Ceftazidime 1985

1959 Tetracycline resistant shigella
1962 Methicillin resistant staph
1965 Penicillin resistant pneumococcus
1969 Gentamicin resistant enterococcus
1979 Levofloxacin resistant pneumococcus
1996 Vancomycin resistant enterococcus
1996 Levofloxacin resistant pneumococcus
1996 Linezolid resistant staph
2000 XDR (extensively drug resistant) Tuberculosis
2004 Vancomycin resistant acinetobacter and pseudomonas
2001 Ceftaroline resistant staph
2011 Ceftaroline resistant staph

Antibiotic resistance identified

Data from CDC, 2013. Graphic by Neil Murthy/MEDILL
Core Elements of Hospital Antibiotic Stewardship Programs from the Centers for Disease Control (CDC)
www.cdc.gov/getsmtart/healthcare/pdfs/checklist.pdf

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America
http://cid.oxfordjournals.org/content/early/2016/04/11/cid.ciw118.full.pdf+html

National Quality Forum (NQF) Playbook: A Practical Approach to Antibiotic Stewardship
www.qualityforum.org/Publications/2016/05/Antibiotic_Stewardship_Playbook.aspx
GLHS Local Drivers
Boarder Approach to Solving the Puzzle

- Development of Infection Control Committee
  - DNV regulatory OFIs
- Hospital Engagement Network (HEN)
  - CDI and ASP initiatives
- Hospital Improvement Innovation Networks (HIIN)
* Updated guidelines for developing programs to enhance antimicrobial stewardship published in 2007
* IDSA / SHEA consensus guidelines extensively endorsed
* Primary goal
  * Optimize clinical outcomes while minimizing unintended consequences of antibiotic use
* Secondary goal
  * Reduce healthcare cost without compromising quality of care

National Discussion - ASPs

- President’s Executive Order and National Strategy
- Presidents Council of Advisors on Science and Technology (PCAST) Report to the President
- National Action Plan for Combating Antibiotic-Resistant Bacteria (CARB)
Regulatory Compliance for ASPs

- TJC
  - MM.09.01.01
  - 8 Elements of Performance
- CMS - §482.42(b) and §485.640 for CAH
  - Infection Control CoPs in place
  - CoPs proposed for hospitals “...require a hospital to develop and maintain an ASP as an effective means to improve hospital antibiotic-prescribing practices and curb patient risk...”
- HFAP – Infection Prevention and Control and Antibiotic Stewardship standards
- DNV - Survey designation “MIR” (managing infection risk)
Establish a team to focus on Antimicrobial Stewardship activities, with leadership support, to drive implementation of strategies and track outcomes.
Infection Control Committee (ASP Core Team)

- Infectious Disease (ID) Physician
- Clinical Microbiologist
- Infection Control Professional
- Hospital Epidemiologist
- ID Clinical Pharmacist
- Information Systems Specialist

Others
Considerations:
- Hospital Administrators
- QA/PI
- Key Partners: surgeons, pulmonologist
- Lab / Micro

GLHS Actions / ASP Areas of Focus

Institutional Drivers
* Preauthorization / Restrictions*
* Audit and Feedback (PAF)*
* Antiogram
* Duration requirements / ASO
* Order Set Review (evidence-based)
  * Develop for common conditions (CAP, UTI, SSTI, surgical prophylaxis, sepsis)
* ATIs (AGs; pip/tazo EI)
* Education

Patient Specific Interventions
* IV to PO
* Dose Optimization
  * PCK dosing AGs and vanco
* Dose adjustments / organ dysfunction
* Lab monitoring

*Considered Core Strategies by IDSA/SHEA
Institution Drivers

* Preauthorization / Restrictions: CDI and fidaxomicin (Dificid); IDSA / SHEA guidelines metronidazole / vancomycin / fidaxomicin; ID consult; documented failure on prior agents before fidaxomicin; Cdiff isolate
*Audit and Feedback (PAF): physician quality review committee structure; DUEs
*Antibiogram
  * ASP overlay in C&S reports; ‘hide drugs based on bugs’; led to issues with EMR / patient on abx?
  * AG ATI: pseudomonal resistance (tob preferred)
*Order Set review: duration requirements / ASO: CAP – 5 days, HCAP – 7 days, sepsis – 10 days; evidence-based practice (drugs, dose, route, freq, dur)
*ATIs (AGs; pip / tazo EI)
*Education
Patient Specific Interventions

* IV to PO: conservative medical staff (automatic for H2, PPI, not Abx)
* Dose Optimization: PCK dosing (AGs, Vanco) – recommend vs. automatic
* Dose adjustments / organ dysfunction (renal / hepatic) – recommend vs. automatic
* Lab monitoring: sCr / CrCl, renal list, vanco, tob/gent, C&S reports (sensitivities)
Establish ASP
Abx Cost / CMI APD reduction (25% 2016; 5% 2017)
Carbapenem Cost / CMI APD reduction (5% in 2017)
Vanco trough < 10 @ < 30% overall: RPh quality assessment
PPI purchases - PO vs IV comparison < 70%
Pharmacist interventions: documentation; estimated cost savings based on intervention
C Diff infection rates / adherence to guidelines (MUE in 2017)
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<th></th>
<th>Baseline</th>
<th>2015</th>
<th>1Q 2016</th>
<th>2Q 2016</th>
<th>3Q 2016</th>
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<td>$32,530.34</td>
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<td>Adjusted Patient Days</td>
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<td>3486</td>
<td>3618</td>
<td>3714</td>
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<tr>
<td>Abx / CMI APD</td>
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<td>$9.35</td>
<td>$7.58</td>
<td>$5.64</td>
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<tr>
<td>% Decrease from Baseline</td>
<td>15.4%</td>
<td>-4.4%</td>
<td>-40.2%</td>
<td>-66.1%</td>
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<td></td>
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<tr>
<td>% Decrease from Previous Quarter</td>
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<td>-23.4%</td>
<td>-34.2%</td>
<td>-17.8%</td>
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<tr>
<td>% Vanco Troughs &lt; 10</td>
<td>58%</td>
<td>36%</td>
<td>14%</td>
<td>18%</td>
<td></td>
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<tr>
<td>% PPI Purchases PO vs IV</td>
<td>66%</td>
<td>72%</td>
<td>68%</td>
<td>52%</td>
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Future / Forward Looking Goals
2017 and Beyond

- Package ‘Nuts and Bolts’ of ASP / Centralize
- IV-PO: Antimicrobials
- QA/PI: DOT / DDD
- Indications for Use on Abxs
- PCN Allergy Testing
- Review of MRSA agents, high risk for CDI
Antimicrobial Stewardship Program Contents

* Mission / Vision / Goals
* Procedures
* Team Members
* Antibiogram
* Outcomes
* Education
* References
Other AS Resources

- CDC Get Smart for Healthcare is a CDC campaign focused on improving prescribing practices in inpatient healthcare facilities. [www.cdc.gov/getsmart/healthcare/index.html](http://www.cdc.gov/getsmart/healthcare/index.html)

- CDC Overview and Evidence to Support Stewardship [www.cdc.gov/getsmart/healthcare/evidence.html](http://www.cdc.gov/getsmart/healthcare/evidence.html)

- Training Programs
Q & A / Discussion

* Questions?
* Comments?
* Shared Learning Opportunities?