Accelerating Prevention: Targeted Assessment for Prevention Strategy

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Centers for Disease Control and Prevention

Information & Quality Healthcare Webinar, MS QIO
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Catheter-associated Urinary Tract Infection (CAUTI)

- CAUTI reduction is a Department of Health and Human Services (HHS) Agency Priority Goal
  - FY 2014-15 goal: 10% reduction by September 2015 (SIR 0.92)

http://www.hhs.gov/ash/initiatives/hai/
Picture courtesy of CMS
National Trend in CAUTI SIR (all locations)
Targeted Assessment for Prevention (TAP) Strategy

Target → Assess → Prevent

- **Target facilities/units** using TAP Report function available in NHSN
- **Assess gaps** in infection prevention in targeted facilities/units using Facility Assessment Tools
- **Prevent infections** by implementing interventions to address the gaps using Implementation Guidance

http://www.cdc.gov/hai/prevent/tap.html
The Five "W"s of the Targeted Assessment for Prevention (TAP) Strategy

WHAT is the TAP strategy?
The Targeted Assessment for Prevention (TAP) strategy is a method developed by the Centers for Disease Control and Prevention (CDC) to use data for action to prevent healthcare-associated infections (HAIs). The TAP strategy targets healthcare facilities and specific units within facilities with a disproportionate burden of HAIs so that gaps in infection prevention in the targeted locations can be addressed. The TAP report uses a metric called the cumulative attributable difference (CAD). The CAD is the number of infections that must be prevented to achieve a HAI reduction goal and is calculated by subtracting a numerical prevention target from an observed number of HAIs. The TAP report allows for the ranking of facilities, or locations within individual facilities, by the CAD to prioritize prevention efforts where they will have their greatest impact.

Related Links
- NHSN technical documents
- NHSN TAP Training Slides
- Partners for Prevention

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Contact Us:
Centers for Disease Control and Prevention
1600 Clifton Rd
Atlanta, GA 30333
800-CDC-INFO (800-232-4636)
TTY: (888) 232-6348
Contact CDC-INFO
TAP: National Healthcare Safety Network (NHSN) Data for Action

NHSN Data
Over 4,800 hospitals currently reporting CAUTI, CLABSI, and CDI data

Targeting

Target hospitals with highest number of excess infections

Partnering for Prevention

- CMS QIN-QIOs
- Health Departments
- Other partners with rights to data
A Measure to Help Target Prevention to Reach HAI Reduction Goals: Cumulative Attributable Difference (CAD)

\[ \text{CAD} = \text{OBSERVED} - (\text{PREDICTED} \times \text{SIR}_{\text{target}}) \]

- **Target SIR** can be chosen based on goals of a group, state, organization, or national target
  - Lower target SIR \(\rightarrow\) larger CAD ("excess" number of infections)
  - NHSN uses HHS target SIRs
- **CAD is the number of infections needed to prevent to reach the target SIR**

Courtesy of Minn Soe, CDC
Cumulative Attributable Difference (CAD)

$\text{CAD} = \text{observed} - \text{predicted} = 3.3$

Number of Infections

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Sample CAUTI TAP Report: Facility Level

- Facilities are ranked by CAD in descending order
- Data separated by ICU vs. non ICU locations (CAUTI, CLABSI)
- TAP report also includes data on device utilization and pathogens

<table>
<thead>
<tr>
<th>FACILITY RANK</th>
<th>ORGID</th>
<th>STATE</th>
<th>BEDS</th>
<th>NO LOCATION (ICU, NON-ICU)</th>
<th>CAUTIS (ICU, NON-ICU)</th>
<th>DEVICE DAYS (ICU, NON-ICU)</th>
<th>DU% (ICU, NON-ICU)</th>
<th>CAD (ICU, NON-ICU)</th>
<th>SIR (ICU, NON-ICU)</th>
<th>ICU: TOTAL NO. PATHOGENS (% EC,YS,PA,KPO,FS,PM,ES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>001</td>
<td>AA</td>
<td>325</td>
<td>6(4,2)</td>
<td>42(34,8)</td>
<td>6861(5364,1497)</td>
<td>26(56,9)</td>
<td>22.9(17.8,5.2)</td>
<td>2.2(2.1,2.8)</td>
<td>37 (24, 14, 16, 8, 11, 0, 0)</td>
</tr>
<tr>
<td>2</td>
<td>002</td>
<td>AA</td>
<td>586</td>
<td>3(2,1)</td>
<td>73(70,3)</td>
<td>14292(13898,394)</td>
<td>48(70,4)</td>
<td>21.6(20.1,1.5)</td>
<td>1.4(1.4,2)</td>
<td>78 (27, 17, 10, 17, 12, 1, 0)</td>
</tr>
<tr>
<td>3</td>
<td>003</td>
<td>AA</td>
<td>471</td>
<td>3(2,1)</td>
<td>28(26,2)</td>
<td>6255(5880,375)</td>
<td>51(72,9)</td>
<td>15.6(15.1,0.6)</td>
<td>2.3(2.4,1.4)</td>
<td>28 (21, 36, 7, 7, 7, 0, 0)</td>
</tr>
<tr>
<td>4</td>
<td>004</td>
<td>AA</td>
<td>340</td>
<td>1(1,0)</td>
<td>36(36,..)</td>
<td>6760(6760,..)</td>
<td>84(84,..)</td>
<td>13(13,..)</td>
<td>1.6(1.6,..)</td>
<td>36 (36, 36, 8, 6, 0, 0, 0)</td>
</tr>
<tr>
<td>5</td>
<td>005</td>
<td>AA</td>
<td>646</td>
<td>4(4,0)</td>
<td>45(45,..)</td>
<td>11569(11569,..)</td>
<td>71(71,..)</td>
<td>12.2(12.2,..)</td>
<td>1.4(1.4,..)</td>
<td>45 (22, 31, 4, 9, 2, 2, 16)</td>
</tr>
</tbody>
</table>

ICU vs. non-ICU location data separated

Device utilization data

Event data

Pathogen data
### Sample CAUTI TAP Report: Unit Level

<table>
<thead>
<tr>
<th>FACILITY RANK</th>
<th>ORGID</th>
<th>LOCATION RANK</th>
<th>LOCATION</th>
<th>CDC LOCATION TYPE</th>
<th>EVENT</th>
<th>DEVICE DAYS</th>
<th>DU</th>
<th>CAD</th>
<th>SIR</th>
<th>TOTAL NO. PATHOGENS (%EC,YS,PA,KPO,FS,PM,ES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>001</td>
<td>1</td>
<td>1073</td>
<td>IN:ACUTE:CC:B</td>
<td>14</td>
<td>1783</td>
<td>48%</td>
<td>6.2</td>
<td>1.78</td>
<td>16 (31, 6, 25, 13, 0, 0, 0)</td>
</tr>
<tr>
<td>1</td>
<td>11001</td>
<td>10</td>
<td>11001</td>
<td>IN:ACUTE:CC:S</td>
<td>10</td>
<td>1443</td>
<td>64%</td>
<td>6.2</td>
<td>2.66</td>
<td>10 (30, 10, 0, 10, 10, 0, 0)</td>
</tr>
<tr>
<td>3</td>
<td>1004</td>
<td>4</td>
<td>1004</td>
<td>IN:ACUTE:CC:M_PED</td>
<td>4</td>
<td>197</td>
<td>18%</td>
<td>3.8</td>
<td>.</td>
<td>5 (20, 0, 20, 0, 40, 0, 0)</td>
</tr>
<tr>
<td>4</td>
<td>10011</td>
<td>5</td>
<td>10011</td>
<td>IN:ACUTE:STEP</td>
<td>5</td>
<td>964</td>
<td>13%</td>
<td>3.2</td>
<td>2.72</td>
<td>5 (20, 80, 0, 0, 0, 0, 0)</td>
</tr>
<tr>
<td>5</td>
<td>1012</td>
<td>3</td>
<td>1012</td>
<td>IN:ACUTE:WARD:M</td>
<td>3</td>
<td>533</td>
<td>6%</td>
<td>2</td>
<td>2.96</td>
<td>4 (50, 0, 25, 0, 0, 0, 0)</td>
</tr>
<tr>
<td>6</td>
<td>1002</td>
<td>6</td>
<td>1002</td>
<td>IN:ACUTE:CC:M</td>
<td>6</td>
<td>1941</td>
<td>78%</td>
<td>1.5</td>
<td>1.34</td>
<td>6 (0, 50, 17, 0, 17, 0, 0)</td>
</tr>
<tr>
<td>2</td>
<td>002</td>
<td>1</td>
<td>24</td>
<td>IN:ACUTE:CC:MS</td>
<td>24</td>
<td>5358</td>
<td>80%</td>
<td>11.7</td>
<td>1.94</td>
<td>26 (19, 31, 12, 12, 4, 4, 0)</td>
</tr>
<tr>
<td>2</td>
<td>NSTU</td>
<td>46</td>
<td>NSTU</td>
<td>IN:ACUTE:CC:NS</td>
<td>46</td>
<td>8540</td>
<td>65%</td>
<td>8.4</td>
<td>1.22</td>
<td>52 (31, 10, 10, 19, 15, 0, 0)</td>
</tr>
<tr>
<td>3</td>
<td>N-REHA</td>
<td>3</td>
<td>394</td>
<td>IN:ACUTE:WARD:REHAB</td>
<td>3</td>
<td>394</td>
<td>4%</td>
<td>1.5</td>
<td>2.00</td>
<td>3 (0, 0, 33, 67, 0, 0, 0)</td>
</tr>
<tr>
<td>3</td>
<td>003</td>
<td>1</td>
<td>19</td>
<td>IN:ACUTE:CC:MS</td>
<td>19</td>
<td>4666</td>
<td>74%</td>
<td>13.4</td>
<td>3.39</td>
<td>21 (19, 48, 0, 10, 5, 0, 0)</td>
</tr>
<tr>
<td>2</td>
<td>NCCU</td>
<td>7</td>
<td>1214</td>
<td>IN:ACUTE:CC:NS</td>
<td>7</td>
<td>1214</td>
<td>64%</td>
<td>1.7</td>
<td>1.31</td>
<td>7 (29, 0, 29, 0, 14, 0, 0)</td>
</tr>
<tr>
<td>3</td>
<td>REHAB</td>
<td>2</td>
<td>375</td>
<td>IN:ACUTE:WARD:REHAB</td>
<td>2</td>
<td>375</td>
<td>9%</td>
<td>0.6</td>
<td>1.40</td>
<td>2 (0, 0, 0, 50, 50, 0, 0)</td>
</tr>
<tr>
<td>4</td>
<td>004</td>
<td>36</td>
<td>36</td>
<td>IN:ACUTE:CC:T</td>
<td>36</td>
<td>6760</td>
<td>84%</td>
<td>13</td>
<td>1.56</td>
<td>36 (36, 36, 8, 6, 0, 0, 0)</td>
</tr>
<tr>
<td>5</td>
<td>005</td>
<td>19</td>
<td>19</td>
<td>IN:ACUTE:CC:MS</td>
<td>19</td>
<td>4729</td>
<td>75%</td>
<td>8.1</td>
<td>1.74</td>
<td>19 (21, 47, 0, 0, 0, 0, 0, 0)</td>
</tr>
<tr>
<td>2</td>
<td>2AB</td>
<td>12</td>
<td>1706</td>
<td>IN:ACUTE:CC:T</td>
<td>12</td>
<td>1706</td>
<td>69%</td>
<td>6.2</td>
<td>2.06</td>
<td>12 (33, 17, 8, 8, 0, 0, 0, 17)</td>
</tr>
<tr>
<td>3</td>
<td>2CD</td>
<td>4</td>
<td>2410</td>
<td>IN:ACUTE:CC:CT</td>
<td>4</td>
<td>2410</td>
<td>71%</td>
<td>-0.1</td>
<td>0.97</td>
<td>4 (0, 75, 0, 0, 25, 0, 0)</td>
</tr>
<tr>
<td>4</td>
<td>1BD</td>
<td>10</td>
<td>2724</td>
<td>IN:ACUTE:CC:NS</td>
<td>10</td>
<td>2724</td>
<td>65%</td>
<td>-2</td>
<td>0.83</td>
<td>10 (20, 0, 10, 30, 0, 10, 30)</td>
</tr>
</tbody>
</table>

* Reporting locations ranked within facilities
Assessing the Gaps in Prevention In Targeted Facilities:

CAUTI Facility Assessment Tool

MAJOR CAUTI DOMAINS:

- General Infrastructure
  - Leadership, training, competency, audits/feedback
- Appropriate indications for urinary catheter insertion
- Timely removal of urinary catheters
- Aseptic urinary catheter insertion
- Proper urinary catheter maintenance
- Asymptomatic bacteriuria
CAUTI Core Prevention Measures

Catheter Use

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed

Catheter Insertion

- Ensure that only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment

Catheter Maintenance

- Maintain a closed drainage system
- Maintain unobstructed urine flow

http://www.cdc.gov/hicpac/cauti/001_cauti.html
Effective CAUTI Prevention Implementation Strategies

- **Goals:**
  - Ensure appropriate utilization of catheters
  - Identify and remove unnecessary catheters
  - Ensure aseptic technique and proper care of catheters

- **Examples of effective programs:**
  - Alerts or reminders
  - Guidelines and protocols for nurse-directed removal of unnecessary urinary catheters
  - Education and performance feedback

[link](http://www.cdc.gov/hicpac/cauti/001_cauti.html)
CDC Coordinating and Collaborating with Partners to Create CAUTI Prevention Tools

CDC TAP strategy website with tools and resources

American Nurses Association urinary catheter insertion tool

CMS Survey & Certification infection control survey tool with urinary catheter checklist

CDC Safe Healthcare Blog: Featuring Dignity Health Hospital Engagement Network

CDC CAUTI Implementation Guide: Links to Resources
Practical Approach to TAP Strategy: Tennessee Example

HAI: CAUTI  Target SIR: 0.75
Number of Infections: 67
Number Predicted: ______ -OR- Current SIR: 1.3

Compute

Need to prevent 29 infections to reach target SIR of 0.75

Clear Form

http://health.state.tn.us/ceds/HAI/calculator.shtml
CLOSTRIDIUM DIFFICILE INFECTION (CDI)
CDI Has Surpassed MRSA as Most Common Cause of HAI in Southeastern Community Hospitals

Miller BA, Chen LF, Sexton DJ, Anderson DJ. Infect Control Hosp Epidemiol 2011; 32:387–90
### Multistate Point-Prevalence Survey of Healthcare–Associated Infections

#### Table 3. Reported Causative Pathogens, According to Type of Infection.*

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>All Health Care–Associated Infections (N = 504)†</th>
<th>Pneumonia (N = 110)</th>
<th>Surgical-Site Infections (N = 110)</th>
<th>GI Infections (N = 86)</th>
<th>UTIs (N = 65)</th>
<th>Bloodstream Infections (N = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. (%) rank number (percent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td>61 (12.1) 1 61 (70.9)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>54 (10.7) 2 18 (16.4)</td>
<td>17 (15.5)</td>
<td>1 (1.2)</td>
<td>2 (3.1)</td>
<td>7 (14.0)</td>
<td></td>
</tr>
<tr>
<td>Klebsiella pneumoniae or K. oxytoca</td>
<td>50 (9.9) 3 13 (11.8)</td>
<td>15 (13.6)</td>
<td>1 (1.2)</td>
<td>15 (23.1)</td>
<td>4 (8.0)</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>47 (9.3) 4 3 (2.7)</td>
<td>14 (12.7)</td>
<td>1 (1.2)</td>
<td>18 (27.7)</td>
<td>5 (10.0)</td>
<td></td>
</tr>
<tr>
<td>Enterococcus species‡</td>
<td>44 (8.7) 5 2 (1.8)</td>
<td>16 (14.5)</td>
<td>5 (5.8)</td>
<td>11 (16.9)</td>
<td>6 (12.0)</td>
<td></td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>36 (7.1) 6 14 (12.7)</td>
<td>7 (6.4)</td>
<td>1 (1.2)</td>
<td>7 (10.8)</td>
<td>2 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Candida species§</td>
<td>32 (6.3) 7 4 (3.6)</td>
<td>3 (2.7)</td>
<td>3 (3.5)</td>
<td>3 (4.6)</td>
<td>11 (22.0)</td>
<td></td>
</tr>
<tr>
<td>Streptococcus species¶</td>
<td>25 (5.0) 8 7 (6.4)</td>
<td>8 (7.3)</td>
<td>2 (2.3)</td>
<td>2 (3.1)</td>
<td>2 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Coagulase-negative staphylococcus species</td>
<td>24 (4.8) 9 0</td>
<td>7 (6.4)</td>
<td>0</td>
<td>1 (1.5)</td>
<td>9 (18.0)</td>
<td></td>
</tr>
<tr>
<td>Enterobacter species</td>
<td>16 (3.2) 10 3 (2.7)</td>
<td>5 (4.5)</td>
<td>0</td>
<td>2 (3.1)</td>
<td>2 (4.0)</td>
<td></td>
</tr>
</tbody>
</table>

*C. difficile* was the most common pathogen, causing 61 health care–associated infections (12.1%)
CDC highlights preventing CDI

Making Health Care Safer
Stopping C. difficile infections

People getting medical care can catch serious infections called health-care-associated infections (HAIs). While most types of HAIs are declining, one—caused by the germ C. difficile—remains at historically high levels. C. difficile causes diarrhea linked to 14,000 American deaths each year. Those most at risk are people, especially older adults, who take antibiotics and also get medical care. When a person takes antibiotics, good germs that protect against infection are destroyed for several months. During this time, patients can get sick from C. difficile picked up from contaminated surfaces or spread from a health-care provider’s hands. About 25% of C. difficile infections first show symptoms in hospital patients; 75% first show in nursing home patients or in people recently cared for in doctors’ offices and clinics. C. difficile infections cost at least $1 billion in extra health care costs annually.

To learn more about how to stop the spread of C. difficile, see page 4.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6109a3.htm
Most CDI cases are associated with healthcare exposures

- 94% are healthcare-related

- Post-discharge CDI common
  - Antibiotics have lasting effect

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6109a3.htm
Vital Signs: 6 Key Components of Prevention

- Prescribe and use antibiotics carefully
- Focus on an early and reliable diagnosis
- Isolate patients immediately
- Wear gloves and gowns for all contact with patient and patient care environment
- Assure adequate cleaning of the patient care environment, augment with EPA-registered C. difficile sporicidal disinfectant
- Notify facilities upon patient transfer

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6109a3.htm
Strategies to Prevent CDI in Acute Care Hospitals: 2014 Update to the SHEA/IDSA Practice Recommendations

- **Basic Practices**
  - Appropriate use of antimicrobials
  - Contact Precautions for CDI patients
  - Cleaning and disinfection of equipment and environment
  - Laboratory-based alert system to IP and clinical personnel
  - CDI surveillance
  - Educate HCP
  - Educate patients and families
  - Measure compliance with HH and CP

Dubberke ER et al. ICHE 2014;35:628-45
Strategies to Prevent CDI in Acute Care Hospitals: 2014 Update to the SHEA/IDSA Practice Recommendations

- **Special approaches for preventing CDI**
  - Intensify measurement of compliance with process measures
  - HH with soap and water during outbreaks or high endemic rates
  - Preemptive CP for patients with diarrhea pending testing
  - Prolonged duration of CP until discharge
  - Assess adequacy of room cleaning
  - Use EPA-approved sporicidal disinfectant
  - Initiate antimicrobial stewardship program

Dubberke ER et al. ICHE 2014;35:628-45
Strategies to Prevent CDI in Acute Care Hospitals: 2014 Update to the SHEA/IDSA Practice Recommendations

- **What not to do**
  - Testing asymptomatic patients
  - Testing for cure
  - Routinely placing patients who are on antimicrobials for other indications on CDI treatment to prevent CDI

Dubberke ER et al. ICHE 2014;35:628-45
Risk Factors: key prevention targets

- Antimicrobial exposure
- Acquisition of *C. difficile*
- Gastric acid suppression
- Advanced age
- Underlying illness
- Immunosuppression
- Tube feeds
Making Health Care Safer
Antibiotic Rx in Hospitals: Proceed with Caution

Antibiotics save lives, but poor prescribing practices are putting patients at unnecessary risk for preventable allergic reactions, super-resistant infections, and deadly diarrhea. Errors in prescribing decisions also contribute to antibiotic resistance, making these drugs less likely to work in the future.

To protect patients and preserve the power of antibiotics, hospital CEOs/medical officers can:

- Adopt an antibiotic stewardship program that includes, at a minimum, this checklist:
  1. Leadership commitment: Dedicate necessary human, financial, and IT resources.
  2. Accountability: Appoint a single leader responsible for program outcomes. Physicians have proven successful in this role.
  3. Drug expertise: Appoint a single pharmacist leader to support improved prescribing.
  4. Act: Take at least one prescribing improvement action, such as requiring reassessment within 48 hours, to check drug choice, dose, and duration.
  5. Track: Monitor prescribing and antibiotic resistance patterns.
  6. Report: Regularly report to staff prescribing and resistance patterns, and steps to improve.
  7. Educate: Offer education about antibiotic resistance and improving prescribing practices.

- Work with other health care facilities to prevent infections, transmission, and resistance.

See page 4
Want to learn more? Visit www.cdc.gov/vitalsigns

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Antibiotic Rx for Hospitals
Proceed with Caution

If prescriptions of high-risk antibiotics in hospitals are reduced by 30%

Then it could lead to 26% fewer cases of deadly diarrhea infections

Audit and feedback targeting broad-spectrum antibiotics

- A prospective, controlled interrupted time-series analysis in 3 acute medical wards for the elderly
- Introduced a narrow-spectrum antibiotic policy
- Reinforced using feedback
- Reductions in targeted antibiotics and CDI

Seven Core Elements Critical to the Success of Hospital Antibiotic Stewardship Programs

- Leadership commitment: Dedicating necessary human, financial, and information technology resources.
- Accountability: Appointing a single leader responsible for program outcomes. Experience with successful programs has shown that a physician leader is effective.
- Drug expertise: Appointing a single pharmacist leader responsible for working to improve antibiotic use.
- Tracking: Monitoring antibiotic prescribing and resistance patterns.
- Reporting: Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff members.
- Education: Educating clinicians about resistance and optimal prescribing.
- Action: Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e., “antibiotic time out” after 48 hours).


Core elements are now part of NHSN annual survey
Gastric Acid Suppression as a Risk Factor for CDI: Dose Response and Interactions with Antibiotics

Howell MD et al Arch Intern Med. 2010;170(9):784-790
Use of Proton Pump Inhibitors and CDI

- February 8, 2012 – FDA warning on PPI Use

FDA Drug Safety Communication: *Clostridium difficile*-associated diarrhea can be associated with stomach acid drugs known as proton pump inhibitors (PPIs)

(en Español)
Early Detection and Isolation

Screen patients for new-onset diarrhea on admission and on a regular basis.

Facilitate early testing. Consider nurse-driven protocols (unresolved).

Pair testing with order for Contact Precautions (special approach).

Use more sensitive testing methods.
Optimizing Testing

- **Enzyme immunoassay (EIA)** for toxin sensitivity 48%-67%

- More sensitive tests:
  - Nucleic-acid amplification tests (NAAT)
    - Polymerase chain reaction (PCR)
    - Loop-mediated amplification (LAMP)
  - 2- or 3-step testing algorithms using GDH + toxin testing of positive specimens
    - GDH less sensitive (79%-98%) compared to NAAT or toxigenic culture in a recent meta-analysis

Shetty et al. J Hosp Infect 2011;77:1-6
First and Foremost...

• For any testing method, you need a favorable pre-test probability of disease for optimal performance
  – Diagnostic accuracy improves with increasing prevalence of disease in the population tested
• That means testing appropriately:
  – Watery/unformed stool (conforms to shape of container)
  – At least 3 unformed stools in 24 hours
  – Avoidance of repeat testing, tests of cure
# How will use of NAAT affect CDI incidence rates?

<table>
<thead>
<tr>
<th>Source</th>
<th>Change in testing</th>
<th>% Increase in CDI incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA → PCR</td>
<td>3 states in CDC’s Emerging Infections Program CDI surveillance</td>
<td>43% - 67%</td>
</tr>
<tr>
<td>EIA → PCR</td>
<td>Multi-hospital</td>
<td>56%</td>
</tr>
<tr>
<td>EIA → PCR</td>
<td>Single center</td>
<td>57%</td>
</tr>
<tr>
<td>EIA → PCR</td>
<td>Single center</td>
<td>110%</td>
</tr>
<tr>
<td>GDH+EIA+CCNA → PCR</td>
<td>Single center</td>
<td>50%</td>
</tr>
<tr>
<td>EIA → GDH+PCR</td>
<td>Single center</td>
<td>97%</td>
</tr>
<tr>
<td>GDH+EIA → GDH+EIA+PCR</td>
<td>Single center</td>
<td>70%</td>
</tr>
</tbody>
</table>

Moehring et al ICHE 2013;34:1051-66
Goldenberg SD. Infect Control Hosp Epidemiol 2011;32:1231-2
Longtin et al. Clin Infect Dis 2012; advanced access
Fong et al. Infect Control Hosp Epidemiol 2011;32:932
NHSN CDI Risk Adjusted SIR Accounts for More Sensitive Testing

Variables from Final Model to be included for Risk Adjustment in SIR Calculation

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
</tr>
<tr>
<td>Facility Bed Size</td>
<td>&gt; 245</td>
</tr>
<tr>
<td></td>
<td>101-245</td>
</tr>
<tr>
<td></td>
<td>≤ 100</td>
</tr>
<tr>
<td>Teaching Type</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
</tr>
<tr>
<td></td>
<td>Limited &amp; Non</td>
</tr>
<tr>
<td>CDI Test Type</td>
<td>NAAT (PCR)</td>
</tr>
<tr>
<td></td>
<td>EIA</td>
</tr>
<tr>
<td></td>
<td>All Other</td>
</tr>
<tr>
<td>Prevalence</td>
<td>Continuous (no CO-HCFA)</td>
</tr>
</tbody>
</table>
Potential Benefits of More Sensitive Testing

- Fewer isolation days for negative patients
- Fewer repetitive tests performed (46% at one institution with restriction rules in place)
- In theory, earlier treatment initiation, reduced complications, and improved infection control

Gould et al. CID 2013;57:1304
Moehring et al. ICHE 2013;34:1055-61
Loo VG, Frenette C. Presented at ICAAC 2011. Abstract D-1273
Belmares J, Pua H, Schreckenberger P, Parada J. [abstract 150]. Presented at SHEA 2011 Annual Scientific Meeting, 1–4 April, 2011; Dallas, TX
Goldenberg SA et al. ICHE 2011
A Randomized Trial of Soap and Water Hand Wash Versus Alcohol Hand Rub for Removal of *Clostridium difficile* Spores from Hands of Patients

Author(s): Sirisha Kundrapu, MD; Venkata Sunkesula, MD, MS; Irina Jury; Abhishek Deshpande, MD, PhD; Curtis J. Donskey, MD

Source: *Infection Control and Hospital Epidemiology*, Vol. 35, No. 2 (February 2014), pp. 204-206
Environmental Cleaning: use of Sporicidal Agents

- EPA registered disinfectants with sporicidal claim: http://www.epa.gov/oppad001/chemregindex.htm
- Limited data suggest disinfecting with bleach (1:10 dilution prepared fresh daily) reduces *C. difficile* transmission in units with high endemic rates
- Therefore, sporicidal agents may be most effective in reducing burden where CDI is highly endemic

## Current list of Agents with *C. difficile* EPA Sporicidal Claim (list K) (N=25)

<table>
<thead>
<tr>
<th>Product</th>
<th>Registrant</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVATE 5.25% INSTITUTIONAL BLEACH</td>
<td>DEARDORFF FITZSIMMONS CORPORATION</td>
<td>Sodium hypochlorite 5.25%</td>
</tr>
<tr>
<td>AUSTIN A-1 ULTRA DISINFECTING BLEACH</td>
<td>JAMES AUSTIN COMPANY</td>
<td>Sodium hypochlorite 6%</td>
</tr>
<tr>
<td>BUSTER</td>
<td>CLOROX PROFESSIONAL PRODUCTS COMPANY</td>
<td>Sodium hypochlorite 8.5%</td>
</tr>
<tr>
<td>CONCENTRATED CLOROX GERMICIDAL BLEACH1</td>
<td>THE CLOROX COMPANY</td>
<td>Sodium hypochlorite 8.25%</td>
</tr>
<tr>
<td>CPPC TSUNAMI</td>
<td>CLOROX PROFESSIONAL PRODUCTS COMPANY</td>
<td>Sodium hypochlorite 8.5%</td>
</tr>
<tr>
<td>DISPATCH HOSPITAL CLEANER DISINFECTANT WITH BLEACH</td>
<td>CLOROX PROFESSIONAL PRODUCTS COMPANY</td>
<td>Sodium hypochlorite 8.65%</td>
</tr>
<tr>
<td>DISPATCH HOSPITAL CLEANER DISINFECTANT WITH TOWELS</td>
<td>CLOROX PROFESSIONAL PRODUCTS COMPANY</td>
<td>Sodium hypochlorite 8.65%</td>
</tr>
<tr>
<td>OSCEOLA 160C</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8.5%</td>
</tr>
<tr>
<td>FF-ATH</td>
<td>ECOLAB INC.</td>
<td>Ethaneperoxoic acid 5.8%, Hydrogen Peroxide 27.5%</td>
</tr>
<tr>
<td>GERONIMO 160A</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8%</td>
</tr>
<tr>
<td>HASTE-SSD-COMPONENT A</td>
<td>STERIS CORPORATION</td>
<td>Tetraacetylethylenediamine 61.6%</td>
</tr>
<tr>
<td>HASTE-SSD-COMPONENT B</td>
<td>STERIS CORPORATION</td>
<td>Hydrogen Peroxide 1%</td>
</tr>
<tr>
<td>KIMTECH GERMICIDAL WIPE</td>
<td>KIMBERLY-CLARK GLOBAL SALES, LLC</td>
<td>Ethaneperoxoic acid .23%, Hydrogen Peroxide 4.4%</td>
</tr>
<tr>
<td>MASSASOIT A</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8%</td>
</tr>
<tr>
<td>METACOMET 160B</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8.25%</td>
</tr>
<tr>
<td>OSCEOLA 160C</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8.5%</td>
</tr>
<tr>
<td>PERIDOX RTU ™</td>
<td>BIOMED PROTECT, LLC</td>
<td>Ethaneperoxoic acid .23%, Hydrogen Peroxide 4.4%</td>
</tr>
<tr>
<td>PURE BRIGHT GERMICIDAL 160 BLEACH</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 6%</td>
</tr>
<tr>
<td>PURE BRIGHT GERMICIDAL ULTRA BLEACH</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 6%</td>
</tr>
<tr>
<td>RESTROOM CLEANER &amp; DISINFECTANT</td>
<td>ECOLAB INC.</td>
<td>Sodium hypochlorite 2.15%</td>
</tr>
<tr>
<td>SANI PROFESSIONAL BRAND NOROCLOTH GERMICIDAL DISPOSABLE</td>
<td>PROFESSIONAL DISPOSABLES INTERNATIONAL, INC.</td>
<td>Sodium hypochlorite .63%</td>
</tr>
<tr>
<td>STERIPLEX SD PART A</td>
<td>SBIOMED, LLC</td>
<td>Silver .015%</td>
</tr>
<tr>
<td>TECUMSEH B</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8.25%</td>
</tr>
<tr>
<td>VIRASEPT</td>
<td>ECOLAB INC.</td>
<td>Ethaneperoxoic acid .05%, Caprylic acid .099%, Hydrogen Peroxide 3.13%</td>
</tr>
<tr>
<td>WAMPATUCK C</td>
<td>KIK INTERNATIONAL INC.</td>
<td>Sodium hypochlorite 8.5%</td>
</tr>
</tbody>
</table>

[http://www.epa.gov/oppad001/list_k_clostridium.pdf](http://www.epa.gov/oppad001/list_k_clostridium.pdf)  Updated August, 2012
Assess Adequacy of Cleaning Before Changing to New Cleaning Product

Environmental Cleaning Evaluation Toolkit

TARGET PLACEMENT ON HIGH TOUCH OBJECTS

Evaluating Patient Zone Environmental Hygiene

<table>
<thead>
<tr>
<th>Method</th>
<th>Ease of Use</th>
<th>Identifies Pathogens</th>
<th>Useful for Individual Teaching</th>
<th>Directly Evaluates Cleaning</th>
<th>Published Use in Programmatic Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Practice Observation</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>1 Hospital</td>
</tr>
<tr>
<td>Swab cultures</td>
<td>High</td>
<td>Yes</td>
<td>Not Studied</td>
<td>Potentially</td>
<td>1 Hospital</td>
</tr>
<tr>
<td>Agar slide cultures</td>
<td>Good</td>
<td>Limited</td>
<td>Not Studied</td>
<td>Potentially</td>
<td>1 Hospital</td>
</tr>
<tr>
<td>Fluorescent gel</td>
<td>High</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>49 Hospitals</td>
</tr>
<tr>
<td>ATP system</td>
<td>High</td>
<td>No</td>
<td>Yes</td>
<td>Potentially</td>
<td>2 Hospitals</td>
</tr>
</tbody>
</table>

http://www.cdc.gov/HAI/recoveryact/stateResources/stateResources.html
Success in Reducing CDI Using a Sporicidal Wipe for Daily and Terminal Cleaning

• Before/after study in two high-risk medical wards
• Intervention:
  – Daily and terminal cleaning of ALL rooms with ATP monitoring before/after (similar pass rate)
  – Quaternary ammonium compound before
  – Hypochlorite wipes with 10 minute contact time after
• Results: 24.2 to 3.6 cases per 10,000 patient-days (85% decline)

Reducing Risk for CDI: It takes a village

- Hospital
- Post-acute care
  - Long-term acute care
  - Nursing home/SNF
  - Home health
  - Hospice
### Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer.

Please attach copies of latest culture reports with susceptibilities if available.

<table>
<thead>
<tr>
<th>Sending Healthcare Facility:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/Resident Last Name</td>
<td>First Name</td>
</tr>
<tr>
<td>Name/Address of Sending Facility</td>
<td>Sending Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sending Facility Contacts</th>
<th>NAME</th>
<th>PHONE</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Manager/Admin/SW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection Prevention</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is the patient currently in isolation?  □ NO  □ YES

Type of Isolation (check all that apply)  □ Contact  □ Droplet  □ Airborne  □ Other:

Does patient currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other organism of epidemiological significance?

<table>
<thead>
<tr>
<th>Does patient currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other organism of epidemiological significance?</th>
<th>Colonization or history Check if YES</th>
<th>Active infection on Treatment Check if YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methicillin-resistant Staphylococcus aureus (MRSA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin-resistant Enterococcus (VRE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acinetobacter, multidrug-resistant*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.coli, Klebsiella, Proteus etc. w/Extended Spectrum B-Lactamase (ESBL)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbapenemase resistant Enterobacteriaceae (CRE)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Does the patient/resident currently have any of the following?

□ Cough or requires suctioning

□ Central line/PICC (Approx. date inserted / / )
Using Data for CDI Prevention

• As part of a pilot CDI initiative with QIN-QIOs, CDC is developing CDI facility assessment and implementation tools to be used in targeted units/facilities
**TAP Strategy**

**Target**
- Generate TAP Reports in NHSN
- Identify hospitals/units with excess HAIs above a set benchmark, using the CAD metric
- Engage targeted hospitals/units to participate in focused prevention efforts

**Assess**
- Assess targeted hospitals/units for potential gaps in infection prevention
- Measure perceptions and practices in targeted hospitals/units
- Summarize and score responses

**Prevent**
- Feedback data from TAP reports and facility assessments to targeted hospitals/units
- Implement strategies to address identified gaps and reduce infection rates
- Evaluate for improvement

**Tools**
- NHSN TAP Reports
- Initial Facility Assessment Tool
- Assessment Tool Excel Database
- Implementation Guide - Links to Resources
Conclusions: Benefits of TAP Strategy

- Focused approach to prevention
- Within targeted hospitals, excess HAIs mapped to unit level (CAUTI, CLABSI)
- Specific gaps in infection prevention identified through a standardized assessment
- Implementation strategies customized to address gaps
Thank you!
Questions?

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
E-mail: 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.