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All materials in partner toolkit are EMBARGOED until Thursday, 3/3/16, at 1 p.m. ET.

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People receiving medical care can get serious infections called healthcare-associated infections (HAIs), which may lead to sepsis or death. Hospitals report common HAIs to CDC, including infections caused by C. difficile, infections following surgery, and infections following placement of a tube in the bladder or a large vein (catheter). These infections can be caused by bacteria that are resistant to antibiotics, making them difficult to treat. In certain kinds of hospitals, one in four of these infections (not including C. difficile) are caused by antibiotic-resistant bacteria identified by CDC as urgent or serious threats to health.

Although progress has been made, more work is needed. Three critical efforts to prevent an HAI are 1) prevent infections related to surgery or placement of a catheter, 2) prevent spread of bacteria between patients, and 3) improve antibiotic use. It’s important that healthcare providers take these actions with every patient every time to prevent HAIs and stop the spread of antibiotic resistance.

Healthcare providers need to:

- Follow recommendations for preventing C. difficile and infections that can occur after surgery or are related to single-use catheters placed in the body. Follow recommended actions with every patient every time. Isolate patients when appropriate, and know antibiotic resistance patterns in your facility/area.
- Prescribe antibiotics correctly. Get cultures, start antibiotics promptly, and reassess 24-48 hours later. Know when to stop antibiotic treatment.

*Long-term acute care hospitals, which provide complex medical care, such as ventilator or wound care, for long periods of time.

Want to learn more? www.cdc.gov/vitalsigns/protect-patients
Antibiotic-resistant HAIs are a threat to all patients.

- HAIs are commonly caused by antibiotic-resistant bacteria, which may lead to sepsis or death. One in seven catheter- and surgery-related HAIs in acute care hospitals, and one in four catheter- and surgery-related HAIs in long-term acute care hospitals, is caused by any of six resistant bacteria (not including *C. difficile*).

- These six bacteria are among the most deadly antibiotic-resistant bacteria, identified as urgent or serious threats by CDC: CRE (carbapenem-resistant Enterobacteriaceae), MRSA (methicillin-resistant *Staphylococcus aureus*), ESBL-producing Enterobacteriaceae (extended-spectrum β-lactamases), VRE (vancomycin-resistant enterococci), multi-drug resistant pseudomonas, and multi-drug resistant *Acinetobacter*.

- Progress has been made in preventing HAIs, including a 50% decrease in central line-associated blood stream infections from 2008 to 2014, but more work is needed.

- *C. difficile* is the most common type of bacteria responsible for infections in hospitals. Most *C. difficile* is not resistant to the antibiotics used to treat it, but antibiotic use puts patients at high risk for deadly diarrhea.

Protect patients from antibiotic-resistant infections.

Surgeries and single-use catheters help treat patients, but they can be pathways for bacteria to enter the body.

Bacteria can be spread when appropriate infection control actions are not taken.

Antibiotics save lives, but poor prescribing practices puts patients at risk.

Combine infection control actions with every patient to prevent infections in healthcare.

- Prevent infections from catheters and after surgery.
- Prevent bacteria from spreading.
- Improve antibiotic use.

SOURCE: CDC Vital Signs, March 2016
Protect every patient every time.

Actions to prevent antibiotic-resistant infections in healthcare.

Prevent infections from catheters and after surgery.
- Use catheters only when needed.
- Follow recommendations for safer surgery and catheter insertion and care.
- Remove catheters from patient as soon as they are no longer needed.

Prevent bacteria from spreading.
- Improve hand hygiene.
- Use cultures to reassess the need for antibiotics and stop antibiotic treatment as soon as they are no longer needed.
- Get cultures and start antibiotics promptly, especially in the case of sepsis.
- Use cultures to reassess the need for antibiotics and stop antibiotic treatment as soon as they are no longer needed.
- When antibiotics are necessary, use the appropriate antibiotic in the proper dosage, frequency, and duration.

Improve antibiotic use.
- Improve hand hygiene.
- Use gloves, gowns, and dedicated equipment for patients who have resistant bacteria.
- Know about antibiotic-resistant HAI outbreaks in your hospital and region (e.g., promote coordinated action for prevention).

Prevent bacteria from spreading.

National Acute Care Hospitals

Healthcare-associated infections (HAI) are infections patients can get while receiving medical treatment in a healthcare facility. Working toward the elimination of HAIs is a CDC priority. For more information on HAI prevention progress, visit: www.cdc.gov/hai/progress-report/index.html.

CLABSIs
- CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS
- **1 in 6** CLABSIs were caused by urgent or serious antibiotic-resistant threats.

CAUTIs
- CATHETER-ASSOCIATED URINARY TRACT INFECTIONS
- **1 in 10** CAUTIs were caused by urgent or serious antibiotic-resistant threats.

SSIs
- SURGICAL SITE INFECTIONS
- **1 in 7** SSIs were caused by urgent or serious antibiotic-resistant threats.

C. difficile Infections
- **9 in 10** patients diagnosed with *C. difficile* are related to healthcare.

SOURCE: CDC Vital Signs, March 2016. Data used for this analysis was reported to CDC’s National Healthcare Safety Network.
The Federal government is

- **Preventing infections and their spread:** Conducting surveillance for HAIs and antibiotic resistance, using data to target prevention, and promoting implementation of recommendations. Identifying emerging resistant threats. Promptly responding to and controlling outbreaks.

- **Improving antibiotic use:** Promoting appropriate use and providing guidance/assessing implementation of stewardship programs across health care settings.

- **Promoting use of data:** Preventing HAIs and improving antibiotic use to better protect patients. Collaborating with partners to implement prevention and stewardship strategies, including in federal facilities.


Healthcare providers need to

- **Prevent infections and their spread:** Follow recommendations for preventing *C. difficile* and infections that can occur after surgery or related to single-use catheters placed in the body. Follow recommended actions with every patient every time. Isolate patients when appropriate, and know antibiotic resistance patterns in your facility/area.

- **Improve antibiotic use:** Prescribe antibiotics correctly. Get cultures, start antibiotics promptly, and reassess 24-48 hours later. Know when to stop antibiotic treatment.

Health care facility CEOs/administrators can

- **Prevent infections and their spread:** Follow CDC guidelines for preventing infections and promote data use to target prevention and improvements. Make sure staff follow hand hygiene, isolation, and environmental/device cleaning practices.

www.cdc.gov/hai/prevent/tap.html

- **Improve antibiotic use:** Establish stewardship program and enroll your hospital to submit data to CDC’s Antimicrobial Use and Resistance (AUR) Module to target improvements.


- **Prioritize:** Make infection prevention, sepsis prevention, and stewardship a priority; participate in a Quality Innovation Network.

State and local health departments can

- **Prevent infections and their spread:** Set goals, monitor your state’s progress in preventing infections, promote action, and achieve regional prevention. Support institutions to meet goals.

www.cdc.gov/hai/progress-report

- **Improve antibiotic use:** Support stewardship efforts and know antibiotic resistance patterns in your area.

Patients and their families can

- **Prevent infections and their spread:** If you have a catheter, ask daily if it’s necessary. If you are having surgery, ask your doctor how he/she prevents infections. Insist that everyone clean their hands before touching you. Clean your hands often. Explore Hospital Compare tool for HAI data.

https://www.medicare.gov/hospitalcompare/search.html

- **Improve antibiotic use:** Ask if your antibiotic is necessary and what is being done to improve antibiotic use and protect patients.

For more information, please contact
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348
www.cdc.gov
Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Publication date: 03/03/2016
Vital Signs: Preventing Antibiotic-Resistant Infections in Hospitals — United States, 2014

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Abstract

Background: Health care–associated antibiotic-resistant (AR) infections increase patient morbidity and mortality and might be impossible to successfully treat with any antibiotic. CDC assessed health care–associated infections (HAI), including *Clostridium difficile* infections (CDI), and the role of six AR bacteria of highest concern nationwide in several types of health care facilities.

Methods: During 2014, approximately 4,000 short-term acute care hospitals, 501 long-term acute care hospitals, and 1,135 inpatient rehabilitation facilities in all 50 states reported data on specific infections to the National Healthcare Safety Network. National standardized infection ratios and their percentage reduction from a baseline year for each HAI type, by facility type, were calculated. The proportions of AR pathogens and HAI caused by any of six resistant bacteria highlighted by CDC in 2013 as urgent or serious threats were determined.

Results: In 2014, the reductions in incidence in short-term acute care hospitals and long-term acute care hospitals were 50% and 9%, respectively, for central line-associated bloodstream infection; 0% (short-term acute care hospitals), 11% (long-term acute care hospitals), and 14% (inpatient rehabilitation facilities) for catheter-associated urinary tract infection; 17% (short-term acute care hospitals) for surgical site infection, and 8% (short-term acute care hospitals) for CDI. Combining HAIs other than CDI across all settings, 47.9% of *Staphylococcus aureus* isolates were methicillin resistant, 29.5% of enterococci were vancomycin resistant, 17.8% of Enterobacteriaceae were extended-spectrum beta-lactamase phenotype, 3.6% of Enterobacteriaceae were carbapenem resistant, 15.9% of *Pseudomonas aeruginosa* isolates were multidrug resistant, and 52.6% of *Acinetobacter* species were multidrug resistant. The likelihood of HAIs caused by any of the six resistant bacteria ranged from 12% in inpatient rehabilitation facilities to 29% in long-term acute care hospitals.

Conclusions: Although there has been considerable progress in preventing some HAIs, many remaining infections could be prevented with implementation of existing recommended practices. Depending upon the setting, more than one in four of HAIs excluding CDI are caused by AR bacteria.

Implications for Public Health Practice: Physicians, nurses, and health care leaders need to consistently and comprehensively follow all recommendations to prevent catheter- and procedure-related infections and reduce the impact of AR bacteria through antimicrobial stewardship and measures to prevent spread.
by inappropriate antibiotic use and inadequate infection control, similar to the six other AR bacteria. Preventing healthcare–associated infections (HAIs) provides immediate benefit in reducing the impact of antibiotic resistance on human health. When combined with antibiotic stewardship and steps to prevent transmission as outlined in the National Action Plan to Combat Antibiotic Resistant Bacteria (2), preventing HAIs is critical to reducing the public health threat of AR bacteria.

More than half of hospitalized patients are receiving antibiotics on any given day (3), and about one in 25 have one or more HAIs (4). During 2011 an estimated 722,000 HAIs occurred in U.S. acute care hospitals, and approximately 75,000 patients with HAIs died during hospitalization (4). More than half of these HAIs include *C. difficile* infections (CDIs), urinary tract infections, bloodstream infections, or surgical site infections (SSIs). The HAI National Action Plan (5) calls for CDC to monitor progress toward established goals through the National Healthcare Safety Network (NHSN). This report describes progress toward reducing HAIs in the United States and describes the frequency of six AR bacteria of urgent or serious public health concern among reported HAIs in 2014.

### Methods

HAIs data on central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), surgical site infections (SSIs), and laboratory-identified CDI events for 2014 were reported to NHSN from hospitals in all 50 states, the District of Columbia, and Puerto Rico, using standard NHSN definitions (6–8). Data are presented separately for acute care hospitals (including critical access hospitals), long-term acute care hospitals, and inpatient rehabilitation facilities, because reporting timelines and type of HAIs reported varied among the different settings.

Standardized infection ratios (SIRs), a statistic used to track HAIs over time, were used to compare the observed number of infections reported during 2014 with the predicted number of infections, based on national aggregate data reported during a historical baseline time period. SIRs for different infections were adjusted for key risk factors (9–11). Baseline time periods among short-term acute care hospitals were 2006–2008 for CLABSIs and SSIs, 2009 for CAUTIs, and 2010–2011 for CDIs. Among long-term acute care hospitals and inpatient rehabilitation facilities the baseline time period was 2013 for both CLABSIs and CAUTIs. The SSI data include 10 procedures that approximate procedures included in the Centers for Medicare and Medicaid Services Surgical Care Improvement Project and were performed during 2014 (10).

Pathogen and susceptibility data are provided by the facility’s designated clinical microbiology laboratory. No more than three pathogens per HAI could be reported. Susceptibility results for each pathogen were reported as “susceptible,” “intermediate,” “resistant,” or “not tested” (12). The six AR phenotypes included the urgent threat of carbapenem-resistant Enterobacteriaceae, along with the serious threats of methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, extended-spectrum beta-lactamase phenotype Enterobacteriaceae, multidrug-resistant (*M. p. aeruginosa*, and MDR *Acinetobacter* species. The criteria used to define each phenotype approximated interim standard definitions for defining multidrug resistance as used in the CDC AR Threat Report (1), along with updated criteria for carbapenem-resistant Enterobacteriaceae (13).

A pooled mean percentage of resistant pathogens, based on the sum of pathogens that tested resistant, divided by the sum of pathogens tested, was calculated for each threat pathogen by HAI type and facility type. In addition, the likelihood that an HAI was associated with any of the six antibiotic-resistant threat pathogens was calculated as the sum of HAIs with any resistant phenotype divided by the sum of HAIs reported (regardless of whether another pathogen or, in the case of SSI, no pathogen was reported).

### Results

In 2014, approximately 4,000 acute care hospitals (3,655 reported CLABSI data, 3,791 reported data on CAUTI, 3,994 reported CDI, and 3,618 reported SSI), 501 long-term acute care hospitals, and 1,135 inpatient rehabilitation facilities contributed data. Within acute care hospitals, 17,758 CLABSIs, 35,760 CAUTIs, 101,074 hospital-onset CDIs, and 15,927 SSIs from selected procedures were reported. The corresponding SIRs (and 95% confidence intervals) were 0.495 (0.488–0.502) for CLABSI, 1.00 (0.990–1.010) for CAUTI, 0.924 (0.918–0.929) for CDI, and 0.827 (0.815–0.840) for SSI, corresponding to percentage decreases compared with the historical baseline assessment ranging from 0% (CAUTI) to 50% (CLABSI) (Figure). The percentage change from 2013 to 2014 was −8% for CLABSI, −5% CAUTI, +4% for CDI, and +2% for SSI.

Among long-term acute care hospitals, 2,928 CLABSIs and 4,467 CAUTIs were reported; after risk adjustment, the SIRs were 0.909 (0.876–0.942) for CLABSI and 0.893 (0.867–0.920) for CAUTI, corresponding to 9% and 11% decreases, respectively, compared with baseline. Within inpatient rehabilitation facilities, 1,449 CAUTIs were reported, for an SIR of 0.856 (0.813–0.901) or a 14% reduction compared with baseline.

Combining HAIs across all settings, 47.9% of *S. aureus* infections were resistant to methicillin, 29.5% of enterococci were resistant to vancomycin, 17.8% of Enterobacteriaceae were extended-spectrum beta-lactamase phenotype, 3.6%
of Enterobacteriaceae were carbapenem-resistant, 15.9% of \textit{P. aeruginosa}, and 52.6% of \textit{Acinetobacter} species were MDR. Notably, the percentage resistance varied by facility type and was consistently higher in long-term acute care hospitals (Table).

During 2014, the likelihood of any of the six AR threat bacteria varied by HAI type and facility type. Overall, among short-term acute care hospitals, 14% of all HAIs were caused by one of the six AR threat bacteria, including 18% of CLABSIs (3,348 of 18,373), 15% of SSIs (2,583 of 17,512), 10% of CAUTIs (3,601 of 34,621). Among long-term acute care hospitals, 28% of CLABSIs (808 of 2,873) and 29% of CAUTIs (1,251 of 4,293) were caused by one of these organisms, and among inpatient rehabilitation facilities, 12% of CAUTIs (164 of 1,349) were caused by one of these six bacteria. Pooled over all facility types, 14.9% of the 79,021 HAIs reported were associated with one of the AR threat pathogens.
TABLE. Pooled mean percentage of tested isolates of six urgent or serious antibiotic-resistant threat pathogens that were antibiotic-resistant, by type of health care facility and type of health care–associated infection reported — National Healthcare Safety Network, United States, 2008–2014*  

<table>
<thead>
<tr>
<th>Facility type/Antibiotic-resistant threat pathogen</th>
<th>Health care–associated infection type</th>
<th>CLABSI</th>
<th>CAUTI</th>
<th>SSI</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. tested</td>
<td>%R</td>
<td>No. tested</td>
<td>%R</td>
<td>No. tested</td>
</tr>
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<td>Short-term acute care hospital</td>
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<td></td>
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<tr>
<td>Methicillin-resistant Staphylococcus aureus</td>
<td>2,556</td>
<td>47.3</td>
<td>629</td>
<td>49.1</td>
<td>3,212</td>
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<tr>
<td>Vancomycin-resistant enterococci</td>
<td>3,079</td>
<td>44.6</td>
<td>4,690</td>
<td>21.7</td>
<td>3,427</td>
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<td>ESBL-phenotype Enterobacteriaceae</td>
<td>2,804</td>
<td>21.1</td>
<td>11,146</td>
<td>16</td>
<td>4,184</td>
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<td>Carbapenem-resistant Enterobacteriaceae</td>
<td>3,199</td>
<td>4.9</td>
<td>10,530</td>
<td>2.8</td>
<td>4,441</td>
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<td>Multidrug-resistant Pseudomonas aeruginosa</td>
<td>810</td>
<td>15.7</td>
<td>3,392</td>
<td>13.9</td>
<td>1,061</td>
</tr>
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<td>Multidrug-resistant Acinetobacter spp.</td>
<td>369</td>
<td>36.6</td>
<td>171</td>
<td>63.2</td>
<td>63</td>
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<td>Long-term acute care hospital</td>
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<td></td>
<td></td>
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<td>Methicillin-resistant Staphylococcus aureus</td>
<td>345</td>
<td>75.7</td>
<td>50</td>
<td>82</td>
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<td>Vancomycin-resistant enterococci</td>
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<td>42.5</td>
<td>642</td>
<td>62.1</td>
<td>1,350</td>
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<td>ESBL-phenotype Enterobacteriaceae</td>
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<td>Carbapenem-resistant Enterobacteriaceae</td>
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<td>11.1</td>
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<td>Multidrug-resistant Pseudomonas aeruginosa</td>
<td>138</td>
<td>31.9</td>
<td>934</td>
<td>32.9</td>
<td>1,072</td>
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<td>Multidrug-resistant Acinetobacter spp.</td>
<td>90</td>
<td>73.3</td>
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<td>89.6</td>
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<td>Multidrug-resistant Pseudomonas aeruginosa</td>
<td>218</td>
<td>12.8</td>
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<tr>
<td>Multidrug-resistant Acinetobacter spp.</td>
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<td></td>
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</tr>
</tbody>
</table>

Abbreviations: %R = % resistant to antibiotics; CAUTI = catheter-associated urinary tract infection; CLABSI = central line-associated bloodstream infection; ESBL = extended-spectrum beta-lactamase; SSI = surgical site infection.

* Empty cells indicate no reporting occurred for that HAI type.
† Insufficient data; fewer than 20 isolates tested for resistance.

Conclusions and Comment

In the United States, approximately 2 million persons become ill every year with AR infections, and approximately 23,000 die. This report is the first to combine national data on AR bacteria threats with progress on HAI prevention. In 2014, the incidence of CLABSI in acute care hospitals reached the 2013 goal established by the HAI Action Plan (5), decreasing 50% during 2008–2014. This is important given the high morbidity, mortality, and excess costs associated with CLABSI (14,15), which are partially related to the frequency with which methicillin-resistant Staphylococcus aureus, vancomycin-resistant enterococci, and extended-spectrum beta-lactamase phenotype Enterobacteriaceae cause these infections (Table). In addition, CAUTIs in acute care hospitals decreased overall by 5% during 2013–2014 and, although not quantified in this report, declined 24% in non–intensive care unit (ICU) settings since baseline.* In long-term acute care hospitals, both CLABSI and CAUTI have decreased as have CAUTI in inpatient rehabilitation facilities. The importance of preventing CAUTI in all settings is highlighted by the frequency with which vancomycin-resistant enterococci, extended-spectrum beta-lactamase phenotype Enterobacteriaceae, and (especially in long-term acute care hospitals) carbapenem-resistant Enterobacteriaceae, cause these infections (Table). Collaboration across the U.S. Department of Health and Human Services (HHS), including CDC, the Office of the Assistant Secretary of Health, the Centers for Medicare and Medicaid Services, and the Agency for Health Research and Quality has been important in achieving this success. For example, Centers for Medicare and Medicaid Services reporting and payment incentives have led to greater transparency and accountability, and their Hospital Engagement and Quality Innovation Networks have promoted best practices.

C. difficile has been recently recognized as the most common HAI pathogen in acute care hospitals (4). In 2011, it caused an overall total of 453,000 infections, and 29,000 patients died within 30 days of diagnosis (16); 94% of all CDIs are related to various precedent or concurrent health care exposures (17). The CDI SIR in acute care hospitals decreased only 8% overall during 2011–2014, and more concerning, increased 4% during 2013–2014. More work is needed to ensure that patients are safe from C. difficile and AR bacteria.

Controlling AR threats is linked to preventing the occurrence of HAI, reducing selective pressure by improving overall antibiotic stewardship, and preventing the spread of AR bacteria within and between facilities. Preventing catheter- and

procedure-related infections can be accomplished by always following recommended indications and guidelines for insertion, maintenance, and removal of vascular and bladder catheters. CDC and its partners are implementing new HHS-proposed HAI targets for December 2020, using 2015 NHSN data as its new baseline. A key strategy for reaching these goals is the Targeted Assessment for Prevention strategy to identify gaps in infection control in facilities with a disproportionate number of HAIs (18). In addition to reducing the need for antibiotics used in treatment, preventing HAIs prevents complications of infection, including sepsis, a major cause of death.

In conjunction with HAI prevention is implementation of hospital antibiotic stewardship programs (19). This is accomplished by always obtaining cultures when starting necessary antibiotics and, especially in septic patients, doing so promptly, using culture results to reassess the continued need for antibiotics, discontinuing antibiotics that are no longer needed or to which AR has developed, and using the appropriate drug at the proper dose and administration frequency. Antibiotic exposure is well recognized as the most important modifiable risk factor for CDI, and antibiotic stewardship is potentially the most effective CDI prevention strategy (17,19). The emergence and spread of the hypervirulent, fluoroquinolone-resistant, ribotype 027 strain of C. difficile in North America and Europe was facilitated by increased use of fluoroquinolones (20). Reducing unnecessary use of this antibiotic class has been instrumental in facilities where control of this strain has been achieved (21,22). What is less widely recognized is the role that disruption of the human microbiome has on increasing patients’ risk for acquiring AR strains of other HAI pathogens (23) and, once colonized, developing infection (24). Genes that confer resistance can be carried on the same plasmid or chromosome as genes that increase bacterial virulence, leading to the emergence of highly adapted AR HAI pathogens (25). CDC summarizes core elements of successful stewardship programs, which can help assure the prompt initiation of necessary antibiotics and reduce unnecessary antibiotic use, thereby reducing the risk of CDI and AR infections, improving individual patient outcomes, and saving health care dollars (19).

In conjunction with HAI prevention and antibiotic stewardship, the third necessary strategy is the prevention of cross transmission. To achieve this, physicians, nurses, and health care leaders need to improve hand hygiene, room cleaning, and use of personal protective equipment, and be aware of HAI outbreaks caused by AR bacteria in their hospital or region. In the case of C. difficile, which is unique among the AR threat bacteria in forming spores, special environmental measures might also be needed to prevent transmission (17). Because AR strains might be more virulent than other strains and thereby more likely to colonize and infect patients already receiving antibiotics, interrupting transmission of these strains reduces both the number of HAIs and the likelihood that an HAI is caused by an AR threat. To assist clinicians, health care leaders, and state and local public health authorities to learn when well-adapted resistant strains are emerging and spreading in a region, CDC is working with partners to build networks to better detect and respond to AR threats and to make antibiotic resistance data from health care facilities more readily accessible through a new HAI Antibiotic Resistance Patient Safety Atlas.1

Over one of every four HAIs reported from long-term acute care hospitals were caused by AR bacteria. Moreover, limited data suggest CDI incidence in long-term acute care hospitals might be several fold higher than in short-term acute care hospitals (26,27). One contributing factor is patient transfer from intensive care units of acute care hospitals where their microbiomes have been disrupted by exposure to antibiotics and where they have been colonized with AR threat bacteria (28). Long-term acute care hospitals are facilities that can transmit or amplify antibiotic resistance within a community or region overall (30). Through sharing of information, practical expertise, and regional leadership, coordinated activity can have a larger impact on preventing transmission and infections with antibiotic-resistant bacteria than hospitals working alone.

The findings in this report are subject to at least two limitations. First, infections included in SIR calculations were a subset of all the infections evaluated for AR. The latter included infection events reported from any type of SSI, and infections occurring in locations regardless of eligibility to calculate a SIR. Second, the reported resistance relied on the manual reporting of the facility staff, based on reports provided by the clinical laboratory, and might contain inaccurate test results, data entry errors, and some incomplete information. Despite these limitations, these data provide important information on the status of HAI infection prevention in the United States in 2014 and the persistent challenge of preventing the spread of AR bacteria in a variety of inpatient health care settings. Preventing HAIs and the spread of antibiotic resistance is possible if physicians, nurses, and health care leaders consistently and comprehensively follow all recommendations to prevent HAIs, including prevention of catheter- and procedure-related infections, antimicrobial stewardship, and implementation of measures to prevent spread.

Key Points

• Antibiotic-resistant (AR) bacteria can make infections impossible to treat, especially given the extensive resistance frequently encountered in health care facilities. Of 18 AR bacteria identified by CDC as public health threats, six, in addition to Clostridium difficile, cause health-care–associated infections (HAIs).

• Three common HAIs associated with catheters placed in a vein or the bladder and procedures (operations) include: central-line associated blood stream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), and surgical site infections (SSIs).

• Preventing these HAIs is an important strategy for reducing the impact of AR bacteria on human health, including the prevention of sepsis and death. Considerable progress has been made for some but not all HAIs. Compared with baseline historic data from 5–8 years earlier, CLABSIs decreased by 50% and SSIs by 17% in 2014. Whereas CAUTIs appear unchanged from baseline, there have been recent decreases. C. difficile infections in hospitals decreased 8% during 2011–2014.

• In 2014, the chance that an HAI was caused by one of the six AR threat bacteria was one in seven in short-term acute care hospitals but higher in other health care settings such as long-term acute care hospitals where it was one in four.

• Physicians, nurses, and health care leaders, working together with the help of CDC, other federal agencies, and other partners, need to consistently combine strategies to prevent catheter- and procedure-related HAIs, prevent the spread of AR bacteria, and improve antibiotic use, thereby preventing further patient harm caused by AR HAIs.

• Additional information available at http://www.cdc.gov/vitalsigns.

References


FEBRARY 2016


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Key Messages

Making Healthcare Safer: Protecting Patients from Antibiotic Resistance

Main Message

- People getting medical care can get serious infections called healthcare-associated infections (HAIs), which may lead to sepsis and death
- **Significant progress has been made** preventing healthcare-associated infections, including national progress between 2013 and 2104
- To protect patients, more work needs to be done
- CDC recommends three critical strategies that doctors, nurses, and other healthcare providers need to take with every patient, every time, to prevent HAIs and stop the spread of antibiotic resistance:
  - Prevent the spread of bacteria between patients
  - Prevent infections related to surgery and/or catheters
  - Improve antibiotic use through stewardship

Key Points

- Nearly all U.S. hospitals report common HAIs to CDC, including infections following surgery, and infections following placement of a tube in the bladder (catheter) or a large vein
  - These common HAIs include central-line associated bloodstream infections, catheter-associated urinary tract infections and surgical site infections. Antibiotic resistant bacteria can cause these infections making them difficult or impossible to treat. In acute-care hospitals, 1 in 7 device-and surgery-related infections can be caused by any of six antibiotic-resistant bacteria
  - In long-term acute hospitals (LTACHs) that number increases to over 1 in 4 infections
- Of 18 antibiotic-resistant bacteria identified by CDC as public health threats, nearly half, including *Clostridium difficile*, cause healthcare-associated infections (HAIs):
  - Carbapenem-resistant Enterobacteriaceae (CRE)
  - Methicillin-resistant *Staphylococcus aureus* (MRSA)
  - ESBL-producing Enterobacteriaceae (extended-spectrum β-lactamases)
  - Vancomycin-resistant Enterococcus (VRE)
  - Multidrug-resistant *Pseudomonas aeruginosa*
  - Multidrug-resistant Acinetobacter
- The data in this Vital Signs report, along with data from CDC’s latest annual progress report on HAI prevention, show that nationally, in acute care hospitals:
  - 50 percent decrease in central line-associated bloodstream infections (CLABSIs) between 2008 and 2014
    - 1 in 6 remaining CLABSIs are caused by urgent or serious antibiotic-resistant threats
  - 17 percent decrease in surgical site infections (SSIs) between 2008 and 2014 related to 10 select procedures tracked in previous HAI progress reports
    - 1 in 7 remaining SSIs are caused by urgent or serious antibiotic-resistant threats
No change in the overall catheter-associated urinary tract infections (CAUTIs) between 2009 and 2014, however, during this time there was progress in non-ICU settings, progress in all settings between 2013 and 2014, and most notably, progress in all settings towards the end of 2014

- 1 in 10 CAUTIs are caused by urgent or serious antibiotic-resistant threats

- CDC efforts, in addition to efforts by the Centers for Medicaid and Medicare (CMS), the Agency for Healthcare Research and Quality (AHRQ), and state mandates for public reporting of HAIs, have all contributed to national progress in improving transparency, accountability, and quality of patient safety

- In addition, Congress has appropriated more funding for CDC to implement its National Action Plan

  - $160 million dollars in new funding will be used to fight the spread of antibiotic resistance by:
    - accelerating outbreak detection and prevention in every state;
    - enhancing tracking of resistance mechanisms and resistant infections;
    - supporting innovative research to address current gaps in knowledge; and
    - improving antibiotic use.

### Additional Details and Background Information

#### About CDC’s National Healthcare Safety Network

CDC’s NHSN is the nation’s most widely used healthcare-associated infection (HAI) tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate HAIs. In addition, NHSN allows healthcare facilities to track antimicrobial use and resistance, blood safety errors and important healthcare process measures such as healthcare personnel influenza vaccine status and infection control adherence rates.

#### CDC’s Antibiotic Resistance HAI Patient Safety Atlas

- CDC’s Antibiotic Resistance HAI Patient Safety Atlas provides open and interactive data about healthcare-associated infections (HAIs) caused by antibiotic resistant bacteria, which is reported to CDC through the National Healthcare Safety Network (NHSN).
  - The Atlas shows percent resistance for many urgent and serious resistance threats identified by CDC in the Antibiotic Resistance Threat Report, including CRE, MRSA, ESBL-producing Enterobacteriaceae, VRE, Pseudomonas aeruginosa, and Acinetobacter.
  - Includes NHSN data from 2011-2014
  - 3 HAI types: CLABSI, CAUTI, SSI
  - 31 Phenotypes (bug-drug combos)
  - 4,000+ healthcare facilities (acute care hospitals, long term acute care hospitals, inpatient rehab hospitals)

- The tool makes HAI antibiotic resistance data reported to NHSN accessible to the public, public health partners, professional partners and researchers for situational awareness about resistant HAI trends in their state and region.
  - The data shown in the Atlas do not change clinical recommendations previously made by CDC but could be used by health departments and facilities to help prioritize infection control priorities.
The Atlas may also be valuable for academic researchers, drug and device industries, and others interested in this topic.

**CDC’s National and State HAI Progress Report**

- Provides comprehensive summary of national progress toward the goal of eliminating HAI s focused on CLABSI, CAUTI, SSI, lab-identified hospital-onset C.diff and lab-identified hospital-onset MRSA bacteremia
  - State level data for CLABSI, CAUTI, SSI for acute care hospitals
  - State level data validation information by HAI type
- New national data in report this year’s report, based on 2014 data
  - Acute Care Hospitals: Expanded SSI information from additional procedures at the national level
  - LTACHs: CLABSI and CAUTI data
  - IRFs: CAUTI data only
- Increase patients’ and caregivers’ awareness and understanding of HAI s
- Improves transparency and accountability around reporting of HAI s
- Educates healthcare providers on the importance of the data
Superbugs threaten hospital patients

1 in 4 catheter- and surgery-related HAIs caused by six resistant bacteria in long-term hospitals

(March 3, 2016, Atlanta, GA) – America is doing a better job of preventing healthcare-associated infections (HAIs), but more work is needed – especially in fighting antibiotic-resistant bacteria. The Centers for Disease Control and Prevention’s (CDC) latest Vital Signs report urges healthcare workers to use a combination of infection control recommendations to better protect patients from these infections.

“New data show that far too many patients are getting infected with dangerous, drug-resistant bacteria in healthcare settings,” said CDC Director Tom Frieden, M.D., M.P.H. “Doctors and healthcare facilities have the power to protect patients – no one should get sick while trying to get well.”

Many of the most urgent and serious antibiotic-resistant bacteria threaten patients while they are being treated in healthcare facilities for other conditions, and may lead to sepsis or death. In acute care hospitals, 1 in 7 catheter- and surgery-related HAIs can be caused by any of the six antibiotic-resistant bacteria listed below. That number increases to 1 in 4 infections in long-term acute care hospitals, which treat patients who are generally very sick and stay, on average, more than 25 days.

The six antibiotic-resistant threats examined are:

- Carbapenem-resistant Enterobacteriaceae (CRE)
- Methicillin-resistant Staphylococcus aureus (MRSA)
- ESBL-producing Enterobacteriaceae (extended-spectrum β-lactamases)
- Vancomycin-resistant Enterococcus (VRE)
- Multidrug-resistant Pseudomonas aeruginosa
- Multidrug-resistant Acinetobacter

U.S. hospitals doing better at preventing most HAIs

The national data in this Vital Signs report, along with data from CDC’s latest annual progress report on HAI prevention, show that acute care hospitals have achieved:

- A 50 percent decrease in central line-associated bloodstream infections (CLABSIs) between 2008 and 2014.
  - 1 in 6 remaining CLABSIs are caused by urgent or serious antibiotic-resistant bacteria.
- A 17 percent decrease in surgical site infections (SSIs) between 2008 and 2014 related to 10 procedures tracked in previous HAI progress reports.
  - 1 in 7 remaining SSIs are caused by urgent or serious antibiotic-resistant bacteria.
- No change in the overall catheter-associated urinary tract infections (CAUTIs) between 2009 and 2014. During this time, however, there was progress in non-ICU settings, progress in all settings between 2013 and 2014, and most notably, even more progress in all settings towards the end of 2014.
  - 1 in 10 CAUTIs are caused by urgent or serious antibiotic-resistant bacteria.
The Vital Signs report also examines the role of *Clostridium difficile (C. difficile)*, the most common type of bacteria responsible for infections in hospitals. *C. difficile* caused almost half a million infections in the United States in 2011 alone. CDC’s annual progress report shows that progress has been made in decreasing hospital-onset *C. difficile* infections by 8 percent between 2011 and 2014.

Along with the updated annual progress report, CDC released the Antibiotic Resistance Patient Safety Atlas, a new web app with interactive data on HAIs caused by antibiotic resistant bacteria. The tool provides national, regional, and state map views of superbug/drug combinations showing percent resistance over time. The Atlas uses data reported to CDC’s National Healthcare Safety Network from 2011 to 2014 from more than 4,000 healthcare facilities.

**CDC message to healthcare providers**

CDC is calling on doctors, nurses, health care facility administrators, and state and local health departments to continue to do their part to prevent HAIs. The report recommends doctors and nurses combine three critical efforts to accomplish this:

- Prevent the spread of bacteria between patients;
- Prevent infections related to surgery and/or placement of a catheter; and
- Improve antibiotic use through stewardship.

“For clinicians, prevention means isolating patients when necessary,” said Clifford McDonald, M.D., associate director for science at CDC’s Division of Healthcare Quality Promotion. “It also means being aware of antibiotic resistance patterns in your facilities, following recommendations for preventing infections that can occur after surgery or from central lines and catheters placed in the body, and prescribing antibiotics correctly.”

CDC efforts, in addition to efforts by the Centers for Medicare and Medicaid Services (CMS), the Agency for Healthcare Research and Quality (AHRQ), and state mandates for public reporting of HAIs, have all contributed to national progress in improving transparency, accountability, and quality related to patient safety.

“The good news is that we are preventing healthcare acquired infections, which has saved thousands of lives,” said Patrick Conway, Deputy Administrator and Chief Medical Officer at Centers for Medicare and Medicaid Services. “The challenge ahead is how we help to prevent antibiotic resistance as well as infections. We are using incentives, changes in care delivery, and transparency to improve safety and quality for patients.”

Congress has recognized the urgent need to combat antibiotic resistance. In fiscal year 2016, Congress appropriated $160 million in new funding for CDC to implement its activities listed in the National Action Plan for Combating Antibiotic-resistant Bacteria. With this funding, CDC will fight the spread of antibiotic resistance by:

- accelerating outbreak detection and prevention in every state;
- enhancing tracking of resistance mechanisms and resistant infections;
- supporting innovative research to address current gaps in knowledge; and
- improving antibiotic use.

As part of the ongoing effort to improve patient safety, CDC and other federal partners will participate in National Patient Safety Awareness Week 2016, March 13 through March 19.
CDC works 24/7 protecting America’s health, safety and security. Whether diseases start at home or abroad, are curable or preventable, chronic or acute, stem from human error or deliberate attack, CDC is committed to respond to America’s most pressing health challenges.
Promotional Social Media for March 2016 Vital Signs

Feel free to use the following Facebook postings and tweets to promote the Vital Signs report to your network of followers.

Facebook
People receiving medical care can get serious infections called healthcare-associated infections (HAIs), which are often caused by antibiotic-resistant germs. Combining infection control actions can better protect patients: http://go.usa.gov/cwK8h

In acute care hospitals, 1 in 7 catheter- and surgery-related healthcare-associated infections (HAIs) is caused by any 6 antibiotic-resistant bacteria. Learn the combined steps to protect patients: http://go.usa.gov/cwK8h

Significant national progress has been made in preventing healthcare-associated infections (HAIs), but more work is needed to protect patients from these often preventable infections and antibiotic-resistant threats. http://go.usa.gov/cwK8h

Patients: Protect yourself & your community from drug-resistant infections by insisting everyone—doctors, nurses, technicians, family—clean their hands before touching you. More tips: http://go.usa.gov/cwK8h

Twitter
We must act now to protect patients from #HAIs, especially as more infections are caused by drug-resistant germs. #VitalSigns http://go.usa.gov/cwK8h

New CDC #VitalSigns report shows need for combined action to better protect patients. http://go.usa.gov/cwK8h

1 in 4 catheter- or surgery-related #HAIs are caused by 6 resistant threats in long term hospitals. http://go.usa.gov/cwK8h #VitalSigns

Clinicians: We’re at a tipping point w/ drug resistance. Take these steps with every patient, every time: http://go.usa.gov/cwK8h #VitalSigns

Learn 6 ways to be a #safepatient & protect yourself from infections while at a healthcare facility. #VitalSigns http://go.usa.gov/cwK8x

Analyze AR & #HAI info in your area using maps, charts & more with CDC’s new #AntibioticResistance Patient Safety Atlas. #VitalSigns http://go.usa.gov/cwkdh

Check out CDC’s Pinterest and Instagram pages for new posts.
Links to CDC Resources

- Vital Signs Homepage
- Vital Signs March 2016 Fact Sheet (Spanish)
- Vital Signs March 2016 MMWR
- Vital Signs March 2016 Press Release
- Vital Signs March 2016 Digital Press Kit (graphics and additional resources)
- Antibiotic Resistance Patient Safety Atlas
- National and State Healthcare-Associated Infections Progress Report