November 2018 · Volume 9, Issue 78

HAI High Sign

Special Edition

Antibiotics Awareness Week

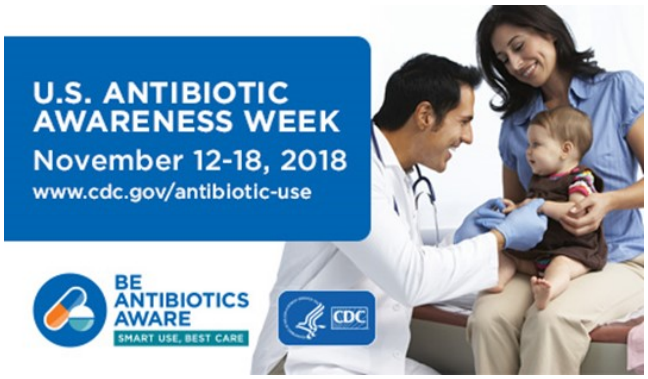
News from the Virginia Department of Health

Healthcare-Associated Infections and Antimicrobial Resistance Program

In this issue:

U.S. Antibiotic Awareness Week - November 12-18, 2018

U.S. Antibiotic Awareness Week is an annual observance to raise awareness about antibiotic resistance and the importance of appropriate antibiotic prescribing and use. It has been three years since the U.S. government released the *Combating Antibiotic-Resistant Bacteria (CARB) National Action Plan*, a five-year roadmap to guide the nation in reducing and preventing the spread of antibiotic resistance. One of the stated milestones is to reduce inappropriate antibiotic use by 50% in outpatient settings and by 20% in inpatient settings.[1] There have been some successes in decreasing inappropriate antibiotic use, but there are still opportunities for improvement.[2,3]



The VDH HAI/AR team would like to use U.S. Antibiotic Awareness Week to highlight the role **everyone** has in antimicrobial stewardship (ASP) and reducing antimicrobial resistance. We are using this Special Edition *HAI High Sign* to promote initiatives occurring in all patient care settings, with all healthcare professionals and patients.

Hospitals

Core Elements of ASP

- Leadership commitment
- Accountability
- Drug expertise
- Action
- Tracking
- Reporting
- Education

What is VDH Doing?

- Nursing education campaign on ASP (page 6)
- State and regional antibiogram (page 8)

Nursing Homes

Core Elements of ASP

- Leadership commitment
- Accountability
- Drug expertise
- Action
- Tracking
- Reporting
- Education

What is VDH Doing?

- Nursing education campaign on ASP (page 6)
- State and regional antibiogram (page 8)

Outpatient Settings

Core Elements of ASP

- Commitment
- Action for policy and practice
- Tracking and reporting
- Education and expertise

What is VDH Doing?

- Analysis and feedback on antibiotic prescribing (page 7)
- State and regional antibiogram (page 8)

Small and Critical Access Hospitals

Core Elements of ASP

- Leadership commitment
- Accountability
- Drug expertise
- Action
- Tracking
- Reporting
- Education

What is VDH Doing?

- Nursing education campaign on ASP (page 6)
- ASP Webinar*
- State and regional antibiogram (page 8)

*Webinar coming in late November. More information and details to follow.

1. National Action Plan for Combating Antibiotic-Resistant Bacteria. March 2015. Retrieved https://www.cdc.gov/drugresistance/pdf/national_action_plan_for_combating_antibiotic-resistant_bacteria.pdf
2. Kelly, A. A., Jones, M. M., Echevarria, K. L., Kralovic, S. M., Samore, M. H., Goetz, M. B., . . . Roselle, G. A. January 2017. A Report of the Efforts of the Veterans Health Administration National Antimicrobial Stewardship Initiative. *Infection Control & Hospital Epidemiology*, 38(05), 513-520. doi:10.1017/ice.2016.328
3. Centers for Disease Control and Prevention. Antibiotic use in the United States, 2017: progress and opportunities. Atlanta, GA: US Department of Health and Human Services, CDC; 2017. https://www.cdc.gov/antibioticuse/stewardship-report/pdf/stewardship-report.pdf.

SPOTLIGHT

Virginia Commonwealth University Health Decreases Carbapenem Use

Michael Stevens, MD, MPH, FACP, FIDSA, FSHEA and Kimberly Lee, PharmD

Carbapenem-resistant Enterobacteriaceae (CRE) can cause difficult to treat infections associated with high morbidity and mortality. Resistance in CRE is complex and can be mediated by numerous different mechanisms. The use of broad-spectrum antibiotics, including carbapenems, can lead to colonization (and subsequent infection) with CRE. CRE can be spread within healthcare settings and major outbreaks of CRE have been reported. As carbapenems are often used as a "last resort" antibiotic for our sickest patients, efforts to reduce the emergence and spread of CRE are critical.

Our Antimicrobial Stewardship Program (ASP) at Virginia Commonwealth University (VCU) Health chose to focus specially on carbapenem use starting in 2015. Our program has been in place for over 20 years and we restrict approximately 40 antibiotics for adult inpatients and also perform 40-80 post-antibiotic order reviews with provider feedback daily. However, as of 2015 we did not restrict meropenem (our anti-pseudomonal formulary carbapenem).

Although we tracked normalized meropenem use (in Days of Therapy, DOT, per 1,000 patients days, PD), we found these data to be difficult for frontline providers to interpret. As we have relatively low endemic rates of cefepime and piperacillin-tazobactam resistance, these two anti-pseudomonal antimicrobials are preferentially recommended within our internal treatment guidelines. To contextualize carbapenem use we created a novel consumption metric, the Proportion of Carbapenem Consumption (PoCC):

$$PoCC = \frac{meropenem\text{^}}{cefepime\text{^} + piperacillin - tazobactam\text{^} + meropenem\text{^}}$$

^DOT/1,000 PD

We then performed a research study utilizing data from academic medical centers across the United States to generate regional PoCC metric norms. These data allowed us to determine that the mean PoCC score in our region is 17%. With these data in hand, and combined with local antibiotic resistance data, we were much more successful in our communications with frontline providers regarding potential carbapenem overuse.

Our PoCC average for 2015 was around 30%. Initially we targeted high use units with more aggressive post-antibiotic order review with intervention strategies and this led to an approximately 5% point reduction in our PoCC score by 2017. Given that we were still significantly above the regional mean PoCC of 17% for academic medical centers meropenem restriction was initiated in January 2018. We have since seen a 10% reduction in our PoCC score bringing it down to approximately 15% (Figure 1).

We believe novel consumption metrics such as the PoCC can be useful to ASPs as these contextualize antibiotic use and are directly meaningful to frontline providers and healthcare leadership. Furthermore, our experience suggests that when targeting carbapenem use restriction may have more of an impact than post-antibiotic order review with provider feedback.

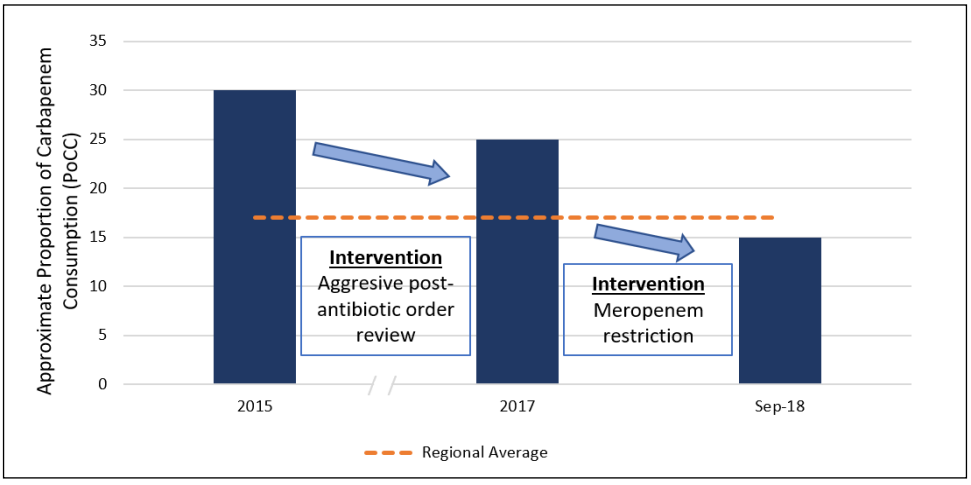


Figure 1: Approximate Reduction in Proportion of Carbapenem Consumption (PoCC) from 2015 to September 2018 at Virginia Commonwealth University Health after intervention implementation.

SPOTLIGHT

Bon Secours Creates Easy Guide for Outpatient and Emergency Department Providers

Andrea Hobbs, PharmD; Rebeccah J. Collins, PharmD, BCPS; and Kerri T. Musselman, PharmD, BCACP

The stewardship program at Bon Secours Memorial Regional Medical Center created a one-page Upper Respiratory Tract Infection (URTI) treatment guide. URTIs are the most common acute illnesses evaluated in the outpatient setting, accounting for 25 million primary care visits each year. Ninety percent of URTIs are caused by viruses, thus antibiotics are not indicated. A mnemonic was created, N.O.A.B.X, to help guide treatment decisions.

*Use the mnemonic **N.O.A.B.X.** to guide your decision-making process as you treat patients that present with an URTI. Remember, **90%** of the time, "**NO ABX**" is needed!*

N — Notice the Signs & Symptoms

O — Omit other Causes

A — Assess the Severity

B — Balance

X — "X" out the antibiotic!

Sinusitis	Bronchitis	Pharyngitis
• Nasal Congestion • Nasal Discharge • Cough • Fever • Facial pain/toothache	• Cough • Dyspnea • Sputum production • Fever • Nasal Congestion • Headache	• Sore throat • Dysphagia • Fever • Headaches/body aches • Petechiae • Tonsillar exudates or tender cervical lymph nodes

Omit other causes of infection and consider confounding disease states

* Consider the possibility of **pneumonia** in patients presenting with pneumonia
* Consider the patient's prior medical history (i.e. could this be asthma, COPD or heart failure exacerbation?)

Length	Worsening Signs & Symptoms	Tests/Cultures
≥ 10 days despite OTC drug use Severe symptoms >3-4 days	Persistent fever, ↑HR Purulent discharge Bloody/rusty sputum (bronchitis)	Rapid Antigen Test (Pharyngitis) Cultures Chest X-Ray

Balance the pros and cons of waiting to initiate antibiotic therapy

* Studies show that antibiotic use only reduces the duration of illness by **less than 1 day**
* Reserve antibiotic treatment for sinusitis for patients with persistent symptoms **≥ 10 days**

If you have no concerns at this point, the infection is **likely viral** and the antibiotic is **NOT** indicated!

* Prescribe supportive care and symptom management therapy
* Provide education on expected duration of viral illness
* Instruct patient to return if symptoms do not resolve within 10 days or if symptoms worsen

SPOTLIGHT

Reducing *Clostridioides difficile* at UVA: Antimicrobial Stewardship Core Elements in Action

Heather L. Cox, PharmD, BCPS-AQID and Amy J. Mathers, MD, D(ABMM), Co-Directors, UVA Antimicrobial Stewardship

Leadership Commitment

In October of 2016, Medical Center leadership identified hospital onset LabID *C. difficile* (HO-CDI) as a "Be Safe" priority, where real-time, root cause problem solving drives the establishment of standard work to optimize quality of care and patient safety. HO-CDI included patients admitted >72 hours with a positive *C. difficile* PCR reported in the electronic medical record (EMR).

Accountability

The Antimicrobial Stewardship Program (ASP) physicians and pharmacists partnered with leaders from Hospital Epidemiology and Quality to form a new *C. difficile* coalition. The group was charged with coordinating HO-CDI reduction strategies across service lines and reporting progress to senior leadership. New HO-CDI cases were reviewed by ASP members and physician leadership and then discussed with patient providers and service team leaders when opportunities for improvement were identified with an expectation for change.

SPOTLIGHT

Reducing *Clostridioides difficile* at UVA (continued)

Drug Expertise

New HO-CDI cases populated an internal Health System dashboard daily; ASP pharmacists performed prospective review in order to better understand the current condition and identify opportunities for improvement (OFI) in testing and antimicrobial use. Opportunities around testing patients who were actively receiving pro-motility agents were identified, providing a possible alternative diagnosis for diarrhea in a hospitalized patient. Prolonged use of cefazolin prophylaxis in neurosurgical patients was identified as an area for potential practice modification, given new data supporting its safe discontinuation soon after procedures were performed.

Action

OFI identification prompted review with ASP physicians and real-time feedback to providers and service line leads. Those most common across broader patient populations drove action to optimize standard work. Projects pursued in the first year of the program included:

1. Built IT infrastructure to track and report testing practices.
2. Implemented computerized decision support tool to guide PCR order appropriateness and reduce unnecessary tests.
3. Limited cefazolin prophylaxis for neurosurgical patients with indwelling drains to 24 hours.
4. Revised institutional guidelines for hospital-acquired and ventilator-associated pneumonia (HAP/VAP).

Tracking and Reporting

The coalition partnered with UVA data scientists and Health System Information Technology to provide real-time reporting of PCR ordering practices prior to and following implementation of an EMR decision support tool. Positive/negative results and orders "prevented" by the new tool were tracked in concert with inappropriately placed orders (duplicate negative, duplicate positive, or solid stools rejected for testing). Data were available electronically to team members and offered filtering by location and service. When comparing an 18-month pre-intervention control period to a 10-month post-intervention period, 41% and 31% reductions in *C. difficile* tests and HO-CDI, respectively, were observed ($p<0.001$)(1).

The ASP collaborated with neurosurgery to limit cefazolin prophylaxis to no more than 24 hours beginning in April 2017. Although cause and effect cannot be definitively established, HO-CDI for the service line fell from 1.96 cases/1,000 patient-days in quarter 4 2016 to zero in quarter 3 2017 immediately following the change; a 78% reduction in cases was observed from May 2017 to May 2018. A 38% decrease in cefazolin days of therapy/1,000 days present was sustained for the remainder of 2017 on neurosurgical units.

When HO-CDI case review revealed practice heterogeneity and prolonged empiric therapy in the setting of suspected hospital and ventilator-associated pneumonia, the ASP assembled a multidisciplinary team to revise institutional guidelines. Local microbiology guided antibacterial recommendations, discontinuing empiric therapy when the clinical picture was not consistent with pneumonia, and shorter durations of therapy were emphasized.

Education

Several live educational initiatives supplemented by electronic communication accompanied the practice change initiatives described herein. Licensed independent providers, nurses, and pharmacists were included where appropriate. For example, 1) the updated institutional pneumonia guidelines were presented in Critical Care, Internal Medicine, and Pharmacy Grand Rounds, 2) housestaff for all training programs engaged in live educational efforts regarding appropriateness of testing, and 3) a literature review and planning discussion was conducted in partnership with neurosurgery faculty in pursuit of safely shortening the duration of peri-procedure prophylaxis.

1. Madden GR, German Mesner I, Cox HL, Mathers AJ, Lyman JA, Sifri CD, Enfield KB. 2018. Reduced *Clostridium difficile* Tests and Laboratory-Identified Events With a Computerized Clinical Decision Support Tool and Financial Incentive. Infect Control Hosp Epidemiol 39:737-740.

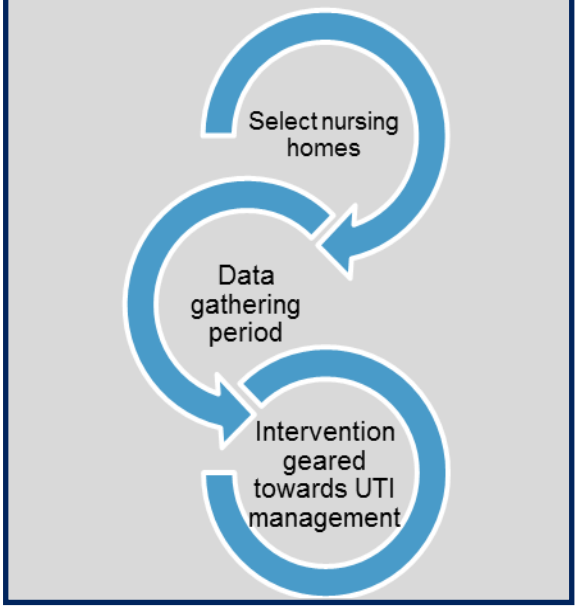
SPOTLIGHT

Inova Starts Pilot Program For Nursing Home Stewardship Program to Improve Metrics

Aabha Jain, MD

Infectious Diseases Physicians (IDP), Inc. is a private clinical practice located in the Northern Virginia suburbs of Washington D.C. devoted to the care of people with infectious diseases. In addition to attending to patients in the hospital and office settings, several years ago, IDP physicians and nurse practitioners began seeing patients in the long-term care setting, as well. This allowed close follow-up for individuals discharged on IV antibiotics and provided consultations for residents with newly recognized infections. Although the ID care had been provided in a fee-for-service arrangement, IDP physicians and nursing home staff recognized the potential need for assistance with related issues, including infection control and antibiotic stewardship.

Figure 1: Pilot Program Overview



Inova is a multi-hospital health system in Northern Virginia. In 2017, its system-wide Infection Control committee expressed interest in expanding its activities outside of the acute-care hospital environment. The committee agreed to fund a 6-month pilot project aimed at identifying the capacity of nursing homes to adapt to, and abide by the recently developed CDC guidelines on Antibiotics Stewardship in the Nursing home. Two local nursing homes were selected to participate and IDP was chosen to carry out this pilot. The pilot included three months of data gathering, regarding existing policies and clinician engagement, followed by three months of a pilot intervention aimed at improving at least one stewardship metric. The pilot intervention, currently being implemented, is a pathway for management of suspected urinary tract infections. The pilot intervention includes streamlined data collection tools, staff and physician engagement, and clear-cut opt-outs for suspected sepsis.

Inova leadership, within the areas of pharmacy, infection control, and care management have been selected to participate and help provide guidance to this pilot project, and to help explore ways in which this collaboration might improve metrics with respect to infection control and transitions of care for patients moving between nursing facilities and acute care facilities across the health system. Potential benefits might include a reduction in antibiotic use in the nursing facilities, fewer resistant bacterial isolates, and fewer complications related to unnecessary antibiotic use.

SPOTLIGHT

Implementation of an Antibiotic Timeout at Sentara Healthcare

Ashlee Hamel, PharmD, BCPS and Chris Tagliente, PharmD, BCPS

An antibiotic time-out (ATO) provides an opportunity for clinicians to intentionally pause to review the appropriateness of active antibiotic orders. It is known that up to 50% of antibiotics prescribed in the hospital are unnecessary and inappropriate. Antibiotics are often started empirically but are not de-escalated or discontinued in a timely manner. Misuse of antibiotics not only increases the risk of adverse drug events and preventable *C. difficile* infections, but promotes the spread of multi-drug resistant organisms.

A number of state and federal agencies, along with professional societies, have developed antimicrobial stewardship best practice standards. These standards impact hospital accreditation, payer reimbursement, and quality metrics. An ATO is one of the measured best practices and is proposed to be a regulatory mandate by the Centers for Medicare and Medicaid Services in the near future.

SPOTLIGHT

Implementation of an Antibiotic Timeout (continued)

Sentara Healthcare recently completed a 2 year project designing an ATO workflow within the electronic medical record.

Goal

Provide clinicians with an opportunity to routinely assess all antibiotic regimens 48-72 hours after initiation

Problem

- Antibiotic rationale is inconsistent and often incomplete
- If assessments occur, documentation is not available in a discrete, reportable, or actionable format

Barriers

- Alerts that fire on all patients are invasive and can quickly become white noise

Solution

- Give providers the ability to proactively assess antibiotics and record the ATO in conjunction with their daily workflow

Providers can document an ATO within a daily progress note using a smart data element (SDE), which files the assessment in discrete, reportable fields. This SDE is incorporated into a smart phrase that providers can add into any note or is available within a note template as cascading questions with response buttons. A change in active antibiotic orders during the ATO window of 48-72 hours is also filed as a reportable field. The documentation of an ATO by the above methods will fulfill the best practice standard.

Example of progress note documentation of an ATO:

Antibiotics and available cultures have been reviewed. Therapy plan is to:

broaden/escalate therapy | continue current regimen | narrow/de-escalate therapy | discontinue antibiotics

Antibiotics are being continued for:

empiric therapy | documented/confirmed infection

If an ATO is not recorded during the time out window of 48-72 hours a best practice alert will fire. In order to reduce white noise and create an actionable alert, the alert was structured to only fire to the provider responsible for the antibiotics. This was done by filtering the alert to providers within the same specialty of the initial ordering provider. The alert shows only between the hours of 0600 and 1800 to reduce the burden on overnight providers who may not be very familiar with the patient. Additional exclusions for the alert criteria include antivirals and topicals/otic/ophthalmic formulations.

Antimicrobial Stewardship Nursing Education Campaign

The Virginia Healthcare-Associated Infections Advisory Group is conducting a statewide education campaign for nurses to become more informed about antimicrobial stewardship. Emails were sent to antimicrobial stewardship and infection prevention contacts from acute care hospitals and long-term care facilities asking them to distribute the CDC/ANA White Paper – Redefining the Antibiotic Stewardship Team: Recommendations from the American Nurses Association/Centers for Disease Control and Prevention Workgroup on the Role of Registered Nurses in Hospital Antibiotic Stewardship Practices — to their nursing staff. The nurses were asked to complete a short survey which included three questions related to information in the article and two questions on antimicrobial stewardship tasks they would like to be more involved with and education they would like to receive. The survey will conclude on November 15th. Follow VDH on social media for updates on survey results!

Global Antimicrobial Resistance Challenge

In September 2018, at the United Nations General Assembly, CDC and the U.S. Department of Health and Human Services launched an ambitious initiative to combat antimicrobial resistance (AMR) across the globe: **The AMR Challenge**. This challenge prompts leaders from across the spectrum of health – including leaders from pharmaceutical companies, insurance companies, the food industry, and government health officials – to combat AMR in at least one of the five commitment areas. During this yearlong challenge, participants are encouraged to commit to a specific action that can address AMR in their facilities. Over 100 organizations have already made commitments! Find out more about the challenge and see a list of participant commitments here.

Five Commitment Areas of the AMR Challenge

- **Tracking and data:** Share and improve data collection
- **Infection prevention and control:** Reduce the spread of resistant germs
- **Antibiotic use:** Improve appropriate antibiotic use, including ensuring access to these drugs
- **Environment and sanitation:** Decrease antibiotics and resistance in the environment, including improving sanitation
- **Vaccines, therapeutics, and diagnostics:** Invest in development and improved access

Antibiotic Treatment for Acute Upper Respiratory Infection

Despite the CDC recommendation not to treat uncomplicated upper respiratory infections with antibiotics, they are often a source of unnecessary antibiotics. In order to share data with prescribers and identify opportunities for improved antibiotic prescribing, VDH analyzed outpatient antibiotic prescription claims for acute upper respiratory infections.

The Virginia Health Information (VHI) houses the All-Payer Claims Database (APCD), which holds data for private insurance, Medicare, and Medicaid. From 2011-2016, this database held 3.5 to 4 million outpatient claims, including at least 95% of Medicaid, and 45-60% of commercially insured Virginians. Additionally, VHI manages a Medicare Database, where Medicare data was only available for 2015-2016. All data sets were extracted from the APCD portal and deduplicated in SAS to ensure each patient claim was only counted once per visit. Repeat visits were counted as separate claims. Antibiotic prescribing proportions were calculated using the following formula:

$$Proportion = \frac{No.\ Antibiotic\ Prescription\ Claims\ Within\ 0\text{-}3\ Days\ of\ Diagnosis}{No.\ Patients\ With\ Primary\ Diagnosis\ of\ Upper\ Respiratory\ Infections}$$

In 2016, 21.5% of outpatient claims for acute upper respiratory infection led to an antibiotic prescription claim. Geographically, there was a disparity in rates across the state with higher rates in Northwest and Southwest Virginia (Figure 1). Furthermore, analyzing the data for different payers, the highest proportions of prescriptions occurred within the Medicare population (Figure 2). Limitations of claims data include misclassification of diagnosis, incomplete inclusion of the Virginia population, and inability to assess appropriateness of individual encounters. Even with these limitations, the data suggest opportunities for improved prescribing. Providers across the state should follow current guidelines. Outpatient prescribers should evaluate their prescribing practices to ensure they are consistent with the recommendations.

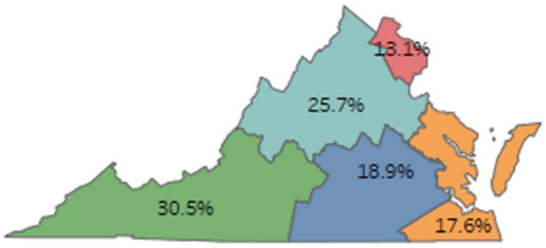


Figure 1: Proportion of Antibiotic Prescription Claims for Upper Respiratory Infections, By Region

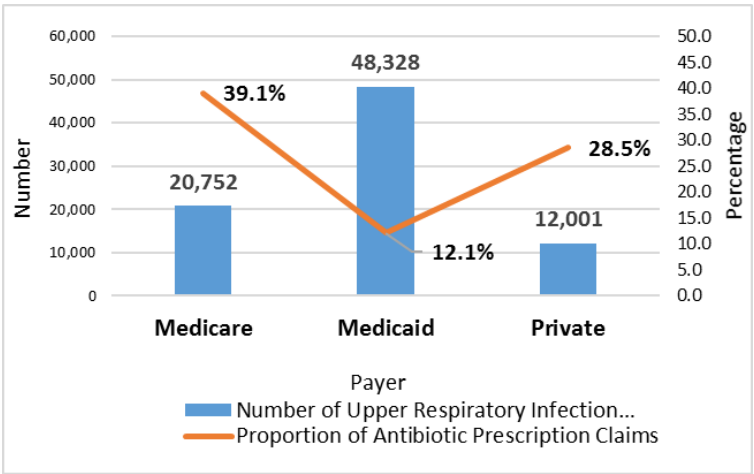


Figure 2: Number of Outpatients Diagnosed with Upper Respiratory Infection, By Payer

Virginia State and Regional Cumulative Antibiogram

Antimicrobial resistance is a global public health concern. Facility-level antibiograms provide a summary of the percentage of isolates susceptible to a variety of antimicrobial agents within a healthcare facility. The facility antibiogram is an important tool for the development of antimicrobial stewardship policies and protocols for empiric antibiotic selection.

The Virginia Healthcare-Associated Infections Advisory Group led by the Virginia Department of Health, Health Quality Innovators, and the Virginia Hospital and Healthcare Association analyzed data from facility-level antibiograms to develop an understanding of antimicrobial susceptibility and resistance among bacteria recovered from clinical specimens in Virginia.

Antimicrobial Resistance: Unmet Needs

- Facility antibiograms are often limited by the number of organisms tested and geographic coverage represented.
- Small hospitals, skilled nursing facilities, physician practices and others that do not encounter a wide variety of organisms are not able to create an antibiogram from their resistance data.

Contact List

- An antimicrobial stewardship pharmacist contact list was created in February 2018 after emails were sent to Infection Preventionists at facilities that submit data to NHSN and have conferred rights to VDH.
- List was also updated with contacts from the Stewardship Interest Group of Virginia, a group developed in 2012 to bring together pharmacists involved in antimicrobial stewardship.

Recruitment

- The Antimicrobial Resistance Coordinator at VDH contacted antimicrobial stewardship pharmacists in June 2018 asking for voluntary submission of the most recent facility antibiogram.
- A total of 85 facilities were contacted to participate.

Limitations

- Preparation of facility-level antibiograms using CLSI M39 guidance and the most recent breakpoint interpretations were not verified.
- Not all facilities reported the same organism/antibiotic combinations.
- Not all facilities reported results by source, location, and/or practice setting.

Analysis

- Total number of organisms susceptible and the total number of isolates tested were combined for each similar organism and antibiotic combination.
- Analyses were completed for statewide data, outpatient data, urine data, and regional data.
- Included in the report are the percent susceptible, total number of isolates tested, percent susceptible range, and number of facilities.
- Maps listing the percent susceptible by region were created using Tableau.

Results

- 76/85 (89%) Virginia hospitals submitted facility-level antibiograms to be included in the statewide report.
- Regional variations exist but in general, far southwest Virginia reported the most resistance.
- Statewide data suggest similar trends in resistance to national data.
  - For *Pseudomonas aeruginosa*, meropenem was resistant in 10% of isolates.
  - For *E. coli*, 27% of isolates were resistant to levofloxacin compared to only 8% of isolates resistant to third generation cephalosporins.
  - For *Staphylococcus aureus*, 47% of isolates were resistant to nafcillin.
  - For *Enterococcus faecium*, 80% of isolates were resistant to ampicillin and 62% were resistant to vancomycin.

The full report with the regional analysis will be published on the VDH website soon. Keep an eye on our social media accounts for more information!

Thank you! We would like to thank all facilities across Virginia for their continued efforts to reduce antimicrobial resistance. We would especially like to thank the antimicrobial stewardship programs that submitted a spotlight article. We know there are other programs doing great work as well, and we would love to hear about it! If you would like to have your facility spotlighted in a future edition of the *HAI High Sign*, please email hai@vdh.virginia.gov.

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