STATE OF NEW HAMPSHIRE

2018 STATE ANTIBIOGRAM & IMPLICATIONS FOR ANTIBIOTIC PRESCRIBING

Released:
January 2020

New Hampshire Department of Health and Human Services
Division of Public Health Services
Antibiogram and Clinical Messaging Update
The New Hampshire State Antibiogram and Clinical Summary uses local antibiotic resistance data to help guide prescribing of antibiotics for common clinical syndromes and avoid unnecessary broad spectrum therapy that can put patients at increased risk for adverse side effects and contribute to development of antibiotic resistance. This document can also be used to help facility antibiotic stewardship programs craft more local messaging about appropriate antibiotic prescribing.

This 2018 State Antibiogram and Clinical Summary incorporates the updated American Thoracic Society and Infectious Diseases Society of America (IDSA) Official Clinical Practice Guidelines for the Diagnosis and Treatment of Adults with Community Acquired Pneumonia [1], and the 2019 IDSA Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria [2]. Our 2016 and 2017 State Antibiograms and Clinical Summaries can be found here.

The arrow bullet points [►] indicate new or significant changes to our clinical messaging. The dot bullet points [●] are important clinical messages that remain from last year’s antibiograms’ clinical summary, but may have updated antibiogram numbers.

Table 1 below offers considerations and evidence for short duration of antimicrobial therapy, an important strategy that when compared to longer courses, is associated with similar treatment efficacy, lower rates of subsequent infection with multidrug-resistant organisms, and fewer systemic adverse reactions [3] [4] [5]. The suggested short course duration of antibiotics is not intended to supplant clinician judgement about individual patients or special clinical situations.

Table 1: Short Course Antibiotic Therapy for Specific Infectious Syndromes in Adults

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Short Course of Therapy (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated urinary tract infections</td>
<td>3-5 days (depending on antibiotic)</td>
</tr>
<tr>
<td>Complicated urinary tract infections, including acute pyelonephritis</td>
<td>May be as short as 7 days</td>
</tr>
<tr>
<td>Community-acquired pneumonia (CAP)</td>
<td>May be as short as 5 days</td>
</tr>
<tr>
<td>Hospital-acquired pneumonia (HAP)</td>
<td>7 days</td>
</tr>
<tr>
<td>Skin and soft tissue infections (SSTI), including Cellulitis</td>
<td>May be as short as 5 days</td>
</tr>
</tbody>
</table>

References:
- IDSA treatment guidelines for HAP/VAP [7]
- IDSA treatment guidelines for CAP in adults [1]
- IDSA treatment guidelines for UTIs [8]
- IDSA treatment guidelines for skin and soft tissue infections (SSTIs) [9]
**Clostridioides difficile (C. diff, formerly Clostridium difficile):**

- Every year in the United States, there are an estimated 450,000 people diagnosed with *C. diff* infections, including 29,000 deaths (i.e., more than 1-in-20 estimated to die of their infection) [10] [11].
- The U.S. Centers for Disease Control and Prevention (CDC) has listed *C. diff* as one of the five top “Urgent” antibiotic-related threats to human health. See the newly released 2019 CDC Antibiotic Resistance Threats report here [12].
- Antibiotic use is associated with a 7-10 times increased risk of a patient developing a *C. diff* infection within the first month of antibiotic use, and the increased risk of *C. diff* extends for up to three months after a patient stops taking antibiotics [13].
- Any antibiotic can cause *C. diff* infection, but the highest risk antibiotics include fluoroquinolones, 3rd and 4th generation cephalosporins, carbapenems, and clindamycin.
- Appropriate narrow-spectrum antibiotic use, de-escalation of empiric broad-spectrum antibiotics based on microbiology results, and addressing appropriate treatment duration (Table 1) can help prevent the emergence of antibiotic resistance and minimize complications such as *C. diff* infection.
- Testing for *C. diff* should occur only in patients with clinically significant new-onset or unexplained diarrhea (e.g. ≥3 unformed stool in 24 hours). Patients can be colonized with *C. diff*, and testing can detect asymptomatic carriage which doesn't need treatment [14] [15].
- Repeat testing should not be performed within 7 days during the same episode of diarrhea, but may be indicated for patients with recurrent diarrhea after successful treatment for *C. diff* that resulted in resolution of diarrhea [15].
- A test of cure is not necessary because more than 60% of patients may have a *C. diff* positive test result even after successful treatment [15].

**Urinary Tract Infections (UTIs):**

- Classic symptoms of a UTI include focal genitourinary symptoms (e.g., urinary frequency, urgency, dysuria, costovertebral angle tenderness). Patients without these focal symptoms are generally considered asymptomatic.
- In most patients, asymptomatic bacteriuria should not be treated with antibiotics. Treatment may be indicated during pregnancy, before certain urologic procedures, and after renal transplantation, particularly within the first month after renal transplantation. The Infectious Disease Society of America updated their Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria in 2019 [2].
- Asymptomatic bacteriuria is common. For instance, 10-20% of people over the age of 60 have asymptomatic bacteriuria, with rates as high as 50% in women over the age of 80 and in patients who are in nursing homes. Patients with indwelling urethral catheters incur a 5% per day risk of bacteriuria, with at least 25% of patients with a catheter in place for a week developing bacteriuria. Treatment of patients with asymptomatic bacteriuria does not reduce symptomatic UTI, pyelonephritis, urosepsis, or death. Instead, it merely increases local rates of resistant Enterobacteriaceae and *C. diff* infections [2] [16] [17] [18] [19] [20] [21] [22] [23] [24].
- Elderly patients with delirium or who experience falls are often found to have bacteriuria, but this bacteriuria is usually unrelated to the patient’s delirium or fall. These events on their own are not indications to evaluate for a UTI. Instead, for clinically stable patients, first attempt hydration, evaluate medications for potential interactions/adverse effects, and discontinue diuretic/psychotropic medication if possible [21] [25]. Similarly, work-up for a UTI should not be initiated based on cloudy or foul-smelling urine alone; these typically indicate dehydration rather than a UTI [26].
- In New Hampshire, the most common Gram-negative bacteria isolated from urine were *Escherichia coli* (70% of isolates) followed by *Klebsiella* spp. (16%) and *Proteus mirabilis* (5%). *Pseudomonas aeruginosa* was recovered in fewer than 4% of urine specimen cultures; therefore, empiric UTI coverage with a fluoroquinolone to cover *Pseudomonas* is not usually needed.
Urinary Tract Infections (UTIs), continued:

- Nitrofurantoin remains the most likely active agent against *Escherichia coli* (98% susceptible), followed by cephalexin (predicted by cefazolin, 90% susceptible). Trimethoprim-sulfamethoxazole and ciprofloxacin are less likely to be active (83% and 88% susceptible, respectively), and we recommend avoiding ciprofloxacin as first-line therapy because of the potential for toxicity and *C. difficile* infection.

- We recognize that many providers are prescribing antibiotic therapy for UTIs by phone. We recommend providers obtain a urine culture before antibiotics are started in cases where the provider elects initial broad spectrum antibiotic therapy (e.g., third-generation cephalosporin or fluoroquinolone), or when a patient has failed the above recommended narrow spectrum therapy.

- For patients with antibiotic allergies or risk for resistant bacteria, fosfomycin can be considered for *E. coli* and enterococcal UTIs. While most hospital laboratories do not routinely test susceptibilities for this antibiotic, testing can be requested. According to national and limited local data, >90% of *E. coli* are susceptible to fosfomycin.

- The most common Gram-positive bacterial pathogen isolated from urine are *Enterococcus faecalis* (69%). The majority of *E. faecalis* isolates in the urine were susceptible to ampicillin/amoxicillin (99% susceptible). Susceptible uncomplicated enterococcal UTIs can be treated with high-dose amoxicillin.

- *Staphylococcus aureus* is an infrequent isolate from urine. In the absence of ureteral hardware (e.g., stents), finding *Staphylococcus aureus* (either MSSA or MRSA) in aseptically obtained urine specimens should lead a provider to consider that the urine culture result is due to a bloodstream infection.

- For most patients hospitalized for a complicated UTI or acute pyelonephritis, empiric initial treatment with ceftriaxone while awaiting culture results is appropriate, assuming that there is no history of a UTI with a ceftriaxone-resistant bacteria. Gram-negative organisms cause the majority of UTIs (87%), and ceftriaxone maintains very good activity against the most common Gram-negative bacteria in the urine. Among the more than 37,800 NH urine cultures that grew either *E. coli*, *K. pneumoniae*, or *P. mirabilis* (the three most common Gram-negative bacteria cultured from urine) in 2018, 95% were susceptible to ceftriaxone.

Community Acquired Pneumonia (CAP) and Hospital Acquired Pneumonia (HAP):

- National data shows that 44% of outpatient antibiotic prescriptions are written for acute respiratory conditions, at least half of which are caused by viruses and will not respond to antibiotics [27].

- The most commonly prescribed antibiotic in the outpatient setting is azithromycin [28], but approximately 40% of *Streptococcus pneumoniae* (Pneumococcus) isolates in NH are resistant to azithromycin (predicted by erythromycin susceptibility). As a result, azithromycin should not be prescribed for suspected pneumococcal pneumonia (e.g., when the clinical presentation is acute with a focal infiltrate on chest x-ray).

  - Empiric treatment of CAP in healthy outpatient adults without comorbidities should be with either amoxicillin 1000 mg by mouth three times daily or doxycycline 100 mg by mouth twice daily (about 80 and 83% of *S. pneumoniae* isolates in NH are susceptible to penicillin and tetracyclines, respectively).

  - Empiric treatment of CAP in outpatient adults with comorbidities (e.g., chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; asplenia) should include combination therapy with either amoxicillin/clavulanate (875mg/125mg by mouth twice a day) or a cephalosporin (either cefpodoxime 200 mg by mouth twice a day or cefuroxime 500 mg by mouth twice a day) PLUS doxycycline 100 mg by mouth twice a day. All these antibiotics still maintain sufficient activity against *S. pneumoniae* isolates in NH.
Community Acquired Pneumonia (CAP) and Hospital Acquired Pneumonia (HAP), continued:

- The respiratory fluoroquinolones (e.g., levofloxacin and moxifloxacin) remain highly active against *Streptococcus pneumoniae* and cover atypical bacterial pathogens; however, we do not recommend fluoroquinolones as first line therapy for the treatment of outpatient CAP because of class toxicities, their ability to cause *C. difficile* infection even months after antibiotics have completed, and the availability of suitable alternatives. The FDA has issued black box warnings related to fluoroquinolone class antibiotics [29].

- For patients with CAP requiring hospitalization, we recommend treatment with ceftriaxone and either doxycycline or azithromycin (for atypical bacterial pathogens).
  - The category of “healthcare-associated pneumonia” (HCAP) is no longer a recognized category. Many studies have shown the factors previously used to define HCAP (e.g., residence in a long-term care facility, hospitalization in the last 90 days, chronic dialysis) do NOT predict more antibiotic resistance, and instead led to inappropriate broad spectrum antibiotic use without improved patient outcomes. Unnecessary broad spectrum antibiotics targeting MRSA and/or *Pseudomonas* have been associated with longer hospitalization, more *C. difficile* infections, and increased mortality. Standard therapy for CAP is typically appropriate for non-critically ill patients meeting the former HCAP criteria, unless patients have a prior history of resistant pathogens [30] [31] [32].

- Hospital-acquired pneumonia (HAP) is pneumonia in a hospitalized patient with onset at least 48 hours after being admitted. HAP still warrants treatment with broad-spectrum empiric therapy pending respiratory culture results; however, vancomycin is not needed in all cases of HAP. Indications for empiric vancomycin include septic shock, worsening respiratory failure (+/- necrotizing pneumonia or empyema), IV antibiotics within the past 90 days, prior MRSA colonization or infection, and MRSA known to be cultured in >5% of all respiratory cultures sent [7].
  - Patients who are hospitalized for CAP with concern for MDROs or patients being treated for HAP should have sputum obtained for culture, ideally before antibiotic administration, and antibiotic therapy should be de-escalated (narrowed) after 48 hours if the cultures do not grow a resistant organism.

**Chronic Obstructive Pulmonary Disease (COPD) Exacerbations:**

- Bacteria are isolated in only 40-50% of patients with COPD exacerbations. The most commonly isolated organisms include *Haemophilus influenzae*, *Streptococcus pneumoniae*, and *Moraxella catarrhalis* [33] [34].
- The role that bacteria play in many cases of COPD exacerbation, however, remains uncertain; and the role for antibiotics in treatment of COPD exacerbations remains controversial [35] [36].
- In general, antibiotics are not routinely needed in patients with a mild COPD exacerbation not requiring hospitalization.
- Antibiotics can be considered in patients with moderate to severe COPD exacerbations based on the presence of increased dyspnea, increased sputum volume, and increased sputum purulence, according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines [36]. Antibiotics are also recommended for patients with severe COPD exacerbations that require mechanical ventilation [36].
- Empiric antibiotic therapy should target the most common bacterial contributors to COPD exacerbations. We suggest empiric therapy that is consistent with revised CAP guidelines, including either amoxicillin/clavulanate, or a 2nd/3rd generation cephalosporin, which maintain good activity against *S. pneumoniae*, *H. influenza*, and *M. catarrhalis*. Doxycycline also maintains good activity against these organisms and can be considered, but may be less effective [36] [37]. Providers should also be aware that *S. pneumoniae* isolates show increasing resistance to macrolides (e.g., azithromycin), which could potentially limit its effectiveness.
Chronic Obstructive Pulmonary Disease (COPD) Exacerbations, continued:

- The use of fluoroquinolones should be reserved for patients with known colonization of fluoroquinolone-susceptible Gram-negative organisms like *Pseudomonas aeruginosa*.
- If there is concern for a more resistant Gram-negative bacteria due to patient factors (e.g. frequent exacerbations, bronchiectasis, failure of prior therapy, severe airflow limitation, exacerbations requiring mechanical ventilation), then we suggest a respiratory culture be performed to help with more targeted antibiotic therapy [36].
- The recommended antibiotic duration of therapy for COPD exacerbations may be as short as 5 days [36].

Skin and Soft Tissue Infections (SSTIs), including Cellulitis:

- Most SSTIs are due to either streptococcal infection or *S. aureus*. Non-purulent SSTIs (i.e., cellulitis) are usually not caused by methicillin-resistant *S. aureus* (MRSA), so empiric coverage of this organism is typically not necessary. 68% all non-urine *S. aureus* isolates in New Hampshire were methicillin-sensitive *S. aureus* (MSSA). There are many options that treat both streptococci and MSSA, including ceftriaxone, cefazolin, cephalexin, and dicloxacillin.
- For non-purulent SSTIs, studies have demonstrated no benefit in adding an empiric MRSA antibiotic to the more standard therapy targeted at streptococci and MSSA [38] [39].
- In the case of skin abscess (i.e. purulent SSTI), the abscess should be incised and drained with drainage sent for bacterial Gram-stain and culture. Preferred empiric outpatient antibiotic regimens for MRSA SSTIs are either trimethoprim-sulfamethoxazole or doxycycline (96% and 93% susceptibility against MRSA, respectively). Adjunctive antibiotic therapy does improve cure rates when paired with incision and drainage [40] [41].
- Clindamycin should not be prescribed empirically for MRSA, because approximately one-third (32%) of isolates are resistant.
- MRSA is present in up to 15% of diabetic foot infections, so empiric vancomycin may be appropriate, although it is worth noting that over 60% are caused by streptococci and MSSA [42]. In temperate environments such as in New Hampshire, *Pseudomonas aeruginosa* is rare in diabetic foot infections. Most patients improve on regimens that do not cover *Pseudomonas aeruginosa* [43] [44].

Specific Antibiotic Recommendations:

- In 2018, 54 CRE cases in NH patients were reported to the NH DPHS. We recommend antimicrobial stewardship programs continue to restrict the use of carbapenem antibiotics, because healthcare settings with more liberal use of carbapenem have seen a more rapid rise in carbapenem-resistance.
  - For example, outcomes in intra-abdominal infections are no better with an empiric carbapenem (or with piperacillin-tazobactam) compared with ceftriaxone (or ciprofloxacin) plus metronidazole [45] [46].
- In hospitalized patients with a presumed Gram-negative infection, use of two different classes of antibiotics as empiric treatment may be indicated in cases with septic shock, respiratory failure, intravenous antibiotics in the prior 90 days, and/or structural lung disease (e.g. bronchiectasis, cystic fibrosis). Otherwise, monotherapy is typically appropriate when selecting an antibiotic for which resistance on the local antibiogram is <10%. Once susceptibilities return, this empiric treatment with multiple agents should be tailored to monotherapy in most cases.
Penicillin Allergies:

- When assessing penicillin allergies in patients, it is important to take a detailed clinical history of when the allergic reaction occurred and symptoms of the reaction.
- Over 90% of patients with a penicillin allergy listed in their medical record are not allergic to penicillin. A common reason for this is a viral rash as a child was misattributed to a penicillin class antibiotic. Many people will also lose their penicillin allergy over time; about 80% of patients will lose their penicillin allergy after 10 years [47].
- In patients with a confirmed penicillin allergy, less than 2% have a reaction to cephalosporins as a class [47] [48] [49]. Reactions to first generation cephalosporins are most common, but still fewer than 10% of patients with a penicillin allergy will also react to first generation cephalosporins [50]. Reactions to second generation or higher cephalosporins are negligible [47] [51].
- Patients with a confirmed mild penicillin allergy (e.g., benign drug rash or even isolated hives) can safely receive any 3rd or 4th generation cephalosporin. Administration of 1st and 2nd generation cephalosporins should be done in a monitored setting, potentially with a test dose followed by 60 minutes of observation, especially if the prior reaction was immediate [51] [52].
- For patients with more severe reported penicillin reactions, referral to Allergy/Immunology is recommended for penicillin allergy testing.
# New Hampshire Statewide Antibiogram 2018

All Sources Other Than Urine

**Percent Susceptible**

## Bureau of Infectious Disease Control

Infectious Disease Surveillance Section

NH Department of Health and Human Services
Division of Public Health Services
Bureau of Infectious Disease Control

January 2020

**2018 NH State Antibiogram**

### Gram Negative Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Total Number of Isolates</th>
<th>Penicillin</th>
<th>Ampicillin (Amoxicillin)</th>
<th>Oxacillin (Nafcillin)</th>
<th>Ampicillin/Sulbactam*</th>
<th>Cefazolin (Cephalexin)</th>
<th>Cefotaxime</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Aztreonam</th>
<th>Ertapenem</th>
<th>Meropenem</th>
<th>Imipenem</th>
<th>Doripenem</th>
<th>Carapfloxacin</th>
<th>Levofloxacin</th>
<th>Amikacin</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Tcglycine</th>
<th>Tetracycline (Doxycycline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>2775</td>
<td>59</td>
<td>65</td>
<td>97</td>
<td>87</td>
<td>88</td>
<td>95</td>
<td>92</td>
<td>92</td>
<td>94</td>
<td>93</td>
<td>99</td>
<td>100</td>
<td>98</td>
<td>100</td>
<td>84</td>
<td>85</td>
<td>99</td>
<td>93</td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>Klebsiella (Enterobacter) aerogenes</td>
<td>129</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>99</td>
<td>88</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>667</td>
<td>92</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>99</td>
<td>88</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>470</td>
<td>79</td>
<td>96</td>
<td>59</td>
<td>90</td>
<td>98</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>94</td>
<td>91</td>
<td>99</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>94</td>
<td>96</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>600</td>
<td>79</td>
<td>90</td>
<td>100</td>
<td>92</td>
<td>98</td>
<td>93</td>
<td>98</td>
<td>99</td>
<td>97</td>
<td>97</td>
<td>99</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>96</td>
</tr>
<tr>
<td>Serratia marcescens</td>
<td>423</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>99</td>
<td>88</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Citrobacter freundii</td>
<td>140</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>99</td>
<td>88</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>Morganella morganii</td>
<td>203</td>
<td>4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>86</td>
<td>92</td>
<td>89</td>
<td>88</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>1550</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>96</td>
<td>93</td>
<td>92</td>
<td>84</td>
<td>88</td>
<td>96</td>
</tr>
<tr>
<td>Acinetobacter baumannii</td>
<td>158</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62</td>
<td>92</td>
<td>87</td>
<td>82</td>
<td>92</td>
<td>87</td>
</tr>
<tr>
<td>Stenotrophomonas maltophilia</td>
<td>342</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92</td>
<td>85</td>
<td>97</td>
<td>97</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>325</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>91</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
</tbody>
</table>

### Gram Positive Organisms

| Organism                                    | Total Number of Isolates | Penicillin | Ampicillin (Amoxicillin) | Oxacillin (Nafcillin) | Ampicillin/Sulbactam* | Cefazolin (Cephalexin) | Cefotaxime | Ceftazidime | Cefepime | Aztreonam | Ertapenem | Meropenem | Imipenem | Doripenem | Carapfloxacin | Levofloxacin | Amikacin | Gentamicin | Tobramycin | Tetacycline |
|---------------------------------------------|--------------------------|------------|--------------------------|-----------------------|-----------------------|------------------------|------------|------------|----------|-----------|-----------|-----------|----------|-----------|--------------------------|---------------|----------|------------|------------|-----------|-----------------------------|
| Methicillin-Sensitive Staphylococcus aureus (MSSA) | 7721                     | 13         | 100                      | 100                   | 100                   | 100                    | 93         | 96         | 94       | 99        | 82        | 100       | 100      | 100       | 100                     | 99            |          |            |            |           |                |
| Methicillin-Resistant Staphylococcus aureus (MRSA) | 3663                     |            | 56                       | 75                    | 93                    | 96                     | 68         | 100       | 100      | 100       | 99        |           |          |           |                          |                |          |            |            |           |                |
| Enterococcus faecalis                       | 1130                     | 99         |                          |                       |                       |                        |             |           |           |           |           | 96        | 99       | 100      |                          |                |          |            |            |           |                |
| Enterococcus faecium                        | 140                      | 30         | 36                       |                       |                       |                        |             |           |           |           |           | 93        | 100     |          |                          |                |          |            |            |           |                |
| Enterococcus spp. (all hospital data)       | 1817                     | 93         |                          |                       |                       |                        |             |           |           |           |           | 92        | 98       | 99       |                          |                |          |            |            |           |                |
| Coagulase negative Staphylococcus            | 1478                     | 7          | 54                       | 52                    | 52                    | 52                     | 73         | 82        | 82       | 73        | 67        | 99        | 99       | 99        | 99                     | 99            |          | 99         | 99         | 99        | 99                     |
| Streptococcus pneumonia (non-meningitis)     | 421                      | 80         |                          |                       |                       |                        |             |           |           |           |           | 91        | 98       | 99       | 100                    | 83            | 84       | 89         | 63         | 100      | 100                     |

**Important Notes for Interpreting the Antibiogram:**

- High resistance to an antibiotic is a percent susceptibility of less than 80%
- Oxacillin predicts nafcillin susceptibility
- Tetracycline predicts doxycycline susceptibility
- Erythromycin predicts azithromycin susceptibility
- Ampicillin predicts amoxicillin susceptibility
- Cefazolin predicts cephalexin susceptibility
- Ampicillin/sulbactam predicts amoxicillin/clavulanate susceptibility (except for Acinetobacter baumannii which is intrinsically resistant)
- CLSI guidelines suggest total isolate counts of less than 30 are excluded

*Indicates data have been censored because of intrinsic resistance and/or inappropriate clinical use.

Indicates data have been censored because of insufficient sample or less than 3 hospitals.

Predicts amoxicillin/clavulanate susceptibility, except for Acinetobacter baumannii which is intrinsically resistant.
### New Hampshire Statewide Antibiogram 2018

#### All Sources Other Than Urine

**Total Number of Susceptible Isolates/Total Tested**

<table>
<thead>
<tr>
<th>Gram Negative Organisms</th>
<th>Total Number of Isolates</th>
<th>Amoxicillin/Ampicillin</th>
<th>Amoxicillin/Ampicillin*</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Piperacillin/Tazobactam</th>
<th>Ceftriaxone</th>
<th>Cefotaxime (Doxycycline)</th>
<th>Meropenem</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Amikacin</th>
<th>Gentamicin*</th>
<th>Tobramycin</th>
<th>Gentamicin*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>667</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
<td>646</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>771</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
<td>736</td>
</tr>
<tr>
<td><em>Klebsiella oxytoca</em></td>
<td>4,702</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
<td>327</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>600</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
<td>493</td>
</tr>
<tr>
<td><em>Citrobacter freundii</em></td>
<td>140</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td><em>Morganella morganii</em></td>
<td>203</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
<td>183</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>1550</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
<td>1374</td>
</tr>
<tr>
<td><em>Acinetobacter baumannii</em></td>
<td>158</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
</tr>
<tr>
<td><em>Stenotrophomonas maltophilia</em></td>
<td>342</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
<td>290</td>
</tr>
<tr>
<td><em>Haemophilus influenzae</em></td>
<td>325</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
<td>287</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gram Positive Organisms</th>
<th>Total Number of Isolates</th>
<th>Amoxicillin/Ampicillin</th>
<th>Amoxicillin/Ampicillin*</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Piperacillin/Tazobactam</th>
<th>Ceftriaxone</th>
<th>Cefotaxime (Doxycycline)</th>
<th>Meropenem</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Amikacin</th>
<th>Gentamicin*</th>
<th>Tobramycin</th>
<th>Gentamicin*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Methicillin-Resistant Staphylococcus aureus (MRSA)</em></td>
<td>7721</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
<td>808</td>
</tr>
<tr>
<td><em>Methicillin-Sensitive Staphylococcus aureus (MSSA)</em></td>
<td>3663</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
<td>2089</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>1130</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
<td>1092</td>
</tr>
<tr>
<td><em>Enterococcus faecium</em></td>
<td>140</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
<td>1372</td>
</tr>
<tr>
<td><em>Coagulase negative Staphylococcus</em></td>
<td>1478</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
<td>1302</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em> (non-meningitis)</td>
<td>421</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
<td>376</td>
</tr>
</tbody>
</table>

*Indicates data have been censored because of intrinsic resistance and/or inappropriate clinical use.

Indicates data have been censored because of insufficient sample or less than 3 hospitals. CSL guidelines suggest total isolate counts of less than 30 are excluded.

Predicts amoxicillin/sulbactam susceptibility, except for Acinetobacter baumannii which is intrinsically resistant.
# New Hampshire Statewide Antibiogram 2018
## Urine Only Sources
### Percent Susceptible

## Bureau of Infectious Disease Control
Infectious Disease Surveillance Section

## NH Department of Health and Human Services
Division of Public Health Services
Bureau of Infectious Disease Control

### Gram Negative Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Total Number of Isolates</th>
<th>Ampicillin (Amoxicillin)</th>
<th>Piperacillin/Tazobactam</th>
<th>Cefazolin (Cephalexin)</th>
<th>Cefuroxime</th>
<th>Cefoxitin</th>
<th>Ceftriaxone</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Aztreonam</th>
<th>Ertapenem</th>
<th>Meropenem</th>
<th>Imipenem</th>
<th>Doripenem</th>
<th>Ciprofloxacin</th>
<th>Levofloxacin</th>
<th>Amikacin</th>
<th>Gentamicin</th>
<th>Tobramycin</th>
<th>Tigecycline</th>
<th>Tetracycline</th>
<th>Trimethoprim/Sulfamethoxazole Nitrofurantoin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Escherichia coli</strong></td>
<td>30364</td>
<td>64</td>
<td>98</td>
<td>90</td>
<td>92</td>
<td>96</td>
<td>95</td>
<td>95</td>
<td>96</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>88</td>
<td>88</td>
<td>99</td>
<td>93</td>
<td>95</td>
<td>100</td>
<td>81</td>
<td>83</td>
</tr>
<tr>
<td><strong>Klebsiella (Enterobacter) aerogenes</strong></td>
<td>533</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>98</td>
<td>98</td>
<td>100</td>
<td>99</td>
<td>95</td>
<td>98</td>
<td>20</td>
</tr>
<tr>
<td><strong>Enterobacter cloacae</strong></td>
<td>972</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>87</td>
<td>91</td>
</tr>
<tr>
<td><strong>Klebsiella pneumoniae</strong></td>
<td>5304</td>
<td>98</td>
<td>95</td>
<td>94</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>97</td>
<td>96</td>
<td>96</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98</td>
<td>98</td>
<td>100</td>
<td>98</td>
<td>97</td>
<td>99</td>
<td>86</td>
<td>92</td>
</tr>
<tr>
<td><strong>Klebsiella oxytoca</strong></td>
<td>976</td>
<td>96</td>
<td>52</td>
<td>90</td>
<td>98</td>
<td>95</td>
<td>99</td>
<td>99</td>
<td>96</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98</td>
<td>98</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>100</td>
<td>94</td>
<td>96</td>
</tr>
<tr>
<td><strong>Proteus mirabilis</strong></td>
<td>2244</td>
<td>80</td>
<td>100</td>
<td>92</td>
<td>98</td>
<td>99</td>
<td>96</td>
<td>94</td>
<td>98</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>81</td>
<td>84</td>
<td>100</td>
<td>91</td>
<td>93</td>
<td>96</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td><strong>Serratia marcescens</strong></td>
<td>342</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>81</td>
<td>84</td>
<td>100</td>
<td>91</td>
<td>93</td>
<td>100</td>
<td>9</td>
</tr>
<tr>
<td><strong>Citrobacter freundii</strong></td>
<td>702</td>
<td>93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>94</td>
<td>96</td>
<td>100</td>
<td>99</td>
<td>98</td>
<td>83</td>
<td>87</td>
</tr>
<tr>
<td><strong>Morganella morganii</strong></td>
<td>312</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pseudomonas aeruginosa</strong></td>
<td>1674</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>96</td>
<td>90</td>
<td>99</td>
<td>91</td>
<td>98</td>
<td>87</td>
<td>97</td>
</tr>
<tr>
<td><strong>Acinetobacter baumannii</strong></td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Indicates data have been censored because of intrinsic resistance and/or inappropriate clinical use.**

**Indicates data have been censored because of insufficient sample or less than 3 hospitals. CLSI guidelines suggest total isolate counts of less than 30 are excluded.**

### Gram Positive Organisms

<table>
<thead>
<tr>
<th>Organism</th>
<th>Total Number of Isolates</th>
<th>Penicillin</th>
<th>Ampicillin (Amoxicillin)</th>
<th>Oxacillin (Nafcillin)</th>
<th>Cefoxitin</th>
<th>Ceftriaxone</th>
<th>Levofloxacin</th>
<th>Moxifloxacin</th>
<th>Tetracycline (Doxycycline)</th>
<th>Trimethoprim/Sulfamethoxazole</th>
<th>Clindamycin</th>
<th>Vancomycin</th>
<th>Linezolid</th>
<th>Daptomycin</th>
<th>Rifampin</th>
<th>Nitrofurantoin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methicillin-Sensitive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus aureus (MSSA)</td>
<td>721</td>
<td>21</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>87</td>
<td>85</td>
<td>97</td>
<td>96</td>
<td>75</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td><strong>Methicillin-Resistant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus aureus (MRSA)</td>
<td>373</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>3044</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterococcus faecium</td>
<td>261</td>
<td>18</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterococcus spp. (all hospital data)</td>
<td>5168</td>
<td>94</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NH Department of Health and Human Services**

**Division of Public Health Services**

**Bureau of Infectious Disease Control**

January 2020

**2018 NH State Antibiogram**

-10-
<table>
<thead>
<tr>
<th>Gram Negative Organisms</th>
<th>Total Number of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>30364</td>
</tr>
<tr>
<td><em>Klebsiella (Enterobacter) aerogenes</em></td>
<td>533</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>972</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>5304</td>
</tr>
<tr>
<td><em>Klebsiella oxytoca</em></td>
<td>976</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>2244</td>
</tr>
<tr>
<td><em>Serratia marcescens</em></td>
<td>342</td>
</tr>
<tr>
<td><em>Citrobacter freundii</em></td>
<td>702</td>
</tr>
<tr>
<td><em>Morganella morgani</em></td>
<td>312</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>1674</td>
</tr>
<tr>
<td><em>Acinetobacter baumannii</em></td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gram Positive Organisms</th>
<th>Total Number of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>721</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>3044</td>
</tr>
<tr>
<td><em>Enterococcus faecium</em></td>
<td>261</td>
</tr>
</tbody>
</table>

**New Hampshire Statewide Antibiogram 2018**

**Urine Only Sources**

**Total Number of Susceptible Isolates/Total Tested**

**Division of Public Health Services**

**NH Department of Health and Human Services**

**Infectious Disease Surveillance Section**

**Bureau of Infectious Disease Control**

**NH State Antibiogram 2018**

**January 2020**

- Indicates data have been censored because of insufficient sample or less than 3 hospitals.
- Indicates data have been censored because of intrinsic resistance and/or inappropriate clinical use.
Methodology

Reporting Requirements:

Reporting requirements are governed by RSA 141:C6 with authority given to DHHS to develop administrative rules to provide specific reporting instructions and methodology. Administrative rules He-P 301 were adopted in fall 2016 “He-P 300 Diseases, PART He-P 301.02 Communicable Diseases,” were updated in 2016 with stakeholder input and approved by the Joint Legislative Committee on Administrative Rules. The updated rules require hospital laboratories to report antibiogram data annually to the State of New Hampshire.

Collection Process and Validation:

NH DPHS developed a standardized antibiogram fillable form for reporting susceptibility data, and requested data from hospital microbiology laboratories in January 2018. This form was developed to encompass most relevant antibiotic and organism combinations, created in collaboration between the NH DPHS and stakeholder subject matter experts. All 26 NH hospitals reported antibiogram data as required under He-P301; along with the Veteran’s Affairs Hospital whom voluntarily reported data.

The HAI Program reconciled data to confirm reported data and evaluate accuracy and reliability of the data. The HAI Program first conducted an internal assessment to identify outliers or implausible data by comparing the percent susceptibilities between all hospitals for every organism and antibiotic combination and then corrected or confirmed data with each respective microbiology laboratory. The program subsequently convened an infectious disease medical and pharmacy advisory group to review the clinical implications of the data and ensure data was clinically accurate and relevant. The advisory group determined which antibiotic-organism combinations to censor due to clinical inappropriateness. Lastly, the antibiogram data was reviewed by the NH Antimicrobial Resistance Advisory Workgroup (ARAW) to provide feedback and suggestions for use.

Antibiogram Development:

The Clinical and Laboratory Standards Institute (CLSI) guidelines were followed in the aggregation of data from all reported hospital antibiograms. Antibiotic and organism combinations that are either intrinsically resistant or not clinically appropriate were censored from the antibiogram. Per CLSI guidelines, any antibiotic and organism combination with a total number of isolate counts of less than 30 isolates were excluded.

An ARAW subcommittee, made up of infectious disease clinical specialists, drafted and reviewed the antibiogram executive summary to assist with clinical interpretation. The summary focused on treatment of common infections syndromes and was based on review of NH antibiogram data and current national treatment guidelines (https://www.idsociety.org/PracticeGuidelines/).
Data Limitations

- Due to the variation in breakpoints used by clinical laboratories to interpret antibiotic susceptibility results there may be discrepancies between laboratory reported susceptibility results.
- Antibiotic susceptibility data from regional reference labs is not included in this data set and therefore the antibiogram is limited in its representativeness to hospital laboratory isolates.
- The urine only antibiogram includes all urine isolates, not necessarily only those pertaining to urinary tract infections. These isolates may represent other types of infections where bacteria were cultured from other clinical isolates in addition to the urine (e.g. bacteremia with seeding of the urine).
- The lack of reported susceptibility results for an antibiotic against a specific organism doesn't necessarily mean that the antibiotic isn't active. In some cases activity is reliably predicted by the activity of another agent (e.g. cefazolin activity against *Staphylococcus aureus* is predicted by oxacillin susceptibility); while in some other cases it is not possible to test susceptibility due to lack of testing reagents. Conversely, reported activity on *in vitro* susceptibility results does not necessarily mean an agent is clinically effective (or as effective as alternatives). For example, ciprofloxacin may show *in vitro* activity against *Staphylococcus aureus*, but ciprofloxacin should never be used to treat infections caused by this organism. This is because of the potential for rapid development of resistance while being treated with ciprofloxacin.
- The values presented in the antibiogram are rounded and do not show exact values.

Note: All the data in this report are based upon information provided to the New Hampshire Department of Health and Human Services under specific legislative authority. The numbers reported may represent an underestimate of the true absolute number in the state. Any release of personal identifying information is conditioned upon such information remaining confidential. The unauthorized disclosure of any confidential medical or scientific data is a misdemeanor under New Hampshire law. The department is not responsible for any duplication or misrepresentation of surveillance data released in this report. Data are complete as of 1/13/20. Report prepared by the Healthcare-Associated Infections Program, Infectious Disease Surveillance Section, haiprogram@dhhs.nh.gov, (603)-271-4496.

Acknowledgements

We would like to first and foremost thank the clinical microbiologists who submitted antibiogram data on behalf of their healthcare facility; without their efforts this report would not be possible. We would also like to thank the ARAW for their time and input that contributed directly to the creation and clinical content outlined in this report. Their work has been invaluable:

Trevor Bauer, MPH  
Rachel Gridley, BS  
Elizabeth Talbot, MD

Michael Calderwood, MD, MPH  
Katrina Hansen, MPH  
Daniel Tullo, MS, SM (ASCP)

Benjamin Chan, MD, MPH  
Jonathan Napoli, PharmD, MHA, BPS  
Joshua White, MD

Maureen Collopy, MPH, MT(ASCP)  
Yvette Perron, MPH  
Carly Zimmermann, MPH, MLS(ASCP)cm

Apara Dave, MD  
Erin Reigh, MD, MS

Melissa Deveau, MsPH, MLS(ASCP)cm  
Paul Santos, PharmD

The NH DPHS HAI Program is a resource for guidance in developing and strengthening your facilities stewardship program, please contact us at haiprogram@dhhs.nh.gov or (603) 271-4496.
References


