

Antibiotic Resistance Patient Safety Atlas

Antibiotic Resistance HAI Data

Phenotype Definitions

The Antibiotic Resistance (AR) Healthcare Associated Infection (HAI) dataset of the AR Patient Safety Atlas provides data from U.S. healthcare facilities that reported at least one HAI to CDC's National Healthcare Safety Network (NHSN). This allows researchers to see trends in antibiotic resistance at the state and national level.

The following are definitions for the phenotypes listed in the Antibiotic Resistance Patient Safety Atlas.

Key
 (S) Sensitive
 (I) intermediate
 (R) Resistant
 (NS) non-susceptible

Pathogen Overview	Phenotype Analytical Definitions
<p><i>Staphylococcus aureus</i></p> <p>These cause a range of illnesses, from skin and wound infections to pneumonia and bloodstream infections that can cause sepsis and death.</p> <p>Less severe infections are common and occur outside of non-acute healthcare settings and in the community.</p>	<p>Methicillin-Resistant (%R) Any isolate that tested (R) to at least 1 of these: methicillin, oxacillin, ceftazidime</p> <p>Community-associated Resistance Pattern (%R) Any MRSA that tested (R) to erythromycin and sensitive (S) to trimethoprim-sulfamethoxazole and has at least 1 of these additional properties:</p> <ol style="list-style-type: none"> 1. Tested (S) to both ciprofloxacin and levofloxacin 2. Tested (S) to clindamycin <p>Linezolid-Resistant (%R) MRSA that tested (R) to linezolid</p> <p>Fluoroquinolone-Resistant (%R) MRSA that tested (R) to ciprofloxacin and/or levofloxacin</p> <p>Vancomycin-Intermediate (%I) MRSA that tested (I) to vancomycin</p> <p>Daptomycin-Resistant (R) or (I) (%R*) MRSA that tested (NS) to daptomycin</p>
<p><i>Acinetobacter spp.</i></p> <p>This type of gram-negative bacteria can cause pneumonia or bloodstream infections among critically ill patients.</p> <p>Fewer than 1 of 10 healthcare-associated infections are caused by <i>Acinetobacter</i>; however, according to a 2011 CDC national prevalence survey, many of these bacteria have become very resistant to antibiotics. Some strains are resistant to nearly all or all antibiotics.</p>	<p>Carbapenem-Resistant (%R*) Any isolate that tested either (I) or (R) to at least 1 of these: imipenem, meropenem, doripenem</p> <p>MDR (%R) Any isolate that tested either (I) or (R) to at least 1 drug in at least 3 of these categories:</p> <ol style="list-style-type: none"> 1. Extended-spectrum cephalosporins (cefepime, ceftazidime, cefotaxime, ceftriaxone) 2. Fluoroquinolones (ciprofloxacin, levofloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem) 5. Piperacillin Group (piperacillin, piperacillin/tazobactam) 6. Ampicillin/sulbactam



Pathogen Overview	Phenotype Analytical Definitions
<p><i>E.coli</i></p> <p>These pathogens cause pneumonia, urinary tract infections, and bloodstream infections in hospitalized patients.</p> <p>Carbapenem-Resistant <i>E.coli</i> is a subset of the nightmare bacteria carbapenem-resistance Enterobacteriaceae (CRE).</p>	<p>Carbapenem-Resistant (%R) Any isolate that tested (R) to at least 1 of these: imipenem, meropenem, doripenem, ertapenem</p> <p>Extended-Spectrum Cephalosporin-Resistant (%R) Any isolate that tested (R) to at least 1 of these: ceftriaxone, ceftazidime, cefepime, and cefotaxime</p> <p>Fluoroquinolone-Resistant (%R) Any isolate that tested (R) to at least 1 of these: ciprofloxacin, levofloxacin, and moxifloxacin</p> <p>MDR (%R) Any isolate that tested either (I) or (R) to at least 1 drug in at least 3 of these categories:</p> <ol style="list-style-type: none"> 1. Extended-spectrum cephalosporins (cefepime, cefotaxime, ceftazidime, ceftriaxone) 2. Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem, ertapenem) 5. Piperacillin Group (piperacillin, piperacillin/tazobactam)
<p><i>Enterobacter spp.</i></p> <p>These bacteria cause pneumonia, urinary tract infections, and bloodstream infections in hospitalized patients.</p> <p>Fewer than 1 of 10 healthcare-associated infections are caused by these; however, according to a 2011 CDC national prevalence survey, many of these bacteria have become very resistant to antibiotics. Some strains are resistant to nearly all or all antibiotics.</p> <p>Carbapenem-Resistant <i>Enterobacter</i> is a subset of the nightmare bacteria carbapenem-resistance Enterobacteriaceae (CRE).</p>	<p>Carbapenem-Resistant (%R) Any isolate that tested (R) to at least 1 of these: imipenem, meropenem, doripenem, ertapenem</p> <p>Extended-Spectrum Cephalosporin-Resistant (%R) Any isolate that tested (R) to at least 1 of these: ceftriaxone, ceftazidime, cefepime, cefotaxime</p> <p>MDR (%R) Any isolate that tested either (I) or (R) to at least 1 drug in at least 3 of these categories:</p> <ol style="list-style-type: none"> 1. Extended-spectrum cephalosporins (cefepime, cefotaxime, ceftazidime, ceftriaxone) 2. Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem, ertapenem) 5. Piperacillin Group (piperacillin, piperacillin/tazobactam)
<p><i>Klebsiella spp.</i></p> <p>These bacteria cause pneumonia, urinary tract infections, and bloodstream infections in hospitalized patients, as well as patients in nursing homes and other healthcare facilities.</p> <p>They are becoming more resistant to even antibiotics of last resort, such as carbapenems.</p> <p><i>Klebsiella oxytoca</i> or <i>Klebsiella pneumoniae</i></p>	<p>Carbapenem-Resistant (%R) Any isolate that tested (R) to at least 1 of these: imipenem, meropenem, doripenem, ertapenem</p> <p>Extended-Spectrum Cephalosporin-Resistant (%R) Any isolate that tested (R) to at least 1 of these: ceftriaxone, ceftazidime, cefepime, cefotaxime</p> <p>MDR (%R) Any isolate that tested either (I) or (R) to at least 1 drug in at least 3 of these categories:</p> <ol style="list-style-type: none"> 1. Extended-spectrum cephalosporins (cefepime, cefotaxime, ceftazidime, ceftriaxone) 2. Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem, ertapenem) 5. Piperacillin Group (piperacillin, piperacillin/tazobactam)

Pathogen Overview	Phenotype Analytical Definitions
<p><i>Pseudomonas aeruginosa</i></p> <p>A common cause of healthcare-associated infections including pneumonia, bloodstream infections, urinary tract infections, and surgical site infections.</p> <p>These pathogens are becoming more resistant to even antibiotics of last resort, such as carbapenems.</p>	<p>Carbapenem-Resistant <i>Pseudomonas aeruginosa</i> (R) or (I) (%R*) Any isolate that tested either (I) or (R) to at least 1 of these: imipenem, meropenem, or doripenem</p> <p>Extended-Spectrum Cephalosporin-Resistant (%R) Any isolate that tested (R) to at least 1 of these: cefepime and ceftazidime</p> <p>MDR (%R) Any isolate that tested either (I) or (R) to at least 1 drug in at least 3 of these categories:</p> <ol style="list-style-type: none"> 1. Extended-spectrum cephalosporins (cefepime, ceftazidime) 2. Fluoroquinolones (ciprofloxacin, levofloxacin) 3. Aminoglycosides (amikacin, gentamicin, tobramycin) 4. Carbapenems (imipenem, meropenem, doripenem) 5. Piperacillin Group (piperacillin, piperacillin/tazobactam) <p>Fluoroquinolone-Resistant (%R) Any isolate that tested (R) to at least 1 of these: ciprofloxacin, levofloxacin</p> <p>Aminoglycoside-Resistant (%R) Any isolate that tested (R) to at least 1 of these: amikacin, gentamicin, tobramycin</p> <p>Pip/Tazobactam-Resistant (%R) Any isolate that tested (R) to at least 1 of these: piperacillin, piperacillin/tazobactam</p>
<p><i>Enterococcus faecium</i></p> <p>Cause a range of illnesses, mostly among patients receiving healthcare, but include bloodstream infections, surgical site infections, and urinary tract infections.</p> <p>The proportion of infections that occur with a vancomycin-resistant strain differs by the two most common species of <i>Enterococcus</i>.</p>	<p>Vancomycin-Resistant (%R) Any isolate that tested (R) to vancomycin</p> <p>Daptomycin-Resistant (%R*) Any isolate that tested (NS) to daptomycin</p>
<p><i>Enterococcus faecalis</i></p> <p>They cause a range of illnesses, mostly among patients receiving healthcare, but include bloodstream infections, surgical site infections, and urinary tract infections.</p> <p>The proportion of infections that occur with a vancomycin resistant strain differs by the two most common species of <i>Enterococcus</i>.</p>	<p>Vancomycin-Resistant (%R) Any isolate that tested (R) to vancomycin</p> <p>Daptomycin-Resistant (%R*) Any isolate that tested (NS) to daptomycin</p>
<p><i>Coagulase-Negative Staphylococci</i></p> <p>This pathogen type cause bloodstream infections and infections of prosthetic material.</p> <p>Overall, these bacteria, commonly found on the skin, are associated with only about 1 out of every 10 healthcare-associated infections according to a 2011 CDC national prevalence survey.</p>	<p>Vancomycin-Resistant (R) or (I) (%R*) Any isolate that tested (R) or intermediate(I) to vancomycin</p> <p>Vancomycin-Resistant (%R) Any isolate that tested (R) to vancomycin</p>

Pathogen Overview	Phenotype Analytical Definitions
<p><i>Enterobacteriaceae spp.</i></p> <p>The 3 most common types that cause healthcare acquired infections include</p> <ul style="list-style-type: none"> • <i>Enterobacter spp.</i>, • <i>Klebsiella spp.</i>, and • <i>E.coli.</i> <p>These bacteria cause pneumonia, urinary tract infections, and bloodstream infections in patients.</p> <p>Emerging resistance to carbapenems makes treating these resistant infections very difficult.</p>	<p>Any isolate. that tested (R) to at least 1 of these: imipenem, meropenem, doripenem, ertapenem</p>

**For more information about the AR Patient Safety Atlas
 Antibiotic Resistance HAI dataset, visit:
<http://www.cdc.gov/hai/surveillance>**

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