

# Antimicrobial-Resistant Phenotype Definitions

Analysis of Antimicrobial-Resistant Organisms in NHSN

Updated 01/2022

This document provides definitions for the pre-defined antimicrobial resistance patterns (phenotypes) that are used in the NHSN analytic reports located in the following analysis folder: [HAI Antimicrobial Resistance \(DA + PA Modules\)](#) > Antimicrobial Resistant HAIs.

| Phenotype Name   | Phenotype Code      | Phenotype Definition   |
|--|---------------------|--|
| Methicillin-resistant <i>Staphylococcus aureus</i>                                       | MRSA_HAI            | <i>Staphylococcus aureus</i> that has tested Resistant (R) to at least 1 of the following: methicillin, oxacillin, or ceftazidime.   |
| Carbapenem-resistant Enterobacterales  | CREall_HAI          | Any <i>Escherichia coli</i> , <i>Klebsiella aerogenes</i> , <i>Klebsiella oxytoca</i> , <i>Klebsiella pneumoniae</i> , or <i>Enterobacter</i> spp. that has tested Resistant (R) to at least 1 of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam.<br><br>*NOTE: For data prior to 2021, meropenem/vaborbactam and imipenem/relebactam are not included in the CRE definition, as results for these drugs were not collected in NHSN.  |
| Carbapenem-resistant <i>E. coli</i>  | CREecoli_HAI        | Any <i>Escherichia coli</i> that has tested Resistant (R) to at least 1 of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam.<br><br>*NOTE: For data prior to 2021, meropenem/vaborbactam and imipenem/relebactam are not included in the CRE definition, as results for these drugs were not collected in NHSN.   |
| Carbapenem-resistant <i>Enterobacter</i> spp.  | CREenterobacter_HAI | Any <i>Enterobacter</i> spp. that has tested Resistant (R) to at least 1 of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam.<br><br>*NOTE: For data prior to 2021, meropenem/vaborbactam and imipenem/relebactam are not included in the CRE definition, as results for these drugs were not collected in NHSN.  |
| Carbapenem-resistant <i>Klebsiella aerogenes</i> /<br><i>oxytoca</i> / <i>pneumoniae</i> | CREklebsiella_HAI   | Any <i>Klebsiella aerogenes</i> *, <i>Klebsiella oxytoca</i> or <i>Klebsiella pneumoniae</i> that has tested Resistant (R) to at least 1 of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam.<br><br>*NOTE: <i>Klebsiella aerogenes</i> is only counted here for 2020 events and forward. Prior to 2020, this pathogen was referred to as <i>Enterobacter aerogenes</i> , and thus would be counted as CRE Enterobacter. For data prior to 2021, meropenem/vaborbactam and imipenem/relebactam are not included in the CRE definition, as results for these drugs were not collected in NHSN. |



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| Phenotype Name  | Phenotype Code    | Phenotype Definition   |
|---|-------------------|--|
| Extended-spectrum cephalosporin-resistant <i>E. coli</i>                                | ESCecoli_HAI      | Any <i>Escherichia coli</i> that has tested Intermediate (I) or Resistant (R) to at least 1 of the following: cefepime, ceftriaxone, cefotaxime, ceftazidime, ceftolozane/tazobactam, or ceftazidime/avibactam.<br><br>*NOTE: For data prior to 2021, ceftolozane/tazobactam and ceftazidime/avibactam are not included in the ESC definition, as results for these drugs were not collected in NHSN.  |
| Extended-spectrum cephalosporin-resistant <i>Klebsiella oxytoca</i> / <i>pneumoniae</i> | ESCKlebsiella_HAI | Any <i>Klebsiella oxytoca</i> or <i>Klebsiella pneumoniae</i> that has tested Intermediate (I) or Resistant (R) to at least 1 of the following: cefepime, ceftriaxone, cefotaxime, ceftazidime, ceftolozane/tazobactam, or ceftazidime/avibactam.<br><br>*NOTE: For data prior to 2021, ceftolozane/tazobactam and ceftazidime/avibactam are not included in the ESC definition, as results for these drugs were not collected in NHSN.  |
| Carbapenem-non-susceptible <i>Pseudomonas aeruginosa</i>                                | carbNS_PA_HAI     | <i>Pseudomonas aeruginosa</i> that has tested either Intermediate (I) or Resistant (R) to at least 1 of the following: imipenem, meropenem, or doripenem.  |
| Multidrug-resistant <i>Pseudomonas aeruginosa</i>                                       | MDR_PA_HAI        | <i>Pseudomonas aeruginosa</i> that has tested either Intermediate (I) or Resistant (R) to at least 1 drug in at least 3 of the following 5 categories:<br><br>1. Extended-spectrum cephalosporin (cefepime, ceftazidime, ceftolozane/tazobactam, ceftazidime/avibactam)<br>2. Fluoroquinolones (ciprofloxacin, levofloxacin)<br>3. Aminoglycosides (amikacin, gentamicin, tobramycin)<br>4. Carbapenems (imipenem, meropenem, doripenem)<br>5. Piperacillin/tazobactam<br><br>*NOTE: For data prior to 2021, ceftolozane/tazobactam and ceftazidime/avibactam are not included in the ESC definition, as results for these drugs were not collected in NHSN. Prior to 2021, piperacillin was grouped with piperacillin/tazobactam. |
| Carbapenem-non-susceptible <i>Acinetobacter</i> spp.                                    | carbNS_Acine_HAI  | Any <i>Acinetobacter</i> spp. that has tested either Intermediate (I) or Resistant (R) to at least 1 of the following: imipenem, meropenem, or doripenem.  |



| Phenotype Name                                    | Phenotype Code  | Phenotype Definition   |
|---|-----------------|--|
| Multidrug-resistant <i>Acinetobacter</i> spp.     | MDR_Acine_HAI   | <p>Any <i>Acinetobacter</i> spp. that has tested either Intermediate (I) or Resistant (R) to at least 1 drug in at least 3 of the following 6 categories:</p> <ol style="list-style-type: none"> <li>1. Extended-spectrum cephalosporin (cefepime, ceftazidime, ceftriaxone, cefotaxime)</li> <li>2. Fluoroquinolones (ciprofloxacin, levofloxacin)</li> <li>3. Aminoglycosides (amikacin, gentamicin, tobramycin)</li> <li>4. Carbapenems (imipenem, meropenem, doripenem)</li> <li>5. Piperacillin/tazobactam</li> <li>6. Ampicillin/sulbactam</li> </ol> <p>*NOTE: For data prior to 2021, ceftriaxone and cefotaxime are not included in the ESC definition, as results for these drugs were not collected in NHSN for <i>Acinetobacter</i>. In addition, for data prior to 2021, piperacillin was grouped with piperacillin/tazobactam.</p> |
| Vancomycin-resistant <i>Enterococcus faecalis</i> | VREfaecalis_HAI | <i>Enterococcus faecalis</i> that has tested Resistant (R) to vancomycin.  |
| Vancomycin-resistant <i>Enterococcus faecium</i>  | VREfaecium_HAI  | <i>Enterococcus faecium</i> that has tested Resistant (R) to vancomycin.   |

