

MC 6.016 Non-Enterobacterales Susceptibility Reporting

Purpose This procedure provides instruction and guidance for routine testing and selective and cascade susceptibility reporting on Non-Enterobacterales.

Principal and Clinical Significance The decisions for the most appropriate antimicrobial agents to test and report are made with input from Pharmacy, Infectious Disease and the Clinical Laboratory. The goal is to provide clinically relevant information that will decrease the chance of developing antibiotic resistance, harmful effects of inappropriate antimicrobial use and avoid reporting results that could adversely affect patient care using selective and cascade reporting rules.

Policy Statements This procedure applies to Microbiologists who perform susceptibility testing.

Special Safety Precautions Microbiologists are subject to occupational risks associated with specimen handling.

- [Biohazard Containment](#)
- [Biohazardous Spills](#)
- [Safety in the Microbiology Laboratory](#)

Procedure

1. Non-Enterobacterales includes *Pseudomonas* species and other nonfastidious glucose-nonfermenting, Gram negative bacilli. Common organisms listed below:
 - *Achromobacter* species
 - *Alcaligenes* species
 - *Agrobacterium* species
 - *Brevundimonas* species
 - *Burkholderia gladioli*
 - *Chromobacterium* species
 - *Comamonas* species
 - *Chryseobacterium* species
 - *Delftia* species
 - *Elizabethkingia* species
 - *Methylbacterium* species
 - *Myroides* species
 - *Ochrobacterium* species
 - *Oligella* species
 - *Pandoraea* species
 - *Pseudomonas* species (not including *P. aeruginosa*)
 - *Ralstonia* species
 - *Sphingobacterium* species
 - *Sphingomonas* species

2. Antibiotics appropriate for routine testing and reporting for Non-Enterobacterales.
 - Aztreonam
 - Ceftriaxone
 - Ceftazidime
 - Cefepime
 - Piperacillin-tazobactam
 - Gentamicin

- Tobramycin
 - Ciprofloxacin
 - Levofloxacin
 - Trimethoprim Sulfamethoxazole
 - Imipenem
 - Meropenem
 - Minocycline
3. Perform susceptibilities using Vitek cards N806 and XN30 or MicroScan NUC101 method.
 4. Not all antibiotics are available on every panel.
 - Vitek will be the primary method of testing.
 - In most cases, only the **N806** cards needs to be performed.
 - **Perform XN30 for Tobramycin when Gentamicin is resistant.**
 - MicroScan is the back up if testing fails.
 - Do not perform testing on multiple methods to cover all the antibiotics. It is acceptable if cascaded antibiotics are not reported.
 5. Vitek results will be accepted under the Online Results tab. Modifications will be under the **VITMIC** keyboard under the Susceptibility tab.
 6. MicroScan results will be entered manually under the **MMIC** keyboards under the Susceptibility tab.
 7. There are no Kirby Bauer interpretations as disk diffusion is unreliable.

Selective Reporting

1. Antibiotics will be reported in a specific order indicating the first and subsequent preferences of the Antimicrobial Stewardship Committee and Infectious Disease physicians
2. There will be exceptions based on the method used for testing.
3. These 4 antibiotics will be reported routinely, in this order.
 1. Ceftriaxone
 2. Ciprofloxacin
 3. Trimethoprim Sulfa
 4. Gentamicin

Figure 1

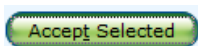
| | | |
|-------------------|---|--|
| Org #4. | ACHROMOBACTER XYLOSOXIDANS (ALCALIGENES) | |
| - VITMIC - | SS | CAX(8), CP(1), TS(40), GM(1) |
| | HIDE | CAZ(2-SS), CEFE(8-SS), PIPT(16-SS), MERO(4-SS), LEVO(2-SS) |

4. If any carbapenem is resistant, confirm result by alternate method. Report in Sunquest if confirmed resistant and submit isolate to MDH. See Carbapenemase Detection section of procedure for further instructions. Resistant carbapenems will be reported regardless of selective or cascade reporting.

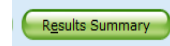
Cascade Reporting- Vitek Method

If resistance is encountered, additional antibiotics will automatically be released.

1. For Vitek method, hidden antibiotics will be released when Accept Selected is clicked.



The released results will be visible in Results Summary.



2. Results can be edited under the **VITMIC** keyboard but is not needed to report the cascaded antibiotics.

Method: Vitek

- If Ceftriaxone is R → report Ceftazidime
 - If Ceftazidime is R → report Cefepime
 - If Cefepime is R → report Piperacillin Tazobactam
 - If Piperacillin tazobactam is R → report Meropenem
 - If Ciprofloxacin is R → report Levofloxacin
 - If Gentamicin is R → report Tobramycin**

3. **Perform XN30 for Tobramycin when Gentamicin is resistant.


Figure 2 Resistance and XN30 results

| Organism #3 - ACHROMOBACTER XYLOSOXIDANS (ALCALIGENES) | |
|--|---|
| - VITMIC - (ZZ01) | |
| SS | MERO (4) , LEVO (2) , TO (4) , TS (40) |
| R | GM (16) , CAX (64) , CP (4) , CAZ (32) , CEFE (32) , PIPT (128) |
| HIDE | MINO (4-SS) , AZTR (8-SS) , IMP (4-SS) |

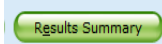
4. All other antibiotics on the XN30 panel that are not part of the cascade are hidden. Do not release and report. Hidden antibiotics include:
 - Aztreonam
 - Minocycline
 - Imipenem
5. Requested antibiotics may be released with a provider request.

Cascade Reporting- MicroScan Method

If resistance is encountered, additional antibiotics will automatically be released.

1. For MicroScan method, hidden antibiotics will be released when File  is clicked.

Results will be visible in Results Summary.

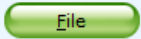


2. Enter **all** results manually under the **MMIC** keyboard. Antibiotics will be released following the cascade rules.


Method: MicroScan –

- If Ceftazidime is R → report Cefepime
 - If Cefepime is R → report Piperacillin Tazobactam
 - If Piperacillin tazobactam is R → report Meropenem
 - If Ciprofloxacin is R → report Levofloxacin


- If Gentamicin is R → report Tobramycin

3. It will appear as the results are hidden but Sunquest will release from HIDE automatically after results are filed. 

| Org #3. | CHRYSEOBACTERIUM INDOLOGENES (FLAVOBACTERIUM) | |
|----------|---|--|
| - MMIC - | | |
| | SS | TS(40) |
| | R | CAZ(32),CP(4),GM(16) |
| | HIDE | CEFE(32-R),PIPT(128-R),MERO(4-SS),LEVO(2-SS),TO(1-SS),AZTR(8-SS) |



| Organism #5 | MYROIDES SPECIES (FLAVOBACTERIUM) | |
|-------------|-----------------------------------|---|
| - MMIC - | | |
| | SS | TS(40),MERO(4),LEVO(2),TO(1) |
| | R | CAZ(32),CP(4),GM(16),CEFE(32),PIPT(128) |
| | HIDE | AZTR(8-SS) |



4. All other antibiotics on the panel that are not part of the cascade are hidden. Do not release and report. Hidden antibiotics include:
 - Aztreonam
5. Requested antibiotics may be released with a provider request.

**Method
Performance
Specifications**

1. Excluded from this group are *Pseudomonas aeruginosa*, *Acinetobacter* species, *Burkholderia cepacia* complex and *Stenotrophomonas maltophilia*.
2. Usually, only the Vitek card AST-N806 will be required for testing Non-Enterobacterales.
3. Report Tobramycin when Gentamicin is resistant.
 - Set up a XN30 card to obtain the Tobramycin result and release only the Tobramycin. Refer to the [MC 6.02 AST-XN30](#) for further reporting instructions.

Appendix

Additional Tables and Flowcharts

List of non-Enterobacterales that can be identified by Children's:

| |
|---|
| ACHROMOBACTER DENTRIFICANS (ALCALIGENES) |
| ACHROMOBACTER DENTRIFICANS/XYLOSOXIDANS |
| ACHROMOBACTER XYLOSOXIDANS (ALCALIGENES) |
| ACHROMOBACTER SPECIES |
| AGROBACTERIUM "YELLOW GROUP" |
| AGROBACTERIUM TUMEFACIENS |
| ALCALIGENES FAECALIS |
| ALCALIGENES ODORANS |
| ALCALIGENES PIECHAUDII (ACHROMOBACTER) |
| ALCALIGENES SPECIES |
| BREVUNDIMONAS DIMINUTA |
| BREVUNDIMONAS VESICULARIS |
| BURKHOLDERIA GLADIOLI (PSEUDOMONAS) |
| CHROMOBACTERIUM VIOLACEUM |
| CHRYSEOBACTERIUM GLEUM (FLAVOBACTERIUM) |
| COMAMONAS TERRIGENA |
| COMAMONAS TESTOSTERONI (PSEUDOMONAS) |
| CUPRIAVIDUS PAUCULUS |
| DELFTIA ACIDOVORANS (COMAMONAS) |
| ELIZABETHKINGIA ANOPHELIS |
| ELIZABETHKINGIA MIRICOLA |
| ELIZABETHKINGIA MENINGOSEPTICA (CHRYSEOBACTERIUM) |
| EMPEDOBACTER BREVIS (FLAVOBACTERIUM) |
| GRIMONTIA HOLLISAE |
| FLUORESCENT PSEUDOMONAS GROUP |
| MANNHEIMIA HAEMOLYTICA |
| METHYLOBACTERIUM SPECIES |
| MYROIDES ODORATUS (FLAVOBACTERIUM ODORATUM) |
| MYROIDES SPECIES (FLAVOBACTERIUM) |
| OCHROMOBACTRUM ANTHROPI |
| OLIGELLA UREOLYTICA |
| PANDORAEA SPECIES |
| PARACOCCLUS YEEI |

| |
|--|
| PSEUDOMONAS ALCALIGENES |
| PSEUDOMONAS GRAMINIS |
| PSEUDOMONAS FLUORESCENS |
| PSEUDOMONAS FLUORESCNES/PUTIDA |
| PSEUDOMONAS LUTEOLA (CHRYSEOMONAS) |
| PSEUDOMONAS MENDOCINA |
| PSEUDOMONAS MARGINATA |
| PSEUDOMONAS OLEOVORANS |
| PSEUDOMONAS ORYZIHABITANS |
| PSEUDOMONAS ORYZIHABITANS (FLAVIMONAS) |
| PSEUDOMONAS OTITIDIS |
| PSEUDOMONAS PSEUDOALCALIGENES |
| PSEUDOMONAS PUTIDA |
| PSEUDOMONAS SPECIES, NOT PSEUDOMONAS AERUGINOSA |
| PSEUDOMONAS SP, CDC GROUP 1 PSEUDOMONAS DENTRIFICANS |
| PSEUDOMONAS SPECIES |
| RALSTONIA INSIDIOSA |
| RALSTONIA MANNITOLYLITICA |
| RALSTONIA PICKETTII |
| RHIZOBIUM RADIOBACTER |
| ROSEMONAS GILARDII |
| SHEWANELLA ALGAE |
| SHEWANELLA PUTRIFACIENS (PSEUDOMONAS) |
| SPHINGOBACTERIUM MULTIVORUM (FLAVOBACTERIUM) |
| SPHINGOBACTERIUM MIZUTAI |
| SPHINGOBACTERIUM SPIRITIVORUM (FLAVOBACTERIUM) |
| SPHINGOBACTERIUM THALPOPHILUM |
| SPHINGOBACTERIUM SPECIES |
| SPHINGOMONAS PAUCIMOBILIS (PSEUDOMONAS) |
| SPHINGOMONAS SPECIES |
| STENOTROPHOMONAS RHIZOPHILIA/MALTOPHILIA |

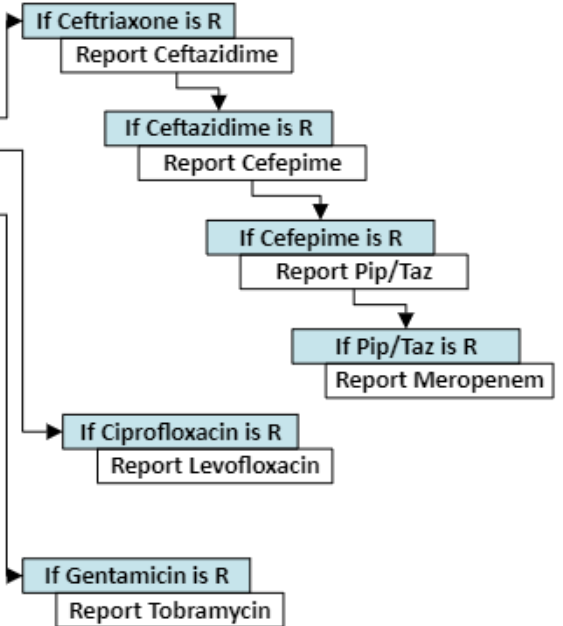
Other non-Enterobacterales include Pseudomonas spp. and other nonfastidious, glucose nonfermenting, gram negative bacilli

Excludes P. aeruginosa, Acinetobacter spp., Burkholderia cepacia complex, and Stenotrophomonas maltophilia

Excludes Aeromonas spp, Burkholderia mallei, Burkholderia pseudomallei, and Vibrio spp.

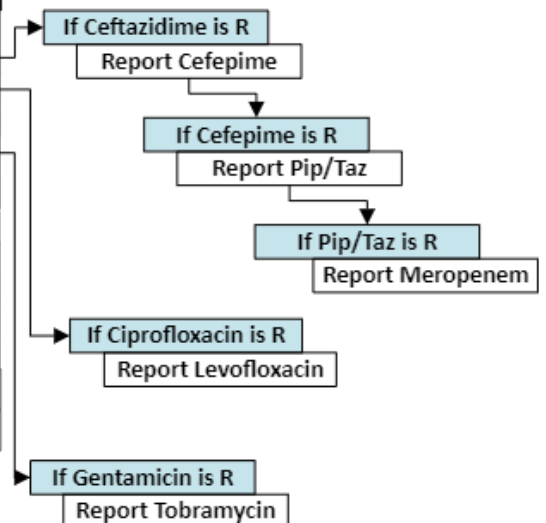
Vitek -Run N806 card

| Drugs that are reported | |
|---------------------------------------|--------------------|
| Sunquest code | Drug Name |
| CAX | Ceftriaxone |
| CP | Ciprofloxacin |
| TS | Trimethoprim/Sulfa |
| GM | Gentamicin |
| Drugs that are hidden unless cascaded | |
| CAZ | Ceftazidime |
| CEFE | Cefepime |
| PIPT | Pip/Tazo |
| MERO | Meropenem |
| LEVO | Levofloxacin |
| TO | Tobramycin |
| Hidden drugs from XN30 | |
| Azt | Aztreonam |
| Min | Minocycline |
| IMP | Imipenem |



Microscan

| Drugs that are reported | | |
|---------------------------------------|---------------|--------------------|
| MICS (Abvr) | Sunquest code | Drug Name |
| Caz | CAZ | Ceftazidime |
| Cp | CP | Ciprofloxacin |
| T/S | TS | Trimethoprim/Sulfa |
| Gm | GM | Gentamicin |
| Drugs that are hidden unless cascaded | | |
| Cpe | CEFE | Cefepime |
| P/T | PIPT | Pip/Tazo |
| Mer | MERO | Meropenem |
| Lvx | LEVO | Levofloxacin |
| To | TO | Tobramycin |
| Hidden drugs | | |
| Azt | AZT | Aztreonam |



There are no breakpoints for Kirby-Bauer on non-Enterobacterales

**Training Plan/
 Competency
 Assessment**

| Training Plan | Initial Competency Assessment |
|--|-------------------------------|
| 1. Employee must read the procedure. 2. Employee will observe trainer performing the procedure. 3. Employee will demonstrate the ability to perform procedure, record results and document corrective action after instruction by the trainer. | 1. Direct observation. |

**Historical
 Record**

| Version | Written/Revised by: | Effective Date: | Summary of Revisions |
|---------|---------------------|-----------------|----------------------|
| 1 | Susan DeMeyere | 1/7/2025 | Initial version |
| | | | |