# Enterobacter spp - Klebsiella aerogenes Pantoea spp Pluralibacter spp Lelliottia spp (LTR62256)

**Edit Approved By: Solomon, Natalia (05/03/2022)** **Revision: 6.00**

**Organism**

**Enterobacter spp. / Klebsiella aerogenes / Pantoea spp. / Pluralibacter spp. / Lelliottia spp.**

- *E. cancerogenus*
- *E. cloacae* complex:
  - *E. asburiae*
  - *E. cloacae*
  - *E. hormaechei*
  - *E. kobei*
  - *E. ludwigii*
  - *E. soli*
- *Klebsiella aerogenes*
- *Lelliottia amnigena (formerly E. amnigenus)*
- *Pantoea spp.*
- *Pluralibacter gergoviae (formerly E. gergoviae)*

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**Clinical**

*Enterobacter* spp. are widely distributed in the environment (water, soil, vegetation). These organisms are opportunistic pathogens which rarely cause primary infections in healthy individuals. They are frequent colonizers in hospitalized patients, especially those who have received broad-spectrum antibiotics. They have been associated with a variety of nosocomial infections in debilitated/immunocompromised individuals. Infections include respiratory and urinary tract infections, wound/ulcer infections (especially burns), osteomyelitis, meningitis, and bacteremia. Bacteremias with these organisms are often polymicrobial.

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**Usual susceptibility pattern**

These organisms produce a chromosomally mediated inducible cephalosporinase (AmpC) and are resistant to penicillins and first/second generation cephalosporins. Although they often exhibit in vitro susceptibility to third generation cephalosporins, use of these agents may result in selection of resistant strains. The beta-lactamase produced by these organisms is not inhibited by beta-lactamase inhibitors and as such, beta-lactam/ beta-lactamase inhibitor combinations should not be reported. Although extended spectrum beta-lactamase (ESBL) may be found in these organisms, conventional ESBL testing is not reliable due to interference by the chromosomal cephalosporinase. Cefepime +/- clavulanic acid may detect an ESBL enzyme. *E. cloacae* may rarely possess a chromosomal carbapenemase that confers resistance to carbapenems and aztreonam, but may remain susceptible to 3$^{rd}$ and 4$^{th}$ generation cephalosporins. Acquired carbapenem resistance is due to plasmid mediated carbapenemase, permeability mutation or enhanced efflux. *Enterobacter* spp. are usually susceptible to aminoglycosides, quinolones and TMP-SMX. The majority are resistant to nitrofurantoin.

**Enterobacter spp. / Klebsiella aerogenes / Pantoea spp. / Pluralibacter spp. / Lelliottia spp.,** Continued

**Susceptibility method**

VITEK2 (except *Pantoea* spp.). Additional tests (Disc diffusion or Etest method) are performed using Mueller-Hinton agar incubated in ambient air at 35°C for 16-20 hours.

**Note:** For Etest use 0.5 McFarland suspension in saline.
For mucoid strains use 1.0 McFarland.

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**Susceptibility reporting**

| | CSF/ Brain | Blood / Sterile Body Site / Endovascular Catheter | Urine | Other | Comments |
|---|---|---|---|---|---|
| Amikacin | | 3 | 3 | 3 | 3rd line if gent and tobra I/R<br>Disc diffusion |
| Ampicillin | R | R | R | R | |
| Cefazolin | | R | R | R | |
| Cefixime | | | R | | |
| Ceftriaxone | R | R | | | |
| Ciprofloxacin | | ✓ | ✓ | ✓ | Do not report in patients < 18 y |
| Doxycycline | | | 2 | | 2nd line if cipro I/R<br>For patients <=17 y report 1st line<br>Disc diffusion<br>If patient <8 y **See Special Considerations** |
| Ertapenem | | ✓ | 2 | 2 | 2nd line if cipro or TMP-SMX I/R<br>If S do not report in patients < 3 months |
| Gentamicin | * | ✓** | ✓ | ✓** | * Report only in neonates (< 1 month)<br>**See Special Considerations |
| Imipenem * | | ✓ | 2 | 2 | 2nd line if cipro or TMP-SMX I/R |
| Meropenem | ✓ | ✓ | 2* | 2* | 2nd line if cipro or TMP-SMX I/R<br>* Report 1st line in neonates (< 1month) |
| Nitrofurantoin | | | ✓ | | **If S –** confirm by Kirby Bauer method<br>Add comment: For uncomplicated lower UTI only #f1 |
| TMP-SMX | * | ✓ | ✓ | ✓ | *Report only at physician request |
| Tobramycin | | 2* | 2 | 2* | 2nd line if gent I/R<br>*See special considerations |

* Do NOT report Imipenem from the VITEK

**Special considerations**

| | |
|---|---|
| Doxycycline: | If reporting doxycycline on patients <8 years add the following comment:<br><br>"Doxycycline can now be prescribed for children <8y for short-course (<21 d) therapy; OTHER tetracyclines are still contraindicated for this age group." **(27664)** |
| Gentamicin/ Tobramycin: | Organisms testing at upper limit of susceptibility (4µg/mL) may not achieve optimal pharmacokinetics/pharmacodynamics.<br><br>**For non-urine isolates:**<br>If MIC 4.0 µg/mL add comment:<br>"This isolate tests at the upper limit of susceptibility for gentamicin. Clinical failure may occur despite in vitro susceptibility." #A312<br>**or**<br>"This isolate tests at the upper limit of susceptibility for tobramycin. Clinical failure may occur despite in vitro susceptibility." #A313<br>**or**<br>"This isolate tests at the upper limit of susceptibility for both gentamicin and tobramycin. Clinical failure may occur despite in vitro susceptibility."#A314 |

**Interpretation**

For Etest, report actual MIC result. For interpretation (S, I, or R) report according to the nearest higher doubling dilution **(Appendix 1)**.

Use **CLSI** interpretive document for **Enterobacterales.**

**For Beta-lactam drugs** – Refer to Beta-lactam Resistance Detection Charts.
For gentamicin and tobramycin – Refer to Special Considerations