

ADDITIONAL FILE 2

ANTIMICROBIAL RESISTANCE RESULTS

Antimicrobial Resistance in Nosocomial Isolates of Gram-Negative Bacteria: Public Health Implications in Latvian Context

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Reference values as adapted from

“The European Committee on Antimicrobial Susceptibility Testing (EUCAST). Breakpoint tables for interpretation of MICs and zone diameters. v11.0, 2021. <http://www.eucast.org>”

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* Antimicrobial resistance data is not available for six genera – *Achromobacter*, *Bacteroides*, *Campylobacter*, *Chryseobacterium*, *Neisseria* and *Prevotella*.

ACINETOBACTER

Additional Table 1. Antimicrobial resistance (R) in *Acinetobacter* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|---------|---------|---------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amikacin (AMK) | 90.67 % | 55.21 % | 67.36 % | 65.68 % | ↓ |
| Colistin (COL) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Gentamicin (GEN) | 71.09 % | 56.29 % | 58.89 % | 57.78 % | ↓ |
| Imipenem (IPM) | 75.00 % | 66.09 % | 74.65 % | 70.00 % | ↓ |
| Trimethoprim-sulfamethoxazole (SXT) | 74.25 % | 63.60 % | 49.47 % | 30.99% | ↓ |

* NT – not tested; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 2. Breakpoints for antibiotics against *Acinetobacter* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|---|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMK | 30 | ≥ 19 | - | < 19 | |
| COL | - | ≤ 2 | - | > 2 | Broth microdilution was performed. The values indicate MIC (minimum inhibitory concentration) cut-offs. |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 24 | 21 – 23 | < 21 | |
| SXT | 1.25 – 23.75 | ≥ 14 | 11 – 13 | < 11 | |

AEROMONAS

Additional Table 3. Antimicrobial resistance (R) in *Aeromonas* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2018 vs 2020) |
|-------------------------------------|--------------------------------|---------|---------|---------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Ceftazidime (CAZ) | NT | 0.00 % | 0.00 % | 25.00 % | ↑ |
| Ciprofloxacin (CIP) | NT | 0.00 % | 25.00 % | 0.00 % | = |
| Trimethoprim-sulfamethoxazole (SXT) | NT | 33.33 % | 75.00 % | 0.00 % | ↓ |

* NT – not tested; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 4. Breakpoints for antibiotics against *Aeromonas* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|-------|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| CAZ | 10 | ≥ 24 | 21 – 23 | < 21 | |
| CIP | 5 | ≥ 27 | 24 – 26 | < 24 | |
| SXT | 1.25 – 23.75 | ≥ 19 | 16 – 18 | < 16 | |

BURKHOLDERIA

Additional Table 5. Antimicrobial resistance (R) in *Burkholderia* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|------|--------|--------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Ceftazidime (CAZ) | 0.00 % | NT | 0.00 % | 0.00 % | = |
| Meropenem (MEM) | 0.00 % | NT | 5.55 % | 0.00 % | = |
| Minocycline (MNO) | 0.00 % | NT | 0.00 % | 0.00 % | = |
| Trimethoprim-sulfamethoxazole (SXT) | 0.00 % | NT | 0.00 % | 0.00 % | = |

* NT – not tested; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 6. Breakpoints for antibiotics against *Burkholderia* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

According to EUCAST v11.0 guidelines, breakpoints for *Burkholderia cepacia* complex organisms are not determined since accurate and reproducible methods for antimicrobial susceptibility testing are lacking due to technical difficulties encountered with these species and the lack of convincing clinical outcome correlates.

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|-------|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| CAZ | 30 | - | - | - | |
| MEM | 10 | - | - | - | |
| MNO | 30 | - | - | - | |
| SXT | 1.25 – 23.75 | - | - | - | |

CITROBACTER

Additional Table 7. Antimicrobial resistance (R) in *Citrobacter* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|----------|----------|---------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 80.00 % | 83.67 % | 75.95 % | 85.71 % | ↑ |
| AMC_UTI | 82.61 % | 72.00 % | 75.00 % | 80.95 % | ↓ |
| Amikacin (AMK) | 01.59 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Ampicillin (AMP) | 100.00 % | 100.00 % | 100.00 % | 98.57 % | ↓ |
| Ceftazidime (CAZ) | 26.56 % | 23.61 % | 26.79 % | 28.57 % | ↑ |
| Chloramphenicol (CHL) | 07.32 % | 08.51 % | 16.22 % | 04.00 % | ↓ |
| Ciprofloxacin (CIP) | 17.20 % | 17.57 % | 15.19 % | 11.27 % | ↓ |
| Cefotaxime (CTX) | 25.00 % | 26.03 % | 27.68 % | 25.71 % | ↑ |
| Ertapenem (ETP) | 04.62 % | 09.46 % | 09.09 % | 09.86 % | ↑ |
| Gentamicin (GEN) | 15.63 % | 12.16 % | 10.71 % | 09.72 % | ↓ |
| Imipenem (IPM) | 01.56 % | 01.33 % | 00.89 % | 00.00 % | ↓ |
| Meropenem (MEM) | 01.56 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Trimethoprim-sulfamethoxazole (SXT) | 20.31 % | 12.33 % | 14.68 % | 15.49 % | ↓ |
| Piperacillin-tazobactam (TZP) | 21.54 % | 14.86 % | 17.69 % | 09.72 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 8. Breakpoints for antibiotics against *Citrobacter* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | - | < 19 | |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | - | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 22 | 19 – 21 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30 – 6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

ENTEROBACTER

Additional Table 9. Antimicrobial resistance (R) in *Enterobacter* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|----------|----------|----------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| AMC_UTI | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| Amikacin (AMK) | 00.57 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Ampicillin (AMP) | 99.42 % | 100.00 % | 100.00 % | 100.00 % | ↑ |
| Ceftazidime (CAZ) | 42.77 % | 37.23 % | 34.93 % | 40.16 % | ↓ |
| Chloramphenicol (CHL) | 28.03 % | 23.02 % | 15.61 % | 14.06 % | ↓ |
| Ciprofloxacin (CIP) | 29.89 % | 19.46 % | 19.30 % | 15.57 % | ↓ |
| Cefotaxime (CTX) | 43.35 % | 38.62 % | 34.96 % | 41.56 % | ↓ |
| Ertapenem (ETP) | 06.29 % | 20.53 % | 16.44 % | 24.70 % | ↑ |
| Gentamicin (GEN) | 32.76 % | 20.11 % | 17.62 % | 10.70 % | ↓ |
| Imipenem (IPM) | 01.15 % | 01.58 % | 00.43 % | 00.00 % | ↓ |
| Meropenem (MEM) | 00.57 % | 01.05 % | 00.00 % | 00.00 % | ↓ |
| Trimethoprim-sulfamethoxazole (SXT) | 34.10 % | 22.87 % | 21.78 % | 16.73 % | ↓ |
| Piperacillin-tazobactam (TZP) | 23.43 % | 25.00 % | 24.45 % | 24.79 % | ↑ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 10. Breakpoints for antibiotics against *Enterobacter* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | - | < 19 | |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 22 | 19 – 21 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30 – 6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

ESCHERICHIA

Additional Table 11. Antimicrobial resistance (R) in *Escherichia* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|---------|---------|---------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 24.52 % | 27.37 % | 33.22 % | 31.10 % | ↑ |
| AMC_UTI | 13.53 % | 12.04 % | 13.58 % | 14.80 % | ↑ |
| Amikacin (AMK) | 00.43 % | 00.63 % | 00.66 % | 00.65 % | ↑ |
| Ampicillin (AMP) | 51.55 % | 55.63 % | 55.96 % | 53.75 % | ↑ |
| Ceftazidime (CAZ) | 13.67 % | 12.40 % | 12.60 % | 14.23 % | ↑ |
| Chloramphenicol (CHL) | 07.66 % | 10.75 % | 10.67 % | 09.01 % | ↑ |
| Ciprofloxacin (CIP) | 25.18 % | 24.60 % | 21.46 % | 22.95 % | ↓ |
| Cefotaxime (CTX) | 15.97 % | 15.76 % | 15.07 % | 18.50 % | ↑ |
| Ertapenem (ETP) | 00.14 % | 00.31 % | 00.13 % | 00.52 % | ↑ |
| Gentamicin (GEN) | 10.81 % | 07.15 % | 06.55 % | 10.16 % | ↓ |
| Imipenem (IPM) | 00.00 % | 00.15 % | 00.00 % | 00.00 % | = |
| Meropenem (MEM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Trimethoprim-sulfamethoxazole (SXT) | 30.00 % | 33.07 % | 29.66 % | 29.34 % | ↓ |
| Piperacillin-tazobactam (TZP) | 05.16 % | 03.00 % | 02.93 % | 02.19 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 12. Breakpoints for antibiotics against *Escherichia* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | - | < 19 | |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 22 | 19 – 21 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30 – 6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

KLEBSIELLA

Additional Table 13. Antimicrobial resistance (R) in *Klebsiella* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|---------|----------|---------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 45.11 % | 43.43 % | 35.91 % | 47.20 % | ↑ |
| AMC_UTI | 33.58 % | 35.36 % | 40.45 % | 44.00 % | ↑ |
| Amikacin (AMK) | 03.99 % | 01.14 % | 00.58 % | 01.42 % | ↓ |
| Ampicillin (AMP) | 100.00 % | 99.80 % | 100.00 % | 99.67 % | ↓ |
| Ceftazidime (CAZ) | 39.80 % | 36.86 % | 35.40 % | 43.35 % | ↑ |
| Chloramphenicol (CHL) | 20.52 % | 16.28 % | 12.36 % | 05.88 % | ↓ |
| Ciprofloxacin (CIP) | 43.07 % | 36.19 % | 35.71 % | 40.98 % | ↓ |
| Cefotaxime (CTX) | 39.65 % | 37.04 % | 35.05 % | 44.92 % | ↑ |
| Ertapenem (ETP) | 07.50 % | 10.91 % | 12.12 % | 07.73 % | ↑ |
| Gentamicin (GEN) | 34.94 % | 33.14 % | 33.15 % | 24.53 % | ↓ |
| Imipenem (IPM) | 01.26 % | 00.56 % | 00.56 % | 01.61 % | ↑ |
| Meropenem (MEM) | 01.26 % | 00.37 % | 00.56 % | 01.59 % | ↑ |
| Trimethoprim-sulfamethoxazole (SXT) | 30.56 % | 31.98 % | 32.63 % | 42.93 % | ↑ |
| Piperacillin-tazobactam (TZP) | 26.63 % | 18.48 % | 17.45 % | 13.61 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 14. Breakpoints for antibiotics against *Klebsiella* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | - | < 19 | |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 22 | 19 – 21 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30 – 6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

MORAXELLA

Additional Table 15. Antimicrobial resistance (R) in *Moraxella* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2018 vs 2020) |
|-----------------------------------|--------------------------------|---------|---------|---------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | NT | 00.00 % | 06.25 % | 00.00 % | = |
| Chloramphenicol (CHL) | NT | 00.00 % | 00.00 % | 00.00 % | = |
| Ciprofloxacin (CIP) | NT | 00.00 % | 00.00 % | 00.00 % | = |
| Cefotaxime (CTX) | NT | 00.00 % | 00.00 % | 00.00 % | = |
| Erythromycin (ERY) | NT | 00.00 % | 00.00 % | 00.00 % | = |
| Tetracycline (TCY) | NT | 00.00 % | 00.00 % | 00.00 % | = |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 16. Breakpoints for antibiotics against *Moraxella* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|----------------------------|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 2 – 1 | ≥ 19 | - | < 19 | |
| CHL | 30 | ≥ 31 | - | < 31 | For topical agent use only |
| CIP | 5 | ≥ 31 | - | < 31 | |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ERY | 15 | ≥ 23 | 20 – 22 | < 20 | |
| TCY | 30 | ≥ 28 | 25 – 27 | < 25 | |

MORGANELLA

Additional Table 17. Antimicrobial resistance (R) in *Morganella* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|----------|----------|----------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| AMC_UTI | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| Amikacin (AMK) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Ampicillin (AMP) | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| Ceftazidime (CAZ) | 03.13 % | 12.24 % | 16.28 % | 15.56 % | ↑ |
| Chloramphenicol (CHL) | 33.33 % | 28.00 % | 19.05 % | 15.15 % | ↓ |
| Ciprofloxacin (CIP) | 12.50 % | 12.24 % | 09.30 % | 04.44 % | ↓ |
| Cefotaxime (CTX) | 03.13 % | 14.29 % | 13.95 % | 15.56 % | ↑ |
| Ertapenem (ETP) | 00.00 % | 02.04 % | 00.00 % | 00.00 % | = |
| Gentamicin (GEN) | 06.25 % | 08.16 % | 04.65 % | 00.00 % | ↓ |
| Imipenem (IPM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Meropenem (MEM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Trimethoprim-sulfamethoxazole (SXT) | 21.88 % | 27.08 % | 18.60 % | 15.56 % | ↓ |
| Piperacillin-tazobactam (TZP) | 00.00 % | 02.04 % | 02.32 % | 02.27 % | ↑ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 18. Breakpoints for antibiotics against *Morganella* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | 19 – 20** | < 19 | ** ATU – area of technical uncertainty |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 50 | 19 – 49 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30-6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

PROTEUS

Additional Table 19. Antimicrobial resistance (R) in *Proteus* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|---------|---------|---------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 25.00 % | 22.95 % | 32.80 % | 25.00 % | = |
| AMC_UTI | 27.63 % | 18.56 % | 36.92 % | 23.88 % | ↓ |
| Amikacin (AMK) | 01.60 % | 01.38 % | 01.11 % | 00.58 % | ↓ |
| Ampicillin (AMP) | 65.93 % | 55.07 % | 64.94 % | 59.52 % | ↓ |
| Ceftazidime (CAZ) | 08.51 % | 04.11 % | 06.49 % | 02.89 % | ↓ |
| Chloramphenicol (CHL) | 34.23 % | 44.07 % | 45.00 % | 46.73 % | ↑ |
| Ciprofloxacin (CIP) | 37.57 % | 31.31 % | 48.91 % | 38.01 % | ↑ |
| Cefotaxime (CTX) | 26.74 % | 18.81 % | 40.54 % | 23.84 % | ↓ |
| Ertapenem (ETP) | 00.53 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Gentamicin (GEN) | 31.18 % | 28.57 % | 47.51 % | 30.64 % | ↓ |
| Imipenem (IPM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Meropenem (MEM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Trimethoprim-sulfamethoxazole (SXT) | 49.46 % | 41.59 % | 58.99 % | 45.03 % | ↓ |
| Piperacillin-tazobactam (TZP) | 01.06 % | 01.84 % | 01.06 % | 00.58 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 20. Breakpoints for antibiotics against *Proteus* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | 19 – 20** | < 19 | ** ATU – area of technical uncertainty |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 50 | 19 – 49 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30-6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

PSEUDOMONAS

Additional Table 21. Antimicrobial resistance (R) in *Pseudomonas* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|----------------------------------|--------------------------------|---------|---------|---------|----------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amikacin (AMK) | 05.42 % | 01.62 % | 02.03 % | 02.19 % | ↓ |
| Ceftazidime (CAZ) | 35.54 % | 16.94 % | 18.59 % | 14.29 % | ↓ |
| Ciprofloxacin (CIP) | 47.59 % | 34.05 % | 31.00 % | 17.58 % | ↓ |
| Imipenem (IPM) | 34.55 % | 21.20 % | 21.18 % | 15.30 % | ↓ |
| Meropenem (MEM) | 39.16 % | 23.24 % | 31.84 % | 24.86 % | ↓ |
| Piperacillin-tazobactam (TZP) | 43.03 % | 27.81 % | 25.37 % | 21.31 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 22. Breakpoints for antibiotics against *Pseudomonas* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|----------------------|--|---|--------------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMK | 30 | ≥ 15 | - | < 15 | |
| CAZ | 10 | ≥ 50 | 17 – 49 | < 17 | |
| CIP | 5 | ≥ 50 | 26 – 49 | < 26 | |
| IPM | 10 | ≥ 50 | 20 – 49 | < 20 | |
| MEM | 10 | ≥ 24 | 18 – 23 | < 18 | |
| TZP | 30 – 6 | ≥ 50 | 19 – 49 | < 18 | **18 – 19 is ATU – area of technical uncertainty |

SERRATIA

Additional Table 23. Antimicrobial resistance (R) in *Serratia* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|----------|----------|----------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Amoxicillin-clavulanic acid (AMC) | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| AMC_UTI | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| Amikacin (AMK) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Ampicillin (AMP) | 100.00 % | 100.00 % | 100.00 % | 100.00 % | = |
| Ceftazidime (CAZ) | 06.45 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Chloramphenicol (CHL) | 07.69 % | 02.22 % | 05.26 % | 00.00 % | ↓ |
| Ciprofloxacin (CIP) | 03.23 % | 07.69 % | 04.54 % | 02.33 % | ↓ |
| Cefotaxime (CTX) | 06.45 % | 09.43 % | 04.65 % | 02.33 % | ↓ |
| Ertapenem (ETP) | 03.23 % | 01.89 % | 00.00 % | 00.00 % | ↓ |
| Gentamicin (GEN) | 06.45 % | 05.88 % | 02.33 % | 00.00 % | ↓ |
| Imipenem (IPM) | 00.00 % | 00.00 % | 00.00 % | 00.00 % | = |
| Meropenem (MEM) | 03.23 % | 00.00 % | 00.00 % | 00.00 % | ↓ |
| Trimethoprim-sulfamethoxazole (SXT) | 10.00 % | 01.92 % | 04.76 % | 04.65 % | ↓ |
| Piperacillin-tazobactam (TZP) | 06.45 % | 03.77 % | 02.33 % | 00.00 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 24. Breakpoints for antibiotics against *Serratia* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|--|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| AMC | 10 – 20 | ≥ 19 | - | < 19 | |
| AMC_UTI | 10 – 20 | ≥ 16 | - | < 16 | |
| AMK | 30 | ≥ 18 | - | < 18 | |
| AMP | 10 | ≥ 14 | - | < 14 | |
| CAZ | 10 | ≥ 22 | 19 – 21 | < 19 | |
| CHL | 30 | ≥ 17 | - | < 17 | |
| CIP | 5 | ≥ 25 | 22 – 24** | < 22 | ** ATU – area of technical uncertainty |
| CTX | 5 | ≥ 20 | 17 – 19 | < 17 | |
| ETP | 10 | ≥ 25 | - | < 25 | |
| GEN | 10 | ≥ 17 | - | < 17 | |
| IPM | 10 | ≥ 22 | 19 – 21 | < 19 | |
| MEM | 10 | ≥ 22 | 16 – 21 | < 16 | |
| SXT | 1.25 -23.75 | ≥ 14 | 11 – 13 | < 11 | |
| TZP | 30 – 6 | ≥ 20 | 19** | < 20 | ** ATU – area of technical uncertainty |

STENOTROPHOMONAS

Additional Table 25. Antimicrobial resistance (R) in *Stenotrophomonas* species from 2017-2020

| Antimicrobial Agent | Antimicrobial Resistance % (R) | | | | Overall Change (2017 vs 2020) |
|-------------------------------------|--------------------------------|---------|---------|---------|-------------------------------|
| | 2017 | 2018 | 2019 | 2020 | |
| Trimethoprim-sulfamethoxazole (SXT) | 08.69 % | 03.64 % | 02.35 % | 00.00 % | ↓ |

* NT – not tested; UTI – uncomplicated urinary tract infection; ↑ indicates increase in resistance; ↓ indicates decrease in resistance; = indicates no change in resistance

Additional Table 26. Breakpoints for antibiotics against *Stenotrophomonas* species in disk diffusion method (EUCAST guidelines v11.0; applicable Jan 2021)

| Antibiotic | Disk Content (µg) | Susceptible (S) [in mm] | | Resistant (R) [in mm] | Notes |
|------------|-------------------|----------------------------------|-------------------------------------|-----------------------|-------|
| | | Susceptible, standard dosing (S) | Susceptible, increased exposure (I) | | |
| SXT | 1.25 -23.75 | ≥ 50 | 16 – 49 | < 16 | |