Table S1. Acquired beta-lactamases identified in the strains used in this study¹

| Molecular Class | Escherichia coli | Klebsiella pneumoniae | Enterobacter cloacae species complex | Others | Total |
|-----------------|------------------|----------------------|-------------------------------------|--------|-------|
| CTX-M-2         | A                | 3                    | 4                                   |        | 7     |
| CTX-M-3         | A                | 3                    | 1                                   | 1      | 5     |
| CTX-M-14        | A                | 5                    | 4                                   | 1      | 10    |
| CTX-M-15        | A                | 18                   | 91                                  | 7      | 2     | 118   |
| CTX-M-27        | A                | 3                    |                                     |        | 3     |
| CTX-M-55        | A                | 1                    |                                     | 1      | 2     |
| SHV-2           | A                | 1                    |                                     |        | 1     |
| SHV-26          | A                | 2                    |                                     |        | 2     |
| SHV-28          | A                | 11                   |                                     |        | 11    |
| SHV-12          | A                | 2                    | 11                                  | 1      | 14    |
| SHV-18          | A                | 1                    |                                     |        | 1     |
| SHV-40          | A                |                      |                                     | 1      | 1     |
| TEM-1           | A                | 18                   | 52                                  | 13     | 4     | 87    |
| TEM-12          | A                | 1                    |                                     |        | 1     |
| TEM-116         | A                | 1                    |                                     |        | 1     |
| TEM-135         | A                | 1                    |                                     |        | 1     |
| TEM-2           | A                |                      |                                     | 1      | 1     |
| TEM-26          | A                | 1                    | 1                                   |        | 2     |
| TEM-28          | A                | 1                    |                                     |        | 1     |
| TEM-30          | A                | 3                    | 1                                   | 1      | 4     |
| TEM-35          | A                | 1                    |                                     |        | 1     |
| TEM-40          | A                | 2                    |                                     |        | 2     |
| PER-2           | A                |                      |                                     | 1      | 2     |
| VEB-1           | A                |                      |                                     | 1      | 2     |
| VEB-3           | A                | 2                    | 2                                   | 4      |       |
| OXY-2-6         | A                |                      |                                     | 2      | 2     |
| OXA-1           | D                | 12                   | 30                                  | 5      | 1     | 48    |
| OXA-10          | D                | 4                    |                                     | 1      | 5     |
| OXA-9           | D                | 1                    | 15                                  |        | 16    |
| DHA-1           | C                | 3                    |                                     |        | 3     |
| CMY-2           | C                | 6                    | 1                                   |        | 7     |
| CMY-4           | C                |                      |                                     | 5      | 5     |
| CMY-42          | C                |                      |                                     | 1      | 1     |
| CMY-6           | C                |                      |                                     | 1      | 1     |
| CMY-16          | C                |                      |                                     | 1      | 1     |
| CMY-94          | C                |                      |                                     | 1      | 1     |
| CMY-99          | C                |                      |                                     | 1      | 1     |
| KPC¹            | A, carbapenemase | 6                    | 25                                  | 12     | 5     | 48    |
| OXA-48-like²    | D, carbapenemase | 3                    | 41                                  | 1      | 3     | 48    |
| MBL³            | B                | 4                    | 21                                  | 5      | 6     | 36    |
Narrow spectrum class A chromosomal beta-lactamases (SHV-1/SHV-11/SHV-24 are not included). Many bacterial cells co-produced two or more beta-lactamases.

KPC-2, 29; KPC-3, 14, KPC-4, 2; KPC-33, 1. Other class A carbapenemases: NMC-A, 1; SME-1, 1.

OXA-48, 32; OXA-181, 8; OXA-232, 5; OXA-162, 2; OXA-163, 1.

NDM-1, 16; NDM-4, 1; NDM-6, 2; VIM-1, 10; VIM-2, 2; VIM-27, 1; VIM-4, 1; VIM-5, 1; IMP-1,

Table S2. Spearman rank correlations

A. Rank orders of beta-lactams

| Beta-lactam | WT MIC (KPM1026a) (µg/ml) | MIC efflux (KPM1027) (µg/ml) | Efflux rank | OmpK36 MIC (KPM2040) (µg/ml) | OmpK36 rank | OmpK35 MIC (KPM613) (µg/ml) | OmpK35 rank | MIC OmpK36/efflux (KPM2126) (µg/ml) | Efflux/OmpK36 rank | Mean MIC clones rank | MIC50 rank | P_value | MIC90 rank | P_value |
|-------------|-----------------------------|-------------------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|--------------------------------|----------------|------------------------|-------------|---------|-------------|---------|
| Cefadroxil  | 0.5                         | 7                             | 1           | 4.5                           | 2           | 6.5                           | 4           | 16                             | 7              | 0.75                   | 8           | 4       | 8           | 64      |
| Cefalexin   | 4                           | 10                            | 8           | 9                             | 16          | 9                             | 32          | 128                            | 9              | 9.5                    | 10          | 32      | 9.5         | 128     |
| Cefdinir    | 0.125                       | 3.5                           | 1           | 4.5                           | 2           | 6.5                           | 2           | 6                              | 8              | 0.13                   | 5           | 0.5     | 4           | 8.5     |
| Cefditoren  | 0.5                         | 7                             | 2           | 7                             | 1           | 5                             | 1           | 4.5                            | 4              | 0.07                   | 3           | 0.5     | 4           | 4       |
| Cefixime    | 0.125                       | 3.5                           | 0.5         | 0.25                          | 2.5         | 0.5                           | 2.5         | 2                              | 64             | 0.09                   | 4           | 0.5     | 4           | 4       |
| Cefpodoxime | 0.125                       | 3.5                           | 2           | 7                             | 0.5         | 4                             | 1           | 4.5                            | 4              | 0.33                   | 7           | 1       | 5.5         | 8       |
| Cefditoren  | 0.125                       | 3.5                           | 2           | 2                             | 0.25        | 2.5                           | 2.5         | 0.25                           | 1              | 0.07                   | 2           | 0.25    | 2           | 2       |
| Cefuroxime  | 2                           | 9                             | 32          | 10                            | 16          | 9                             | 16          | 8                              | 64             | 1.5                    | 2           | 0.25    | 2           | 2       |
| Mecillinam  | 0.5                         | 7                             | 2           | 7                             | 16          | 9                             | 128         | 10                             | 128            | 9.5                    | 6           | 1       | 5.5         | 128     |
| Tebipenem   | 0.06                        | ≤0.06                         | 1           | 0.125                         | 0.5         | 2.5                           | 1           | 1.5                            | 0.06           | 0.06                   | 0.75        | 1       | 0.5         | 1       |

B. Spearman correlation coefficients

|                           | MIC50 rank | P_value  | MIC50 rank | P_value  |
|---------------------------|------------|----------|------------|----------|
| Mean MIC clones rank       | 0.97       | 0.000003 | 0.91       | 0.0002   |
| wild type MIC rank (based on KPM1026a MIC) | 0.87 | 0.001 | 0.82 | 0.003 |
| Efflux rank (based on KP1027 MIC) | 0.83 | 0.003 | 0.83 | 0.003 |
| OmpK36 rank (based on KPM2040 MIC) | 0.83 | 0.003 | 0.96 | 0.0002 |
| OmpK35 OmpK36 rank (based on KPM2613 MIC) | 0.79 | 0.007 | 0.95 | 0.0003 |
| OmpK36/efflux rank (based on KPM2126 MIC) | 0.84 | 0.002 | 0.97 | 0.000003 |
