Supplementary Note

Genetic context of *oxa23*

ST52 isolate BAL_212 (MIC 64 μg/mL) had an *oxa23*:chromosome depth ratio of 1.1 and carried ISAba1 insertions in the chromosome as well as within an Aci6-type plasmid (although not in AbaR4), consistent with either a chromosomal or plasmid location for Tn*2006* in this isolate (Table 1).

Genetic context of *oxa58* and *ndm1*

Four of the imipenem resistant isolates (MIC 64 μg/mL) carried both *oxa58* and *ndm1*. Two of these, BAL_255 and 255_n (VAP and carriage, respectively, from the same patient), CC16, had the Tn*125 ndm1* transposon inserted within a chromosomal gene (ABK1_1257). The *oxa58* was flanked by ISAba3 and inserted within a novel plasmid, which we were able to resolve into a single circular assembly using Bandage. This was designated p255n_1, and was submitted to GenBank under accession KT852971 (Fig. S3). The other two isolates carrying both *oxa58* and *ndm1*, BAL_205 and BAL_322, did not harbour p255n_1. In these isolates, *ndm1* was present within the Tn*125* transposon, while *oxa58* was flanked by ISAba3 in a novel context. Analysis of the assembly graphs in Bandage yielded no evidence that these genes were chromosomally located; hence, we conclude that they were most likely plasmid-encoded. Interestingly, we also observed low-depth presence of *oxa58* and p255n_1 in two imipenem resistant *oxa23*-carrying GC2 isolates, BAL_361 and BAL_128 (Fig. S2(f)-(g)), consistent with cross-contamination or plasmid loss upon sub-culture.

Detection of carbapenemase genes in imipenem sensitive isolates

We detected *oxa23* in the imipenem sensitive isolate BAL_103 (MIC 0.5 μg/mL); however, the *oxa23*:chromosome read depth ratio was just 0.07 (Fig. S2(a)). This could be explained by either cross-contamination with DNA from a resistant isolate during library preparation and multiplex sequencing, or by loss of an *oxa23*-bearing plasmid during culture.

We also detected *oxa58* reads in the imipenem susceptible isolates BAL_283, BAL_287 and UV_1268 (MIC 0.75-1.5 μg/mL). These displayed *oxa58*:chromosome depth ratios of 0.38-0.87 (Fig. S2(b)-(d)) and the assembly graphs were again consistent with the presence of the *oxa58* in plasmid p255n_1. As we detected the *oxa58* gene in the plasmid per the *oxa58*-mediated imipenem resistant isolates, we speculate that imipenem susceptibility was dependant on either (a) the loss of the plasmid in culture prior to phenotyping or (b) a lack of *oxa58* expression from the p255n_1 plasmid. Notably the imipenem resistant isolates carrying the *oxa58*-bearing plasmid also had *ndm1* present in the chromosome which could alternatively explain the resistant phenotype (Fig. S2(h)-(k)).