

A long-term multidrug-resistant *Providencia stuartii* outbreak in a Tunisian intensive care unit

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INTRODUCTION

Providencia stuartii survives well in natural environment and often causes opportunistic infections. Clinical isolates of *P. stuartii* are usually resistant to multiple antibiotics. Here we describe an outbreak caused by a multidrug resistant-*P. stuartii* strain involving 20 critically ill patients in a Tunisian intensive care unit (ICU) December 2013 and July 2016.

METHODS

Twenty multidrug-resistant *P. stuartii* clinical strains isolated in the ICU of Habib Bourguiba Hospital, SFAX Tunisia, between December 2013 and July 2016 were studied.

Antibiotic susceptibility testing : disk diffusion method according to the European Committee on Antimicrobial Susceptibility Testing.

Molecular typing : repetitive sequence-based PCR (repPCR).

Antibiotic resistance genes : PCR and sequencing.

Plasmid analysis : conjugation experiments and incompatibility replicon typing by PCR.

CONCLUSIONS

To our knowledge, this is the first report of a long-term outbreak due to a multidrug resistant-*P. stuartii* co-producing CMY-2, ArmA, and QnrA6. This strain may have persisted in the environment and caused opportunistic infections. It, therefore, poses a major threat to patient safety. Clear guidelines to control reservoirs in the hospital are urgently needed.

Twenty multidrug-resistant *P. stuartii*, showing identical susceptibility patterns (figure 1) and similar repPCR patterns (figure 2) were isolated from endotracheal aspirates (13), pus (2) bloodcultures (3) and urine (2) of 20 patients hospitalized in the medical ICU of Habib Bourguiba hospital between December 2013 and July 2016.

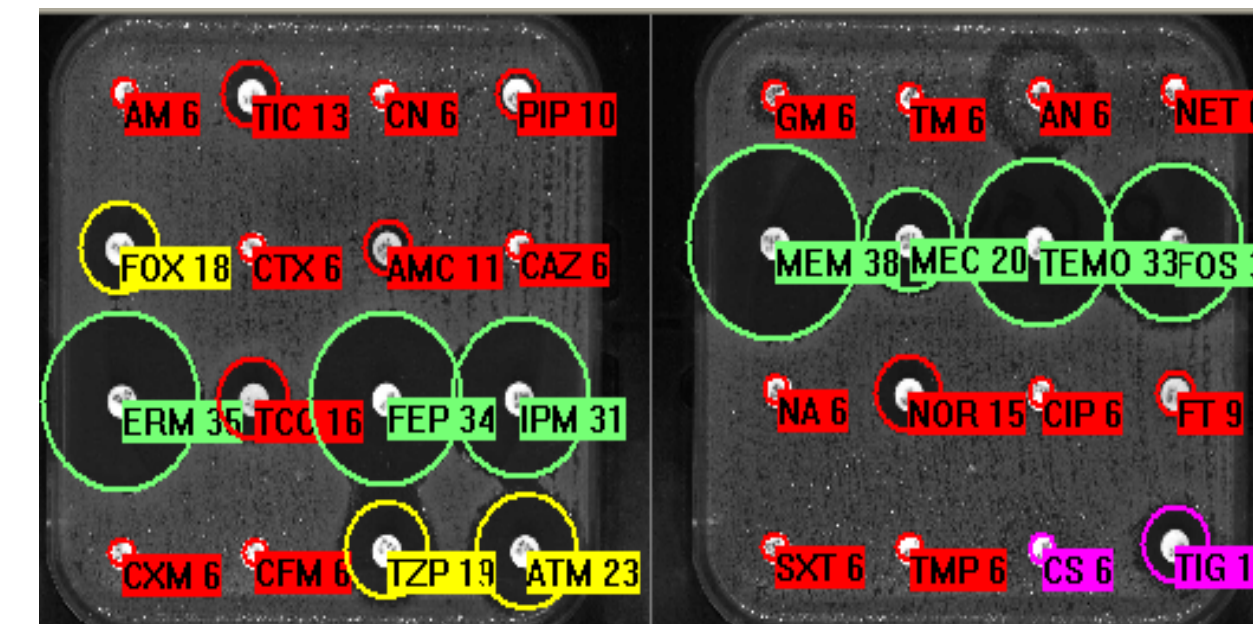


Figure 1 : Antibiogram of *P. stuartii* isolates.

All isolates were resistant to all antibiotics except carbapenems and cefepime

E. coli J53-
Transconjugant

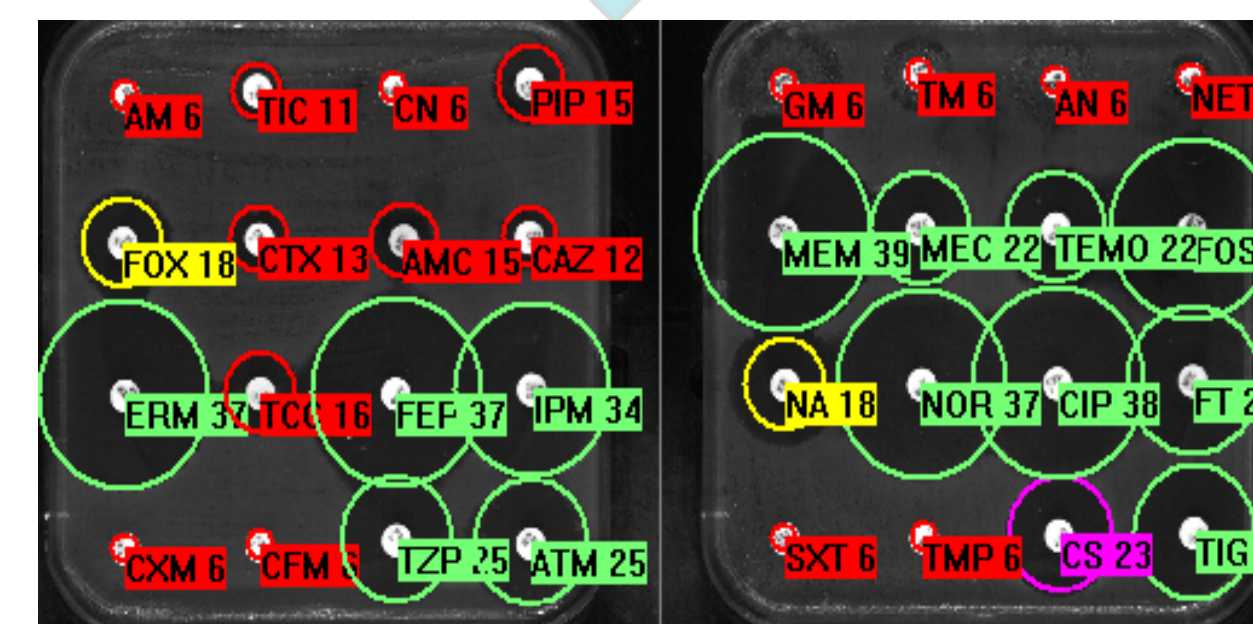


Figure 3 : Antibiogram of an *E. coli* J53 transconjugant of *P. stuartii* isolates.

All isolates carried *bla*_{CMY-4}, *qnrA6*, and *armA* on IncA/C plasmid

RESULTS

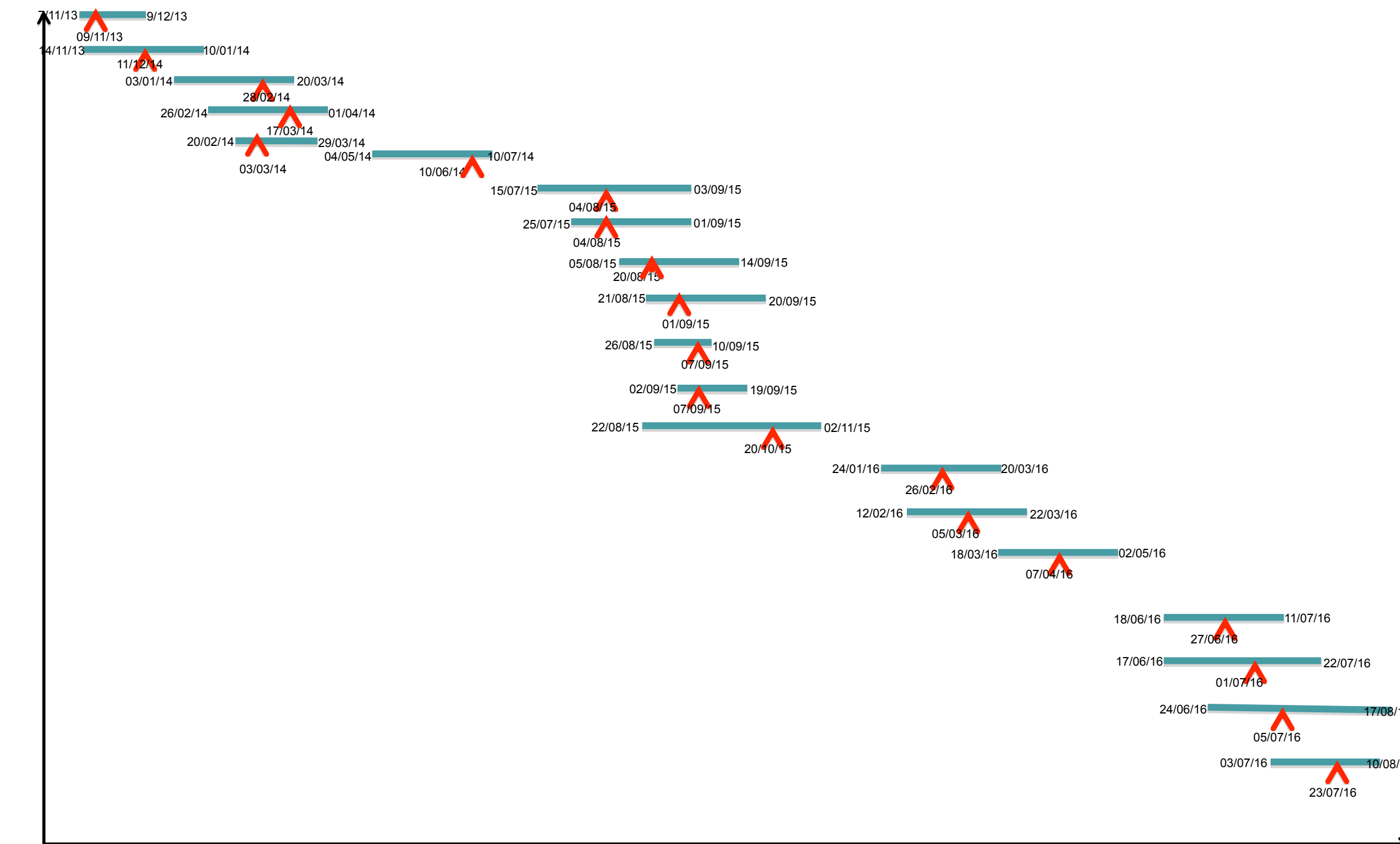


Figure 4 : Description of the *P. stuartii* outbreak
(blue bar : duration of the hospital stay; arrow : isolation of *P. stuartii*)

Figure 3 shows that many infected patients were hospitalized during overlapping time periods, horizontal intra-ICU transmission was considered as the main route for the dissemination of the outbreak strain after the persistence of this strain in the hospital environment. Moreover, this strain has been isolated sporadically during 2017.

As the majority of the strains originated from respiratory specimens, the mechanical ventilation was considered as a persistent source of contamination. The mean patient age was 41.8 years and the sex-ratio 5.6.

The average length of stay before *P. stuartii* isolation was 21.25 days

Mortality rate : 40%