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The post-antibiotic era has arrived: interventions to contain an outbreak of pan-drug-resistant (PDR) NDM-1 and OXA-48-like dual producer Providencia stuartii (PST) in an acute care hospital in Argentina

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Background. Carbapenemases(C) are an emerging health problem worldwide. In Argentina, KPC are detected in *Enterobacteriaceae* (15%, National Reference Laboratory -NRL-2015) and OXA-like in *Acinetobacter* spp. (80%). OXA-48-like and NDM were first identified in 2008 and 2013, respectively, and since then, the detection of these C has increased. We describe an outbreak of PDR NDM-1+OXA-48-like-producing PST isolates and the measures we took to in order to contain it.

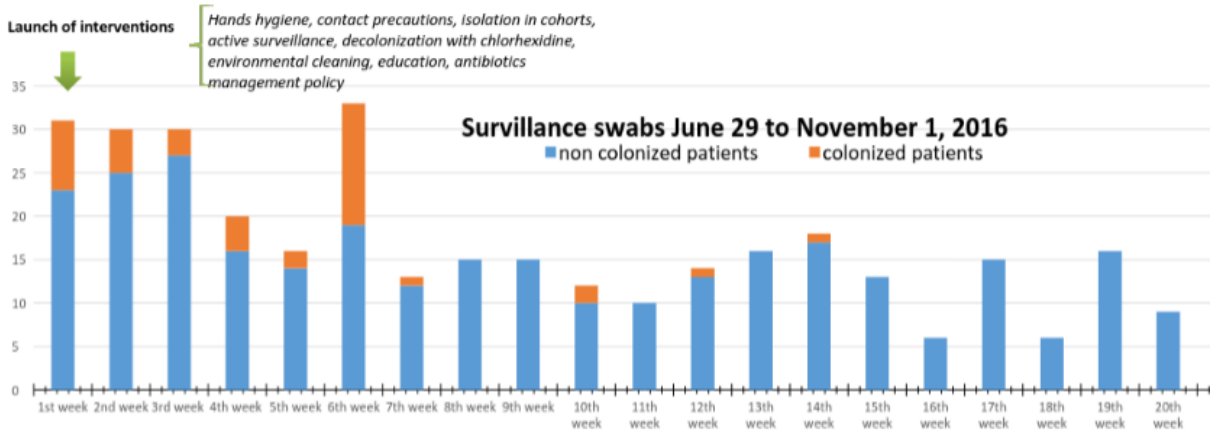
Material/methods. The institution is an acute care 274 bed, third level hospital, in Buenos Aires Province. Susceptibility profile of the isolates was determined according to CLSI. Molecular characterization of *bla* was performed by PCR, bacteria identification confirmed using MALDI-TOF (Bruker) and clonal relationship determined using PFGE. PST NDM or OXA-48-like producers were first detected in 2014. Sporadic cases, susceptible to at least one antibiotic, were detected until

November 2015.Since then, they increased until June 2016 (19 patients). In June 6, we recorded first case of NDM-1+OXA-48-like PST with a PDR phenotype. From June 6 to July 27, 4 patients had PDR PST infection: 3 males (mean age: 66), mean hospitalization: 35 days. All of them had comorbidities, underwent surgery prior to the onset of the infection, were admitted to ICU and received broad spectrum antibiotics; 3 of them died in the first 48 hours after clinical diagnosis was made. PDR PST isolates were recovered form: blood (2), surgical site (1), ascitic fluid (1). The alive patient received double high-dose carbapenem scheme.

Interventions to contain the outbreak were guided and followed up by a multidisciplinary working group formed by members of several scientific societies and health authorities. Infection control bundles included: hands hygiene policy, isolation in cohorts, active surveillance (rectal swabs) in ICU, daily bathing of patients with chlorhexidine, environmental cleaning protocols, continuous training of staff, guidelines update, dedicated staff for caring colonized patients, real time communication between medical staff and microbiologist in order to isolate patients and antibiotics management policy.

Results:

In vitro synergy-kill curves performed at NRL detected that meropenem plus fosfomycin plus (cefepime or rifampin) was the only bactericidal drug combination against this clone. By PFGE, PDR PST belonged to a new and unique clone.



Conclusions:

Working group intervention has preliminary succeeded in containing the spread of PDR PST in our hospital. The commitment of health authorities was an important key to reach successfully the final outcome. All these implemented measures must be followed and adhered in a long period of time in order to definitively contain this outbreak. This experience can be taken as a model of local interventions guided by an external expert working group.