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The burden of colonization and infection by carbapenemase-producing *Enterobacteriaceae* in the neuro-rehabilitation setting: a prospective 4-year experience

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Background: The spread of carbapenemase-producing *Enterobacteriaceae* (CPE) is a serious threat in all healthcare facilities. The risk of colonization and infection is particularly high for patients with spinal cord (SCI) and acquired brain injuries (ABI), due to prolonged length-of-stay, invasive medical devices and functional dependence. Moreover, preventing CPE cross-transmission may be extremely difficult, as normally persecuted intervention (strict infection control measures, isolation) could reduce patients' access to rehabilitation activities, leading to a worse rehabilitation outcome. To date, epidemiology of CPE in the rehabilitation setting is largely unknown. The aim of this study was to assess the burden of CPE colonization and infection in a neuro-rehabilitation hospital.

Material/methods: Prospective, observational study at a 150-bed rehabilitation hospital dedicated to SCI and ABI, from January 2012 to December 2015. All patients were screened for CPE rectal colonization on admission and every 2 weeks. Contact isolation and geographic separation in a ward

cohort were applied for CPE-carriers, who could attend activities in common spaces (occupational and recreational therapy, meals) if they were able to comply with hand hygiene and contact precautions. At the same time, a persuasive antimicrobial stewardship program was implemented, to reduce the unnecessary and inappropriate use of antibiotics. Endpoints were prevalence of CPE rectal colonization on admission, incidence of in-hospital acquisition of CPE rectal colonization, and incidence of CPE bloodstream infection (CPE-BSI).

Results: During the study period, 2841 patients were screened; mean length-of-stay was 78 days. CPE rectal colonization was found on admission in 258 patients (9%), in-hospital acquisition in 206 (7.9%). Overall incidence of in-hospital acquisition of CPE rectal colonization and CPE-BSI were 9 and 2.9 cases/10,000 patient-days, respectively. A slight decrease of both CPE prevalence on admission and in-hospital colonization was observed from 2012 to 2014, but this trend was not confirmed in 2015 (see Table). Likewise, the incidence of CPE-BSI decreased from 4 to 1.4 cases/10,000 patient-days from 2012 to 2014 but increased to 3.2 cases/10,000 patient-days in 2015, when the burden of CPE-carriers was higher.

Conclusions: The burden of CPE colonization and infection was high in our neuro-rehabilitation hospital, consistently with national epidemiology. At our knowledge, this is the first longitudinal report about epidemiology of CPE in this setting. Current infection control measures were more effective in containing cross-transmission when the amount of imported CPE-carriers was lower. Increasing the rate of CPE-carriers on admission, more aggressive and tailored infection control programs, coordinated with the acute-care hospitals, could be needed.

	2012	2013	2014	2015
Patients admitted	655	721	740	725
CPE carriers–n°(%)	124 (19)	119 (16.5)	100 (13.5)	121 (16.6)
On admission	66 (10)	68 (9.4)	56 (7.5)	68 (9.3)
During hospitalization	58 (9.8)	51 (7.8)	44 (6.4)	53 (8)
In-hospital CPE colonization/10,000 patient-days	10	9.2	7.9	9.3