Risk factors of infection produced by *Klebsiella pneumoniae* extended-spectrum beta-lactamase in a neonatal intensive care unit.

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Background

Preterm infants are at increased risk for developing sepsis compared with term infants because they are inmunocompromised host, have inmature epithelial mucosal barrier and are subjected to invasive procedural devices[1]. Outbreaks by *Klebsiella pneumoniae* extended-spectrum beta-lactamase (Kp-ESBL) have been described frequently in neonatal intensive care unit (NICU)[2] . Risk factors predisposing to infection by such pathogens have been investigated but very few studies were able to identify independent risk factors. Moreover variables associated with infection may vary considerably between different studies[3].

The aim of this study is to identify the risk factors associated with infection of Kp-ESBL compared with only colonization in the 14-bed NICU at Hospital Universitario Miguel Servet (HUMS) between January 2012 and June 2015.

Material/methods

Retrospective study of patients admitted to the HUMS NICU with Kp-ESBL isolation in epidemiological and/or clinical samples during the period of study.

Demographic and clinical data collection from the computerized clinical history: sex, mode of delivery, gestational age (weeks), birth weight (g), days in NICU, invasive procedural devices (duration of the epicutaneous catheter, duration of mechanical ventilation and parenteral nutrition) and previous antibiotic therapy. A bivariate and multivariate statistical analysis was established with selected variables. All statistical calculations were performed using SPSS software. A *P* value ≤0,05 was considered significant.

Results

During the period of study, there were 69 patients only colonized and 18 with Kp-ESBL infection. The rates of Kp-ESBL colonization and infection were 16% and 2,4% respectively. The most frequent infection was bacteremia, corresponding to 58% of infections.

The risk factors associated with Kp-ESBL infection are low gestational age (*P*=0,002), low birth weight (*P*=0,001), long stay in the NICU (*P*=0,004) and invasive procedural devices (duration of the epicutaneous catheter (*P*=0,007) and mechanical ventilation (*P*=0,035)) (Table 1). The length of stay in the NICU is the only risk factor that is independently associated with Kp-ESBL infection, increasing the risk of infection 1,028 for each day of admission (Table 2).

Table 2. Multivariate statistical analysis results

Risk factor	Odds-ratio	IC95%	p-valor
Days in NICU	1,028	1,008-1,049	0,006

Table 1. Bivariate statistical analysis results

Variables	Test	p-valor (≤0.05)	Alternative hypothesis
Sex	Chi-square	0,127	NO
Mode of delivery	Chi-square	0,073	NO
Gestational age (weeks)	Mann-Whitney	0,002	YES
Birth weight (grams)	Mann-Whitney	0,001	YES
Days in NICU	Mann-Whitney	0,004	YES
Duration of the epicutaneous catheter (days)	Mann-Whitney	0,007	YES
Duration of mechanical ventilation (hours)	Mann-Whitney	0,035	YES
Parenteral nutrition	Fisher	1,000	NO
Previous antibiotic therapy	Fisher	0,579	NO

Conclusions

- ✓ **Kp-ESBL has a significant clinical and epidemiological impact in the NICU of HUMS.**
- ✓ **A long stay in NICU is the risk factor associated with Kp-ESBL infection in our hospital.**
- ✓ **The identification of the risk factors will allow defining the local epidemiology, implementing interventions and guiding the most efficient empiric therapy.**

References:

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