An outbreak of SHV-5 producing *Klebsiella pneumoniae* in a neonatal intensive care unit; meropenem failed to avoid fecal colonization

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An outbreak of extended-spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae* (ESBL-Kp) in a neonatal intensive care unit prompted a prospective surveillance study between 12th September and 6th October 2003. Surveillance was carried out by obtaining stool samples twice a week. The DNA relatedness of the isolates was shown by random amplified polymorphic DNA comparison (ERIC-PCR). ESBL production was identified by clavulanic synergy, isoelectric focusing, PCR and sequence analysis. During the study period, 49 neonates were hospitalized in the neonatal intensive care unit (NICU). In the first 20-day period, five neonates were infected with ESBL-Kp. The first patient treated with third generation cephalosporin and the second patient treated with meropenem died. While all three infected survivors were clinically improving, the digestive tracts were being colonized by SHV-5 producing *Klebsiella*.

In the next period of the study, five neonates were colonized by ESBL-Kp as well. Univariate comparison of risk factors between colonized and non-colonized neonates was not significant. A total of 24 colonally related ESBL-Kp have been recovered from clinical materials and stool samples. This study demonstrated that parenterally applied meropenem, though successful in treating the systemic illness, might fail to protect the digestive tract from colonization of ESBL-Kp.

**KEY WORDS:** Beta-lactamase, *Klebsiella*, outbreak, meropenem

**SUMMARY**

An outbreak of extended-spectrum beta-lactamase (ESBL) producing *Klebsiella pneumoniae* (ESBL-Kp) in a neonatal intensive care unit prompted a prospective surveillance study between 12th September and 6th October 2003. Surveillance was carried out by obtaining stool samples twice a week. The DNA relatedness of the isolates was shown by random amplified polymorphic DNA comparison (ERIC-PCR). ESBL production was identified by clavulanic synergy, isoelectric focusing, PCR and sequence analysis. During the study period, 49 neonates were hospitalized in the neonatal intensive care unit (NICU). In the first 20-day period, five neonates were infected with ESBL-Kp. The first patient treated with third generation cephalosporin and the second patient treated with meropenem died. While all three infected survivors were clinically improving, the digestive tracts were being colonized by SHV-5 producing *Klebsiella*.

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**INTRODUCTION**

*Klebsiella pneumoniae* is naturally resistant to ampicillin and amoxicillin, usually, due to the production of SHV-1 beta-lactamase encoded on the chromosome (Haeggman et al., 1997; Simpson et al., 1980). In 1985, strains of *K. pneumoniae* that were also resistant to broad-spectrum cephalosporins due to the production of extended spectrum beta-lactamases (ESBL) appeared in French hospitals (Jarlier et al., 1988). These enzymes were mostly encoded on plasmids and spread worldwide among the members of Enterobacteriaceae. Initially, ESBL producing organisms were infrequent. Now, however, these organisms cause outbreaks quite often (French et al., 1996).

ESBL-producing *Klebsiella pneumoniae* (ESBL-Kp) has been reported with increasing morbidity and mortality in compromised patients and neonates (Pessoa-Silva et al., 2003) and therefore