

ESBL producing *Klebsiella pneumonia* outbreak in the neonatal ICU of a tertiary hospital in the Sultanate of Oman

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Background and Objectives: K. pneumonia has emerged as an important cause of hospital-acquired infections, particularly among patients in neonatal intensive care units with several risk factors resulting in a trend of increased colonization and infections. This study examines an outbreak of ESBL producing *Klebsiella pneumonia* in the NICU of a tertiary hospital in Oman. The study aims to determine the risk factors identified and clinical outcome for an outbreak of ESBL K. pneumonia in NICU. It also describes the results of molecular typing of the strains and control measures implemented in the neonatal ICU of the Royal Hospital, Sultanate of Oman that is related to ESBL K. pneumonia outbreak

Methods: The study was a retrospective case-control study with 12 cases in a cohort of 48 patients admitted to the NICU during the period of the outbreak. Relative risks were calculated for a number of risk factors identified clinically. For the assessment of risk factors such as birth weight, length of stay, device exposures, and length of antibiotic treatment, analysis of variance (ANOVA) was used. All significance tests were two-tailed, and $P < 0.05$ was considered significant. The clinical outcomes were assessed based on the implementation of infection prevention and control measures in the NICU.

Results: The univariate analysis identified exposure through bed proximity to the index case, and mode of delivery as the only statistically significant risks associated with the acquisition of ESBL K. pneumonia. (cases vs controls, 12 vs 21, $P = 0.02$) (cases vs controls, 8 vs 15, $P = 0.02$) There was no statistically significant difference between other risk factors in cases and controls. Infected/colonized infants were placed under contact precautions and thorough environmental cleaning and regular microbiological investigations were carried out in order to successfully contain the outbreak and prevent its spread. No further cases were observed beyond the two month outbreak period.

Conclusions: The study outlines the major risk factors associated with a nosocomial outbreak of ESBL producing *Klebsiella pneumonia* in a NICU and analyses each risk factor individually based on its significance to an acquisition of the infection. The study also the importance of active surveillance in detecting the silent spread of ESBL-producing Gram-negatives in a critical healthcare setting and the implementation of infection control measures.

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