

## The Lebanese LSIDCM

# ESBL-producing *Escherichia coli* and *Klebsiella pneumoniae* in two major Lebanese hospitals: molecular epidemiology and correlation with consumption

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### Abstract

**Introduction:** Extended-spectrum – beta lactamases (ESBLs) are increasingly detected globally among *Escherichia coli* and *Klebsiella pneumoniae*. The correlation between antibiotics use and resistance, though not fully described, has been addressed and shown in several studies. In this study, the profiles of ESBLs in *E. coli* and *K. pneumoniae* isolated from two Lebanese hospitals and their relationship to antibiotic consumption were determined.

**Methodology:** A total of 205 *E. coli* and 67 *K. pneumoniae* isolates resistant to third- or fourth-generation cephalosporins were collected between January 2011 and January 2012. Antibiotic susceptibility and consumption data were also collected from 2010–2012. Double-disk synergy and Etest ESBL assays were performed, followed by PCR for ESBL genes. Pulsed-field gel electrophoresis (PFGE) was performed for representative isolates. Statistical analysis for consumption and susceptibility data over 3 years was performed.

**Results:** As expected, CTX-M-15 was predominant. In both hospitals, strains of *E. coli* and *K. pneumoniae* harbored at least one ESBL, and in some cases (23%) harboured four different ESBLs. A significant correlation was detected between total use of antimicrobial agents and resistance to various antibiotics. This was obvious for the use of penicillins and resistance to aztreonam, ceftazidime and ciprofloxacin, and use of third- and fourth-generation cephalosporins and resistance to ceftazidime, cefuroxime, ceftiofloxacin and ciprofloxacin in both bacteria.

**Conclusions:** This study shows the predominance of CTX-M-15 among cephalosporin-resistant *E. coli* and *K. pneumoniae* in Lebanese hospitals and highlights the direct relationship between the use of antibiotics and the emergence of resistance in bacteria.

**Key words:** Enterobacteriaceae; ESBL; antibiotic consumption.

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