



Molecular epidemiology of carbapenem resistant *Acinetobacter baumannii* in University Hospital Split, Croatia



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Abstract: The aim of the study was to investigate and to compare genotypes of carbapenem resistant *Acinetobacter baumannii* collected from different Intensive Care Units in University Hospital Split, Croatia. During 2004, twenty-two non-repetitive isolates of *A. baumannii* obtained from clinical relevant samples with an unusual resistance profile were isolated from patients hospitalised on three different Intensive Care Units (two surgical adults and one children ICU) inside University Hospital Split. The isolates of *A. baumannii* were genetically characterized using pulsed-field gel electrophoresis (PFGE) by macrorestriction with *Apa* I enzyme and DNA macrorestriction patterns were analysed by visual inspection. We report the clonally dissemination of pulsotype A between two different adult intensive care units in University Hospital Split, belonging to the same pulsed-field gel electrophoresis (PFGE) profile. The strain characterised as pulsotype B was the only strain isolated from children intensive care unit without expanding inside the hospital.

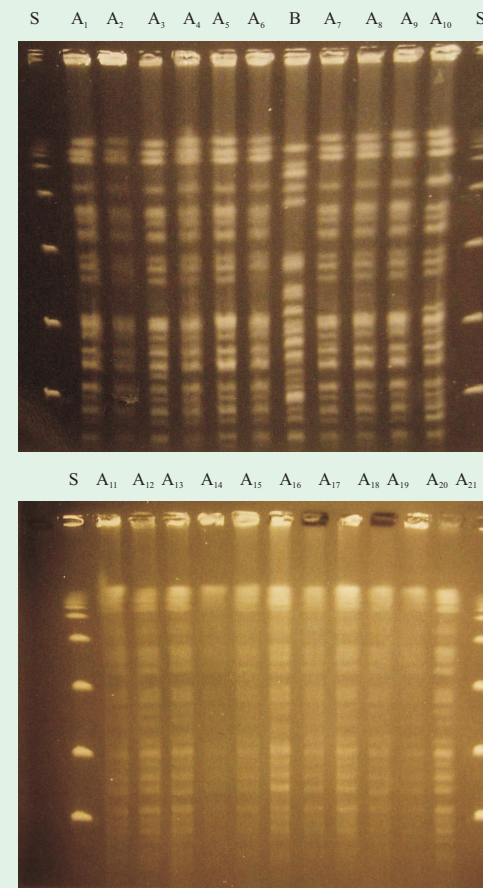
Introduction: *Acinetobacter baumannii* is an opportunistic pathogen that is frequently involved in outbreaks of infection, occurring mostly in intensive care units. The aim of the present study was to analyse and compare genotypes of clinical relevant isolates of carbapenem resistant *Acinetobacter baumannii* collected from three different ICUs in University Hospital Split, Croatia.

Methods: During 2004, twenty-two non-repetitive *A. baumannii* isolates with an unusual resistance profile were obtained from patients hospitalised at three different Intensive Care Units (two adults ICU and one children ICU) inside University Hospital Split, which is 1651-bed university teaching hospital and the only hospital in the region. The hospital is located at three different locations and serves a paediatric and adult population of about 500,000 and acts as a referral hospital for a wider area of southern Croatia, thus covering population of about one million. Isolates

were recovered from blood cultures, urine samples and bronchial secretions. All isolates of *A. baumannii* displayed intermediate or resistant profile to imipenem (MICs 8-16 mg/L) and meropenem (MICs 8-64 mg/L). Minimum inhibitory concentrations were also determined for ceftazidime, ceftazidime, ceftazidime, amikacin, gentamicin, ciprofloxacin and piperacillin-tazobactam by broth microdilution according to CLSI (formerly NCCLS) recommendation. All isolates were multidrug-resistant exhibiting high resistance to ceftazidime (>128 mg/L), ceftazidime (64-128 mg/L), ceftazidime (>128 mg/L) piperacillin/tazobactam (64/4->128/4 mg/L), amikacin (128 mg/L), gentamicin (>128 mg/L), and ciprofloxacin (16-64 mg/L). The isolates of *A. baumannii* were genetically characterized using pulsed-field gel electrophoresis (PFGE). Strain typing was performed by macrorestriction analysis of chromosomal DNA by use of PFGE (*Apa* I enzyme, in a CHEF DR III drive module).

Results. We report the clonally dissemination of pulsotype A between two different adult Intensive Care Units in University Hospital Split, belonging to the same pulsed-field gel electrophoresis (PFGE) profile, probably by hospital staff during medical procedures. The strain characterised as pulsotype B was the only strain isolated from children Intensive Care Unit without expanding inside the hospital.

Conclusion: The infection control team of the hospital implemented restriction of carbapenem usage and strict antiseptic techniques, including the rigorous use of alcohol-chlorhexidine solutions before and between patient and equipment contact and before leaving the units. Consequently, incidence and spread of multidrug-resistant *A. baumannii* nosocomial infections suggest the necessity of a surveillance program and the continuous monitoring of the local situation enforcing adequate control measures inside hospital.



Figures 1. and 2. Pulsed-field gel electrophoresis analysis of *Apa*I digested chromosomal DNA from twenty-two various *Acinetobacter baumannii* isolates on three different ICUs. PFGE profile A1-A6 and A7-A21 were isolated from two adult surgical and neurosurgical ICUs. PFGE profile B was strain isolated from third paediatric ICU. Lateral lanes S contain multimers of phage lambda DNA molecular mass markers.