

3. Utilization of molecular epidemiology methods in detection of outbreaks of nosocomial infections

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Bacterial infections are important factors affecting morbidity and mortality, especially in patients hospitalized in intensive care units. The multicentre study conducted in the Czech and Slovak Republic has documented the importance of gram-negative bacteria, which in the case of primarily sterile clinical materials (blood, sputum, urine) were the etiological agents of infections in more than 50% of cases. *Pseudomonas aeruginosa* strains were the dominant majority of the identified bacteria. EPIC II studies show that more than half of patients in ICUs have been diagnosed with nosocomial infection, with most of these infections (up to 62%) caused by gram-negative bacteria, with most PSA strains showing multi-resistance. Massive use of broad-spectrum penicillins, cephalosporins and carbapenems has resulted in a significant increase in resistant PSA strains. The most important mechanisms of resistance in PSA are the production of broad-spectrum beta-lactamases (ESBL) and AmpC-type beta-lactamases. *Pseudomonas aeruginosa* is one of the most important and most common bacterial agents of nosocomial infections.

The aim of this project is to monitor outbreaks of bacterial strains of *Pseudomonas aeruginosa* at ICU. The occurrence of PSA will be monitored by continuous monitoring of the environment at the JIS. In addition, the incidence of PSA strains will also be monitored in patients from different types of primarily sterile biological material. The obtained PSA strains from the JIS environment and from patients will be analyzed using phenotypic methods as well as molecular biology methods.