

BACTERIAL RESISTANCE IN URINARY TRACT INFECTIONS IN KIDNEY TRANSPLANT PATIENTS: LITERATURE REVIEW

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Introduction. Urinary tract infections are the most common complication in renal transplant patients and a major cause of morbidity, hospitalization and mortality. The incidence of urinary tract infections varies widely (7-80%) with a more frequent ratio of 42%-75% depending on the length of patient surveillance. The problem of treating UTIs in kidney transplant patients is becoming more challenging due to the increasing incidence of antibiotic resistance, including the detection of multi-drug resistant (MDR) and extensively drug resistant (XDR) strains: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococci* (VRE), *Enterobacteriaceae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*. The aim of the present study was to determine effective management strategies according to antimicrobial susceptibility pattern of causative agents among renal transplant recipients.

Materials and methods. A narrative literature search was performed in the Hinari database with source selection for the last 5 years. Keywords used for the search were: Kidney transplantation, Urinary tract infection, Drug resistance, gram-negative bacteria, antibiotics, β -Lactamase inhibitors. Inclusion criteria were: clinical trials, literature reviews accessible in full-text, articles published in English. Exclusion criteria were: articles without full-text version, studies with irrelevant results, case reports, letters to the editor or articles in languages other than English.

Results. In renal transplant patients several studies have reported an increasing detection of gram-negative bacteria (*E. coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*) producing extended-spectrum β -lactamases (ESBLs) with resistance to almost all penicillins and cephalosporins of I-III generation. Cases of resistance (10-25%) to combinations of penicillins with β -lactamase inhibitors (ampicillin+sulbactam, amoxicillin+clavulanic acid, piperacillin+tazobactam) are currently also reported. The introduction of the new β -lactam/ β -lactamase inhibitors (ceftazidime/avibactam, cefepime/taniborbactam, ceftolozane/tazobactam meropenem/vaborbactam, imipenem/relebactam, etc.), carbapenems (doripenem, ertapenem, razupenem etc.), new cephalosporin antibiotic - siderophore (cefiderocol), aminoglycosides (plazomicin), polymyxins (colistin), phosphonic antibiotic (fosfomycin) opens new perspectives in the treatment of urinary tract infections in kidney transplant patients.

Conclusions. The empiric selection of antibiotics in urinary tract infections in renal transplant patients should be based on local resistance data, the degree of manifestation of the infection, individual patient characteristics, type of immunosuppressive therapy and post-transplant period. For a rational antibiotic selection is necessary to study their pharmacokinetic properties (metabolization, elimination pathways) and possible adverse reactions (probability of nephrotoxicity).

Keywords: kidney transplantation, urinary tract infection, drug resistance, gram-negative bacteria, antibiotics, β -lactamase inhibitors.