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Innovative bioinformatic approach to kidney transplant wait-list management in the Republic of Serbia

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Abstract
Renal failure represents a growing clinical problem around the world. Although dialysis is a short-term solution, kidney transplantation confers better survival and quality-of-life outcomes for most patients with end-stage kidney disease. A major limitation to renal transplantation is the supply of donor kidneys. Determining eligibility for a kidney transplantation is one of the most difficult decisions facing clinicians. Clinical practice guidelines have been implemented in many countries for the evaluation and acceptance of patients for the kidney transplantation waiting list in order to provide explicit recommendations to guide clinical decision making. The most important determinants of the outcome of renal transplantation are the degree of HLA matching, the cold ischemia time (total time between removal of the kidney from the donor and its transplantation into the recipient), blood group matching, number of prior grafts, presence of donor-specific antibodies, age of donor and recipient, time on dialysis prior to transplantation, diabetes in the recipient, race, living or cadaver donor, and transplant center. Kidney allocation algorithms vary both within and between countries. Most methods of donor organ allocation involve the use of simple algorithms designed to take into account major factors thought to influence graft outcome.
The aim of this study is to improve the existing decision support system for Kidney Exchange Program (KEP) in the Serbian healthcare system by applying complex multicriteria optimization (CMCO) methods. Also, the goal is to determine the framework for harmonization of KEP in Serbia with the corresponding programs in European countries. In this study, we present the objectives and constraints in the Serbian KEP, determined by the medical aspects of kidney transplantation process and the Serbian law on human organ transplantation. We will then compare them with the corresponding KEP objectives and constraints in European countries. Based on the comparison and analysis of the applied CMCO algorithms in European countries with developed KEP, we intend to determine the guidelines for the CMCO algorithm in the Serbian KEP.

Keywords:
bioinformatics, kidney transplantation, kidney allocation, multicriteria optimization

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