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Letter to the Editor

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# Artificial Intelligence Applications in Organ Allocation Systems: An Ethical and Structural Necessity in Light of Scientific Evidence

## Organ Tahsis Sistemlerinde Yapay Zekâ Uygulamaları: Bilimsel Kanıtlar Işığında Etik ve Yapısal Bir Gereklilik

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Dear Editor,

Organ transplantation represents one of the most sensitive areas of modern medicine, as it requires the fair and efficient distribution of a limited and life-saving resource.[1] In many countries, organ allocation decisions are still primarily based on clinical scoring systems and expert judgment. However, these approaches may be insufficient to simultaneously and objectively evaluate the growing volume of data and the increasing complexity of clinical variables involved in transplantation.

In recent years, accumulating scientific evidence has demonstrated that artificial intelligence (AI) and machine learning (ML)–based models achieve higher predictive accuracy than conventional methods in estimating graft survival, donor–recipient matching, and long-term clinical outcomes. Systematic reviews focusing particularly on kidney and liver transplantation indicate that AI-supported models can effectively analyze multivariate clinical data and provide meaningful contributions to decision-making processes.[2,3] Similarly, a comprehensive scoping review in kidney transplantation has reported that AI applications not only improve predictive performance but also support more individualized patient management strategies.[4]

Despite these advances reported in the literature, the application of AI and ML in organ transplantation remains largely confined to research settings and decision-support tools, and standardized models integrated into national organ allocation policies have not yet become widespread. However, the ongoing global shortage of donor organs necessitates stronger emphasis on fairness, transparency, and efficiency in allocation processes. The capacity of AI to analyze large and complex datasets using multivariable approaches and to generate predictive models suggests a considerable potential to support these objectives. Nevertheless, several challenges continue to limit the broader adoption of AI and ML in clinical transplantation practice. These include concerns related to data privacy and security, regulatory and legal compliance, interoperability among heterogeneous healthcare information systems, and the need for rigorous clinical validation of developed models prior to routine implementation.[5] Addressing these challenges through comprehensive and structured strategies is essential to ensure the reliable, safe, and ethical use of AI-based tools in clinical environments.

Within this context, the integration of AI-driven approaches into organ allocation systems should be addressed in a structured manner, accompanied by ethical principles, robust clinical validation processes, and appropriate legal oversight mechanisms. AI should not replace physician judgment but rather be positioned as a supportive tool that enhances objectivity and strengthens clinical decision-making. The development of guidelines and implementation frameworks by national and international transplantation authorities may contribute to the establishment of more equitable and sustainable organ allocation systems in the future.

### Disclosures

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