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To Study The Role of Artificial Intelligence in Early Prediction of Acute Kidney Injury in Pediatric Patients: Systematic review

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Objectives : Machine learning based models, by taking into consideration different physiological parameters can help in prediction of AKI earlier than traditional laboratory parameters. This systematic review aims to synthesize the evidence available and explore whether the AI has any significant role in prediction of AKI among paediatric age group specifically.

Methods : Databases searched were Pubmed and Cochrane with use of appropriate keyword for the studies published till date December 2023. Total 75 studies were found which were further scrutinized as per inclusion criteria- studies involving paediatric patients exclusively (age upto 21 years) observed for developing AKI. Out of 11 such studies 7 studies got further excluded. Final data extraction and synthesis was done based on 4 studies available regarding predictive validity of different machine learning models.

Results : Retrospective Pooled data from all eligible studies (from countries- China, USA and UK) showed total 372675 Patients enrolled from which 38014 (10.2%) patients had developed AKI. We found various variables used such as stage of AKI, BUN, S. Na⁺, K⁺, Nephrotoxic drugs used, S. Creatinine, S. Creatinine rate of change, anion gap, WBC, PaCO₂, Gentamicin trough etc. •In this study we found various machine learning model were used from which Renal angina index (AUC-ROC 0.57) was having less predictive value as compared to other model XGBoost (AUC-ROC in range of 0.79-0.91), Logistic regression model (0.79), Genetic algorithm (0.76-0.79), Clinical (0.73), Lasso (0.77), Top AUC(0.76), Forward (0.78). Our study found XGBoost model having good sensitivity (60-95%), specificity(58-95%), PPV(29.4-78.6%) and NPV(91-98%).

Conclusions : Machine learning based algorithms are helpful in early prediction AKI and its severity in paediatric patients with good accuracy. Currently too less research is available in paediatric patients which highlights the need to explore artificial intelligence in improving clinical outcomes by conducting studies with larger data sets.