

From the Desk of Editor in Chief



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Moving forward with technology: machine learning models for prediction of Acute Kidney Injury

In non-renal health related settings, acute kidney injury (AKI) always remains an area of great concern especially in critical care units and after major surgeries. During last 8.5 decades (if we take AKI reporting during WW II) evolvments in defining AKI, where definitions took various turns till KDIGO in 2012.¹ Well where definition has not yet brought satisfaction, there came search of biomarkers to predict the AKI in high-risk population.² Further, move on during last few years in lieu of developing machine leaning (ML) models for prediction of AKI.

A study published during COVID-19 era where researchers used AI and developed a prognostic scoring with ML technique, which they found useful in predicting development of AKI in these patients and mortality.³

Some also used other models of ML like logistic regression, Least Absolute Shrinkage and Selection Operator (LASSO), random forest (RF), and eXtreme Gradient Boosting (XGBoost), and reported a success in predicting the need for dialysis and mortality in patients with AKI developed in combination of COVID-19 infection. This was a multi-center study with large cohort and it validated the better performance of XGBoost model in predicting critical outcome in AKI patients.⁴

Sepsis is a primary driver of AKI in both community and hospital-acquired settings, with a particularly high incidence in the latter. While traditional clinical scoring systems such as the Systemic Inflammatory Response Syndrome (SIRS) criteria, the Modified Early Warning Score (MEWS), and the Sequential Organ Failure Assessment (SOFA) score—have long been the standard for risk assessment, seem to be outpaced increasingly by ML models. Recent advancements in artificial intelligence (AI) have demonstrated highly promising results in the ultra-early detection of sepsis, offering superior predictive accuracy compared to these legacy tools.⁵

AI's application in sepsis prediction is still under research, and the best model type is yet in queue. Some have also used Deep Learning (DL) for doing sub phenotypes of AKI associated with Sepsis. This approach would direct AI's approach in guiding personalized treatment options for individuals.⁶

Specific kidney histopathology in AKI setting is another area of interest. So far, renal biopsy is gold standard for diagnosis in certain disorders causing AKI, the variability among observers can affect the final diagnosis. AI has produced whole slide images (WSIs) via slide digitalization on high throughput, it makes computer assisted analysis of histopathology more reliable.⁷ DL further involve data preparation and processing and has shown promise in pathology image analysis.⁸

Major concern about use of these models are about data fed in models is mainly from a different racial population then ours, thus regional database development is need of time.

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