



**Abstract Type : Poster exhibition**

**Abstract Submission No.: A-0175**

**Abstract Topic : Acute Kidney Injury**

## **Machine Learning to Assist in Managing Acute Kidney Injury in General Wards**

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**Objectives :** This study aims to develop and validate a machine learning–based framework to assist in managing acute kidney injury (AKI) and acute kidney disease (AKD) in general ward patients, using a refined operational definition of AKI to improve predictive performance and clinical relevance.

**Methods :** This retrospective multicenter cohort study analyzed electronic health record data from 3 hospitals in South Korea. AKI and AKD were defined using a refined version of the KDIGO criteria, which included adjustments to baseline serum creatinine estimation and a stricter minimum increase threshold to reduce misclassification due to transient fluctuations. The primary outcome was the development of machine learning models for early prediction of AKI and AKD.

**Results :** Using the refined criteria, 2898 cases of AKI were identified, whereas applying the standard KDIGO criteria resulted in the identification of 5407 cases. Among the 2509 patients who were not classified as having AKI under the refined criteria, 2242 had a baseline serum creatinine level below 0.6 mg/dL, while the remaining 267 experienced a decrease in serum creatinine before the onset of AKI. The final selected early prediction model for AKI achieved an area under the receiver operating characteristic curve of 0.9053 in the internal cohort and 0.8860 in the external cohort. The early prediction model for AKD achieved an area under the receiver operating characteristic curve of 0.8202 in the internal cohort and 0.7833 in the external cohort.

**Conclusions :** The proposed machine learning framework successfully predicted AKI and AKD in general ward patients with high accuracy. The refined AKI definition significantly reduced the classification of patients with transient serum creatinine fluctuations as AKI cases compared to the previous criteria. These findings suggest that integrating this machine learning framework into hospital workflows could enable earlier interventions, optimize resource allocation, and improve patient outcomes.