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Promoting Sustainable Kidney Health: The Asia-Pacific and Beyond

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Developing an AI-powered prescription algorithm for maintenance hemodialysis patients

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Objectives : Nephrologists are enduring excessive overtime and workload for monthly prescription of ESRD patients, raising significant concerns about burnout. Specifically, the critical treatment in hemodialysis centers involves monthly examinations and medication prescriptions for dialysis patients, typically guided by the KDIGO and K-DOQI guidelines. However, practices may vary among attending physicians, with prescriptions influenced by individual preferences, knowledge, and beliefs. In this study, we developed an artificial intelligence model using data from approximately 180,000 past prescriptions and assessed its applicability.
Methods : The artificial intelligence-based medication prescription system for hemodialysis patients is comprised of a model trained using past blood test and prescription data of hemodialysis patients. This model is then utilized to prescribe medications based on the blood test results of hemodialysis patients (Figure 1). The flow of the study involves extracting and analyzing past blood test result data and corresponding prescription data for hemodialysis patients to use as training data for the AI model. Additionally, an analysis of prescription protocols is carried out to perform the initial work for AI model development (Figure 2). Once the AI model is finalized, the patient's blood test results upon arrival are stored in the database (database layer). These results are then fed into the previously developed AI model as input variables, recommending suitable drugs for the test results (functional layer). Finally, the attending physician follows the process of prescribing the appropriate drugs to the patient through the system interface (presentation layer).
Results : The AI-based drug prescription model demonstrated exceptional performance, with scores of 0.99 or higher across all four performance indicators of the classification model according to 7 types of protocol including bicarbonate, erythropoetin, vitamin D25, iPTH, potassium and phosporus.
Conclusions : This innovation is anticipated to significantly mitigate physician burnout by reducing it by less than 10%, thereby making a substantial contribution to the healthcare system.

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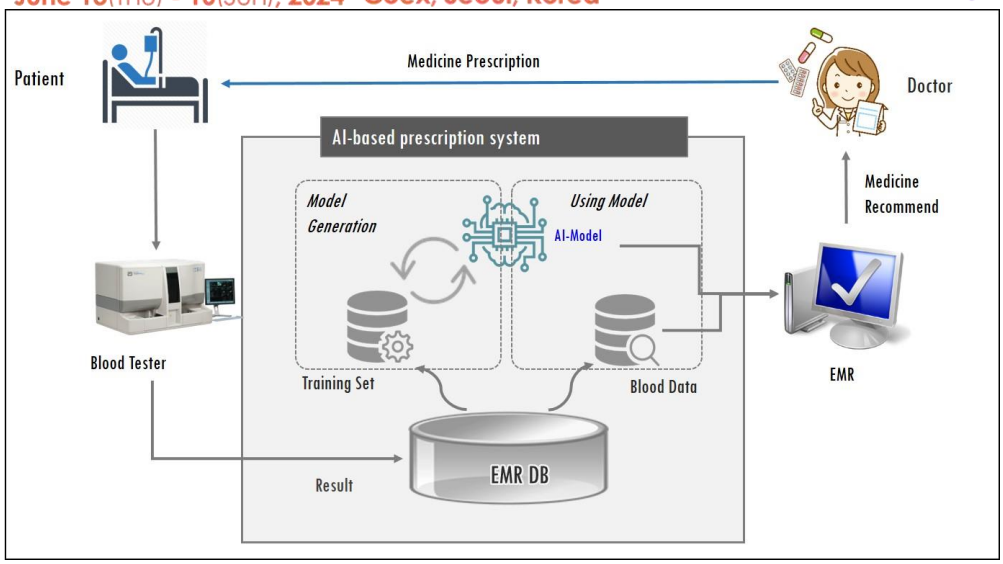
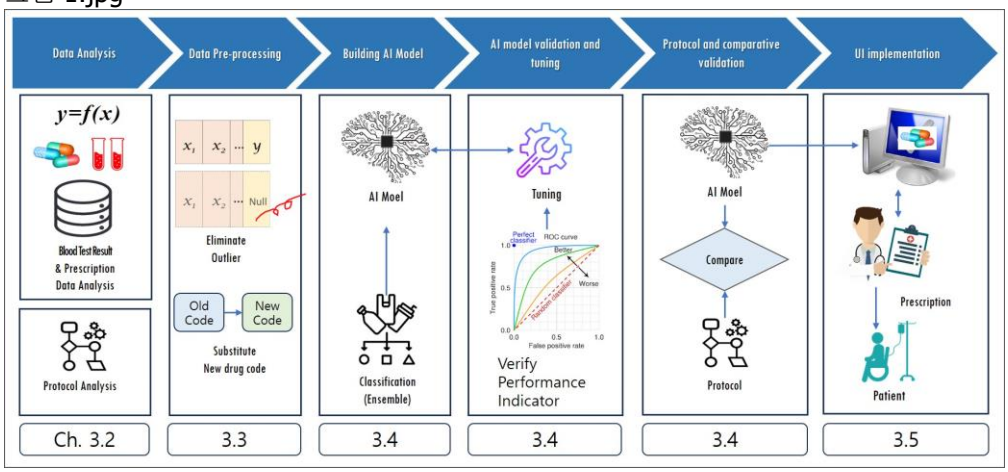

Patient
Medicine Prescription
Doctor
AI-based prescription system
Model Generation
Using Model
AI-Model
Medicine Recommend
Blood Tester
Training Set
Blood Data
EMR
Result
EMR DB

그림 1.jpg


Data Analysis
Data Pre-processing
Building AI Model
AI model validation and tuning
Protocol and comparative validation
UI implementation
y=f(x)
Blood Test Result & Prescription Data Analysis
Protocol Analysis
Eliminate Outlier
Old Code
New Code
Substitute New drug code
AI Moel
Classification (Ensemble)
Tuning
Verify Performance Indicator
AI Moel
Compare
Protocol
Prescription
Patient
Ch. 3.2
3.3
3.4
3.4
3.4
3.5