



Supplementary Figure 2. Architecture of the AKI prediction model. (A) Sliding window approach: The upper part of the figure illustrates the sliding window approach for time series data. It uses a 48-hour input window to predict AKI occurrence within the subsequent 48 hours. The model uses data from the first 7 days of admission to predict AKI occurrence up to the 8th day. Each day is divided into three 8-hour time slots for data aggregation. (B) Model architecture: The lower part of the figure depicts the model structure. The model employs dual input processing, separately handling static and dynamic features through initial residual blocks (ResBlocks). The core of the model uses a residual network (ResNet) structure, with each ResBlock containing three convolutional neural network layers (CNN, denoted as 'C' in the figure) followed by activation functions (a). Skip connections are implemented to facilitate gradient flow during training. The output stage consists of an average pooling layer (AVG pool, denoted as 'P' in the figure) followed by linear layers (L) with activation functions (a) for final prediction. Key components of the model include ResBlock for enhancing model depth, CNN, activation functions, an AVG pool, and linear layers. The model was trained using a learning rate of $1e-4$, a batch size of 256, and the Adam optimizer. Early stopping was implemented using a validation set to prevent overfitting. The total structure comprises five ResBlocks: two initial blocks for separate input processing and three in the main body as shown in the figure. The hidden dimension was set to 128, and the kernel size for CNN layers was 3. During model development, we conducted experiments with various hyperparameters, focusing on the ResNet structure's hidden dimension and the number of ResBlocks. These parameters significantly influence the model's capacity and performance. We observed that reducing these parameters led to underfitting, while increasing them beyond the current configuration resulted in overfitting and reduced generalization performance. The final configuration (hidden dimension of 128 and five ResBlocks) was selected as it provided the best balance between model complexity and generalization ability.

AKI, acute kidney injury.