Purpose: We aimed to develop an accurate and explainable prediction model to estimate the risk of in-hospital amputation in patients with diabetic foot ulcer (DFU).

Methods: A total of 618 hospitalized patients with DFU were included in this study. The patients were divided into non-amputation, minor amputation or major amputation group. Light Gradient Boosting Machine (LightGBM) and 5-fold cross-validation tools were used to construct a multi-class classification model to predict the three outcomes of interest. In addition, we used the SHapley Additive exPlanations (SHAP) algorithm to interpret the predictions of the model.

Results: Our area under the receiver-operating-characteristic curve (AUC) demonstrated a 0.90, 0.85 and 0.86 predictive ability for non-amputation, minor amputation and major amputation outcomes, respectively. Besides, the SHAP algorithm provided visual contribution of the patient characteristics to the model predictions.

Conclusions: Taken together, our data demonstrated that the developed explainable machine learning model provided accurate estimates of the amputation rate in patients with DFU during hospitalization. Besides, the model could inform individualized analyses of the patients’ risk factors.