Table 2: Specificity and sensitivity of the ML model applied to the all features as predictors of the severity of the disease

| ML model | Specificity | Sensitivity |
|---|---|---|
| Gradient Boosting | 0.5972 | 0.9734 |
| AdaBoost | 0.6667 | 0.9775 |
| Extra Trees | 0.7361 | 0.9693 |
| Random Forest | 0.75 | 0.9795 |
| NN | 0.9938 | 1.0 |
| SVM linear | 0.6806 | 0.9508 |
| Logistic regression | 0.6667 | 0.952 |
| Logistic regression (L1 penalty) | 0.7083 | 0.959 |

Table 3: Confusion matrix to assess the accuracy of classification with a three-layer dense NN model to predict the severity of the disease

| | | Predicted | |
|---|---|---|---|
| | | Not admitted to ICU | Admitted to ICU |
| Actual | Not admitted to ICU | 485 | 3 |
| | Admitted to ICU | 0 | 72 |

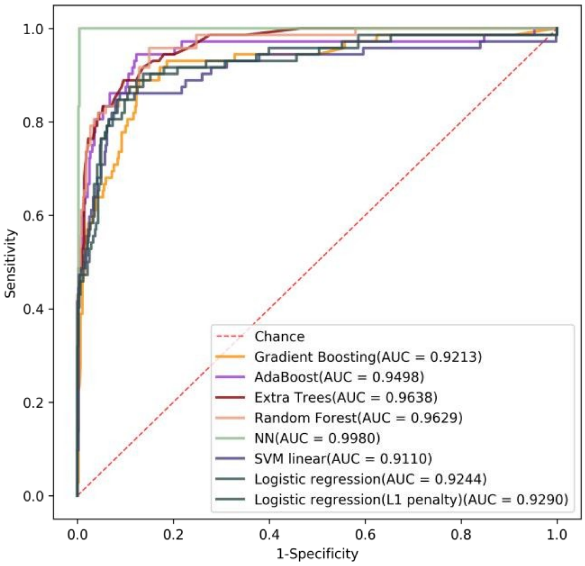


Figure 2: The performance of the employed NN classification method.

**Prediction of transferring to ICU** We utilized three-layer fully connected NN with the following configuration of hidden layers (35, 30, 10) and with the stochastic gradient descent optimizer. The learning rate hyperparameter of the model was assigned to 0.1. The model was also regularized using L2 penalty with 0.0001 alpha value. NN was trained for maximum 100 epochs or before converged. Convergence implies that the loss function is not improving by at least 0.0001 for 10 consecutive iterations.

To evaluate the classifier output quality, we trained several ML classification models using a stratified 10-fold cross-validation technique to generalize the models to the true rate error. For each fold, we used 90% of the data to train the model and then tested it on the rest 10%.

The decision matrices built on the test dataset for all folds were combined and used to calculate the performance metrics. The best performance measures were obtained with a three-layer fully connected NN.

Table 4: Classification metrics of the NN model to predict the event of being transferred to ICU

| | Recall | Precision | F1 score | Support |
|---|---|---|---|---|
| Not admitted to ICU | 1.00 | 0.99 | 1.00 | 488 |
| Admitted to ICU | 0.96 | 1.00 | 0.98 | 72 |
| accuracy | | | 0.99 | 560 |
| macro average | 0.98 | 1.00 | 0.99 | 560 |
| weighted average | 0.99 | 0.99 | 0.99 | 560 |