## Client Requirements

Client is a leading health services provider. Client wanted to reduce length of stay of its diabetes patients, and needed a simulation model to identify patients likely to have high Length of Stay (LOS).
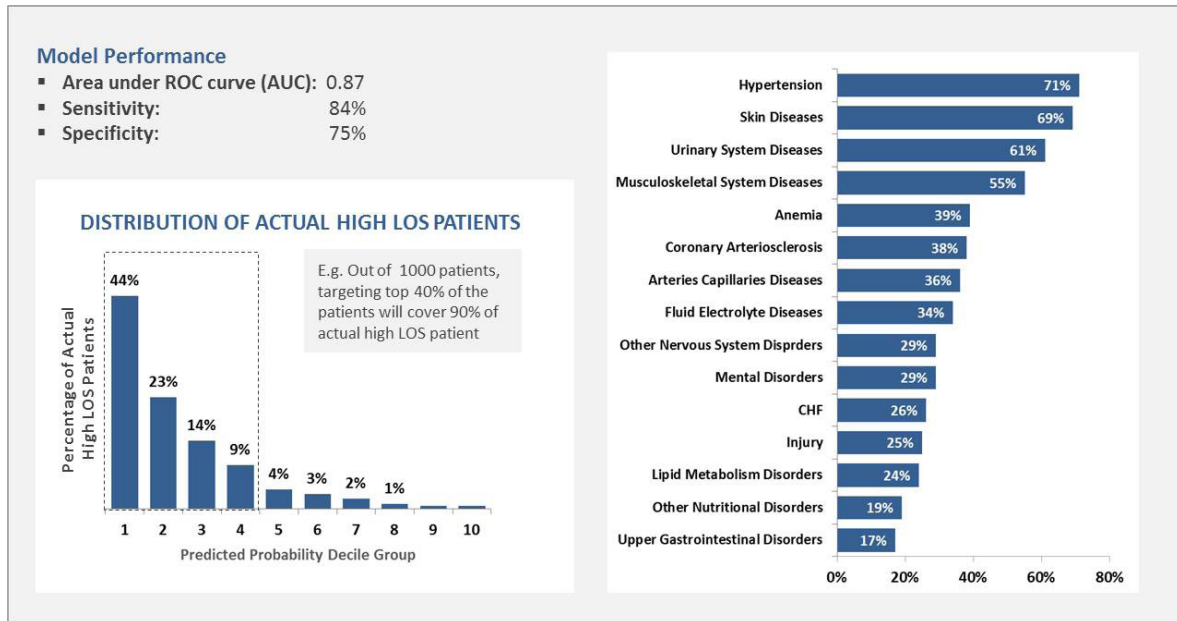
To achieve this, client wanted to leverage its patient demographic data and historical information on co-morbid conditions, and determine correlation with LOS.

## Input Parameters

Key predictors included variables that are available in the first 72 hours of admission, such as Patient Demographics, Lab Test Results, Comorbid Conditions.

## Output Parameters

Neural Network based model was developed to classify patients as high LOS with an accuracy of 89%. Key comorbidities leading to high LOS were identified for possible interventions.



**Model Performance**
- **Area under ROC curve (AUC):** 0.87
- **Sensitivity:** 84%
- **Specificity:** 75%

**DISTRIBUTION OF ACTUAL HIGH LOS PATIENTS**

E.g. Out of 1000 patients, targeting top 40% of the patients will cover 90% of actual high LOS patient

| Predicted Probability Decile Group | Percentage of Actual High LOS Patients |
|---|---|
| 1 | 44% |
| 2 | 23% |
| 3 | 14% |
| 4 | 9% |
| 5 | 4% |
| 6 | 3% |
| 7 | 2% |
| 8 | 1% |
| 9 | |
| 10 | |

| Comorbidity | Percentage |
|---|---|
| Hypertension | 71% |
| Skin Diseases | 69% |
| Urinary System Diseases | 61% |
| Musculoskeletal System Diseases | 55% |
| Anemia | 39% |
| Coronary Arteriosclerosis | 38% |
| Arteries Capillaries Diseases | 36% |
| Fluid Electrolyte Diseases | 34% |
| Other Nervous System Disprders | 29% |
| Mental Disorders | 29% |
| CHF | 26% |
| Injury | 25% |
| Lipid Metabolism Disorders | 24% |
| Other Nutritional Disorders | 19% |
| Upper Gastrointestinal Disorders | 17% |

## Medictiv for LOS Predictions

CitiusTech's Medictiv team worked with the client to create a highly customized model to predict likelihood of high LOS, at the time of admission, for its diabetic patients.

## Algorithms Used

Different predictive models were constructed using a range of classification algorithms such as Logistic Regression, Neural Network and Random Forest.

## Value Delivered

By partnering with CitiusTech, the client was able to:
- Create a customized model to predict LOS at the time of patient admission
- Leverage Medictiv's LOS model to reduce LOS for diabetes patients by identifying and intervening on potential high risk patients
- Identify key comorbidities and use them as defining parameters to identify high-risk patients

## About CitiusTech

CitiusTech is a specialist provider of healthcare technology services and solutions to medical technology companies, providers, payers and life sciences organizations. CitiusTech's services and solutions include healthcare software development, healthcare interoperability, regulatory compliance, BI/analytics, consumer engagement, care coordination and population health management.

CitiusTech helps customers accelerate innovation in healthcare through a number of solutions and accelerators for clinical quality reporting, healthcare big data, cloud computing, mobile health and predictive analytics. With cutting-edge technology expertise, world-class service quality and a global resource base, CitiusTech consistently delivers best-in-class solutions and an unmatched cost advantage to healthcare clients worldwide.

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**CitiusTech**