

Improving Efficiency with Risk Scores for Patient Safety Events

Introduction

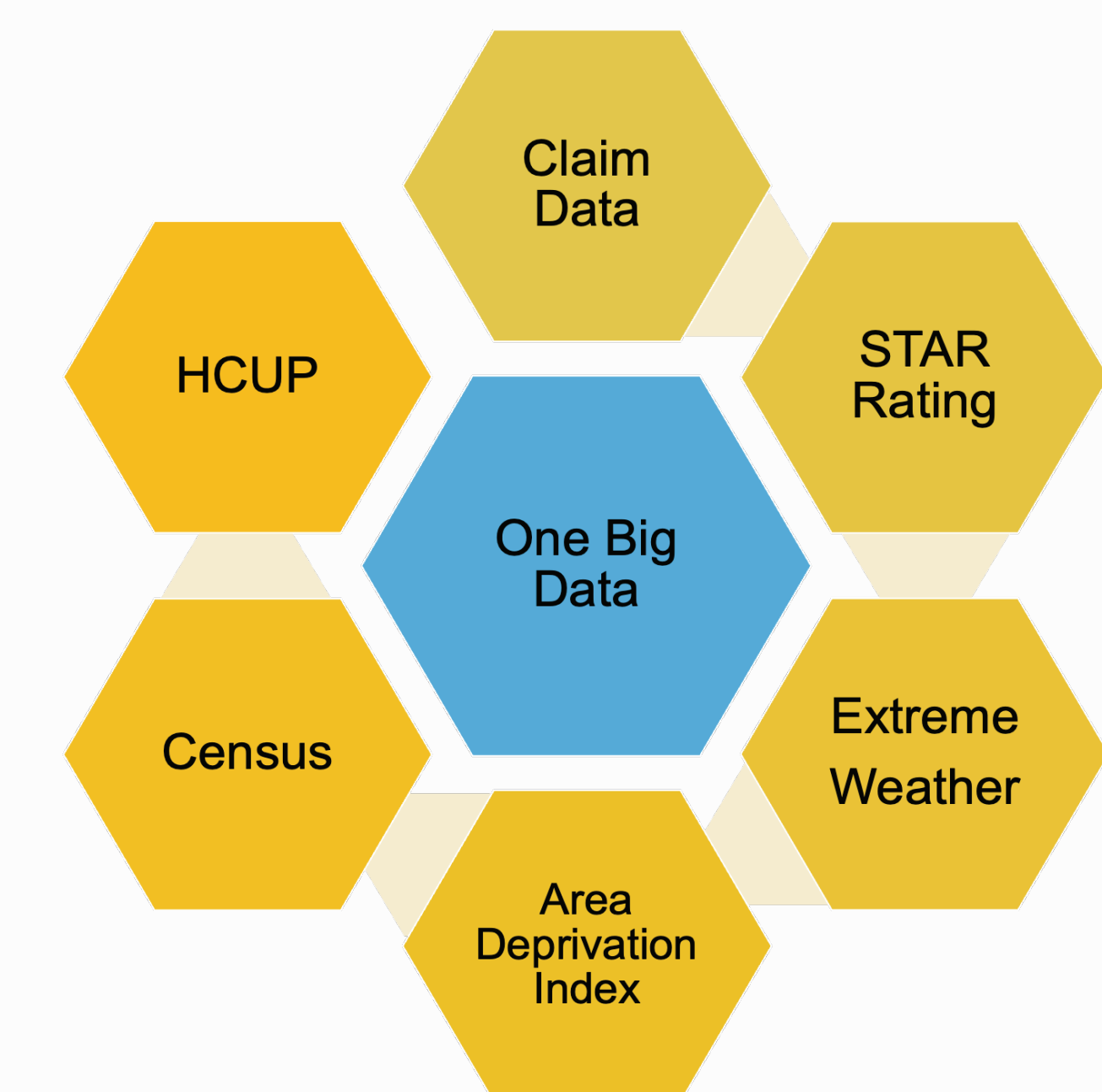
The Beneficiary and Family Centered Care National Coordinating Oversight and Review Center (BFCC NCORC) reviews 4,000 Medicare inpatient medical records annually as a part of the patient safety surveillance system. Almost half of the efforts of physician and nurse reviewers is spent on medical records with no patient safety events (PSEs). To improve efficiency of medical review, the BFCC NCORC developed a predictive model to calculate risk scores to predict the occurrence of PSEs using readily available public datasets and claim data.

Methods

A total of 12,415 cases admitted between April 2018 and December 2021 had been reviewed by the time this analysis was conducted. The following steps were taken to develop the predictive model.

- Explore factors contributing to PSEs.
- Select the best combination of the factors.
- Quantify the contribution of the factors.
- Calculate a risk score to predict PSEs.
- Evaluate the performance of the model.

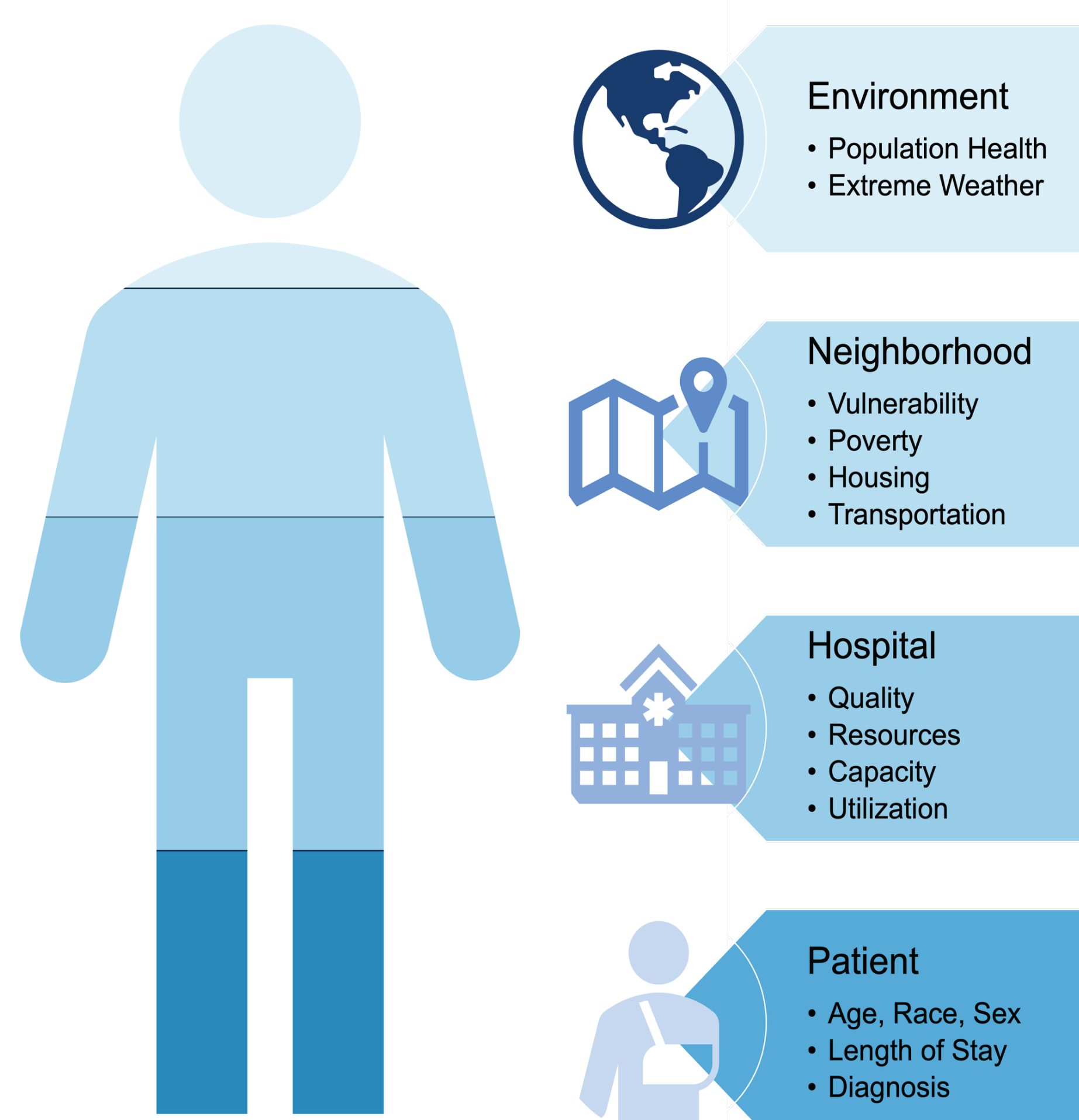
Data Sources



Note: HCUP, Healthcare Cost and Utilization Project

Multi-Level Determinants of Patient Safety Events

Many factors are associated with the occurrence of PSEs directly or indirectly, such as age, race, disease severity, healthcare quality, neighborhood socioeconomic status, and population health. They can be classified into the following four levels: patient, hospital, neighborhood, and environment.

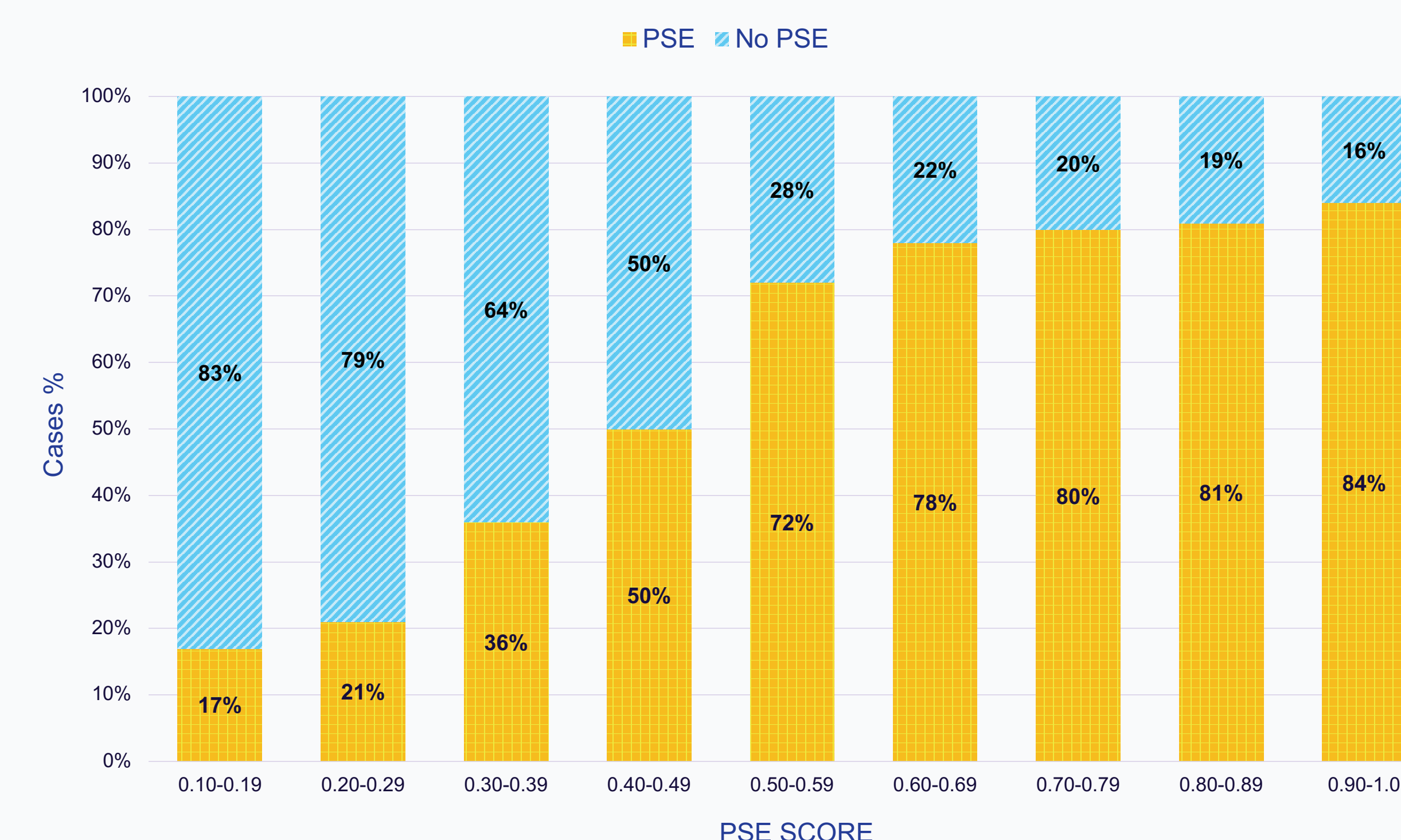


Results

The predictive model selected 11 variables to calculate the risk score. The area under the receiver operating characteristic (AU-ROC) was 0.77, which meant the model had excellent discrimination of cases with PSEs against those with no PSE.

In our model, 84% of the cases with risk scores of 0.90 or above have PSEs, while only 17% of cases with risk scores smaller than 0.2 have PSEs.

Model Performance



Key Takeaways

- The BFCC NCORC's predictive model, using readily available data, performs well in predicting the occurrence of adverse patient safety events.
- Hospital quality and neighborhood environment are associated with the risk of adverse patient safety events.
- The efficiency of the patient safety review work may be improved significantly by applying our method in risk-based sampling and quality control.
- Future applications could include identification of at-risk patients, interventions targeting at high-risk hospitals and patients, increase in patient safety review efficiency by sampling high-risk cases, and quality assurance for patient safety review works.