Can predictive models based on patient information support emergency department decision-making?

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Highlights

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Importance

Medical emergency departments (ED) account for a considerable proportion of patient admissions at hospitals, and for that reason, efficiency processes at presentation are needed to avoid overcrowded rooms and long waiting times that could affect negatively the quality of service.

With the purpose of improving capacity management in emergency department and be used as a complementary technology to triage and other clinical methodologies, we developed a clinical decision support tool based on predictive models that identifies patients to be hospitalized and their expected time in emergency room.

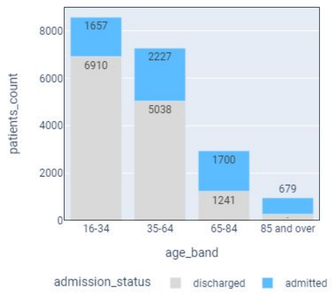
Data

18 variables for 19,734 adult patients aged 16 and older from admission at three ED in London, that include:

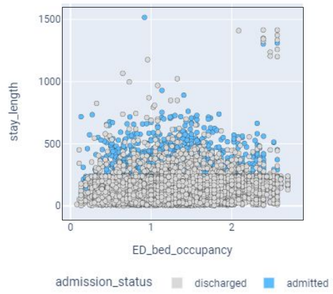
- Admission status.
- Stay length.
- Demographic factors.
- Bed occupancy rates.

85% of times consultant on duty is present

1.25 average bed occupancy in ED



32% of admission, with higher proportions at older age bands.



Most of admitted patients stay in ED from 250 to 600 minutes.

Models

Classification problem

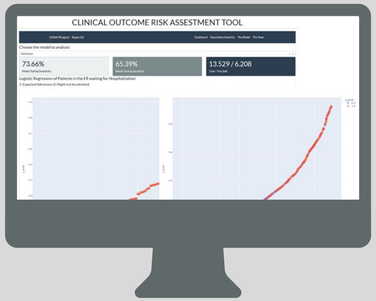
Presentation to ED outcome prediction as `hospitalized` or `not hospitalized`.

Regression problem

Presentation to ED outcome prediction as `time of hospitalization` in minutes.

Web Application

- `Dashboard`: in this module the user can upload a csv file with daily patients to run the classification and regression tuned models. The dashboard cards will show the uploaded file calculated KPIs compared with the thresholds defined by the training dataset.
- `Descriptive analytics`: in this module different plots will show demographic characteristics of the population represented by the uploaded file.
- `The Model`: in this module key information about classification and regression tuned models will be shown, for users interested in technical details of modeling performed.



SCAN ME

http://ds4a-dev.us-east-2.elasticbeanstalk.com

Predicting a patient admission result with sufficient accuracy can be done with information gathered at the arrival moment, and this input contributes to an efficient capacity management.

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