

Finding Medicine's Hot Spot: PREDICTING 30-DAY ICU READMISSIONS USING THE MIMIC-III DATABASE

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May 16, 2018



A model for predicting readmissions: LACE (the Epic standard)

- L** Length of stay of the index admission.
- A** Acuity of the admission
(admitted through E.D. vs. an elective admission)
- C** Co-morbidities (Charlson Co-morbidity Index)
- E** Count of E.D. visits within the last 6 months.

LACE score ranges from 1-19

0 – 4	=	Low risk;
5 – 9	=	Moderate risk;
≥ 10	=	High risk of readmission.



Research Question:

Whether a patient discharged from an intensive care unit (ICU) is likely to be readmitted within 30 days?

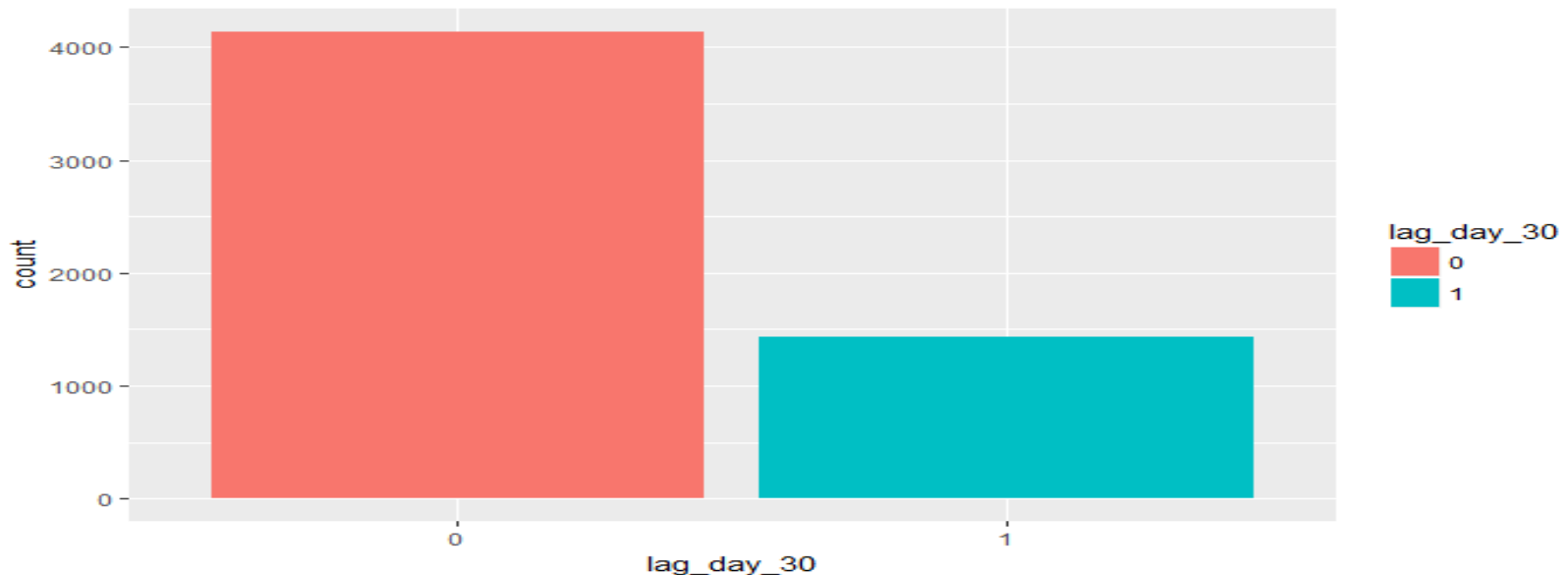


- 53,423 distinct hospital admissions for 46,520 distinct patients between 2001 and 2012
- 26 large inter-related tables (totaling 38GB)



Data – Cohort selection

- Adult patients (aged 16 years or above) who were admitted twice over the 10 years (N=10,320)
- Survived with valid measures of outcome & covariates of interest (N=4,899)
- 26% of them were readmitted within 30 days.



Methods

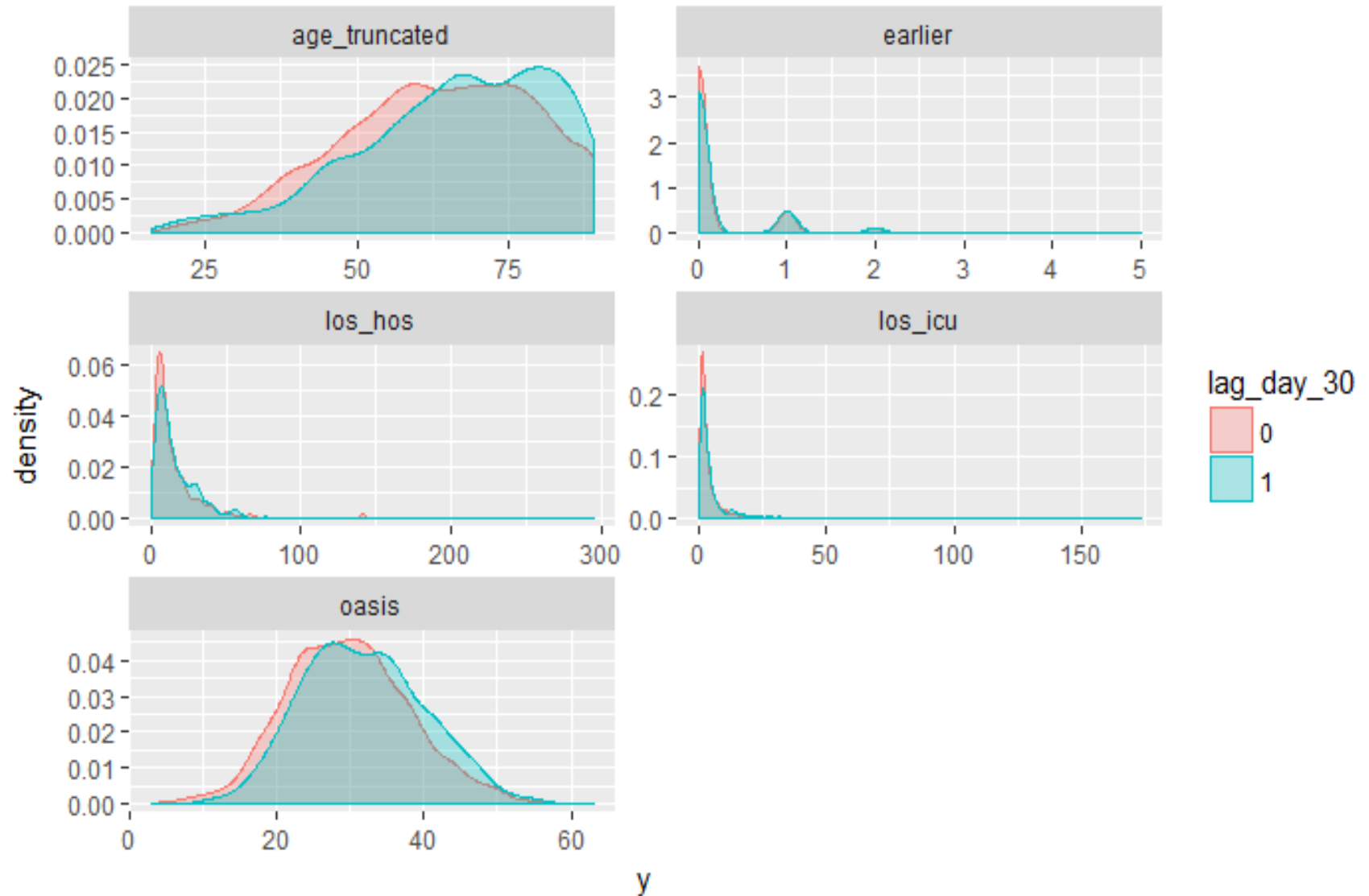
- Logistic Regression (glm)
- Random Forests (rf)
- Stochastic Gradient Boosting (gbm)

The PLACES Index for Predicting 30-Day ICU Readmissions

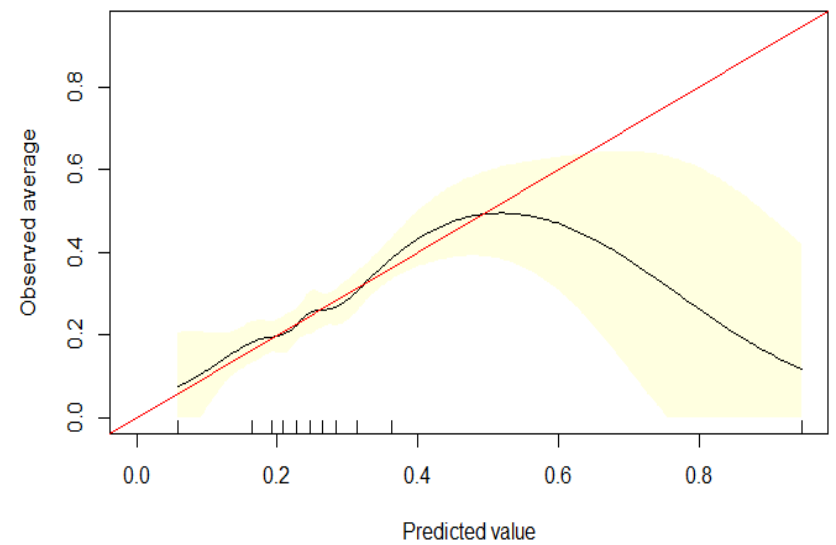
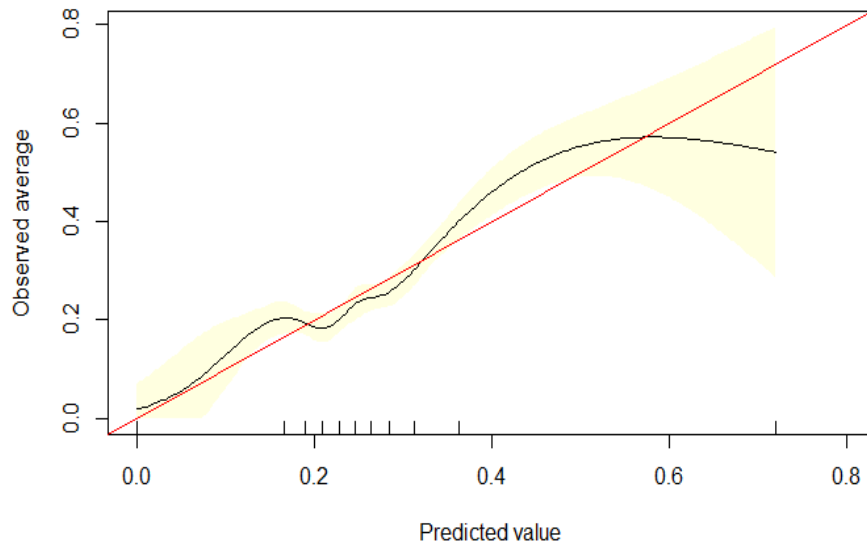
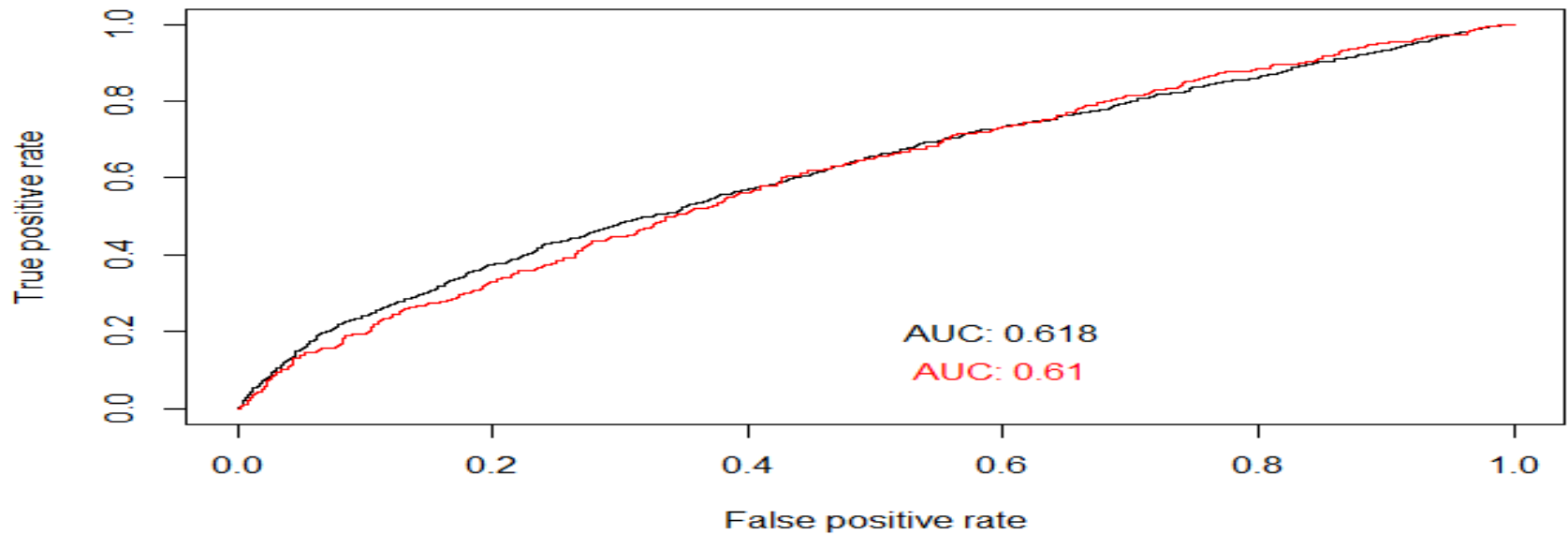
Patient	Patient characteristics including gender, age, ethnicity and insurance
Length	Length of Stay
Acuity	Acuity of Admission
Comorbidity	Elixhauser Comorbidity Index (30 categories)
Emergency	Emergency department visits in past 6 months
Severity	Oxford Acute Severity of Illness Score (OASIS)



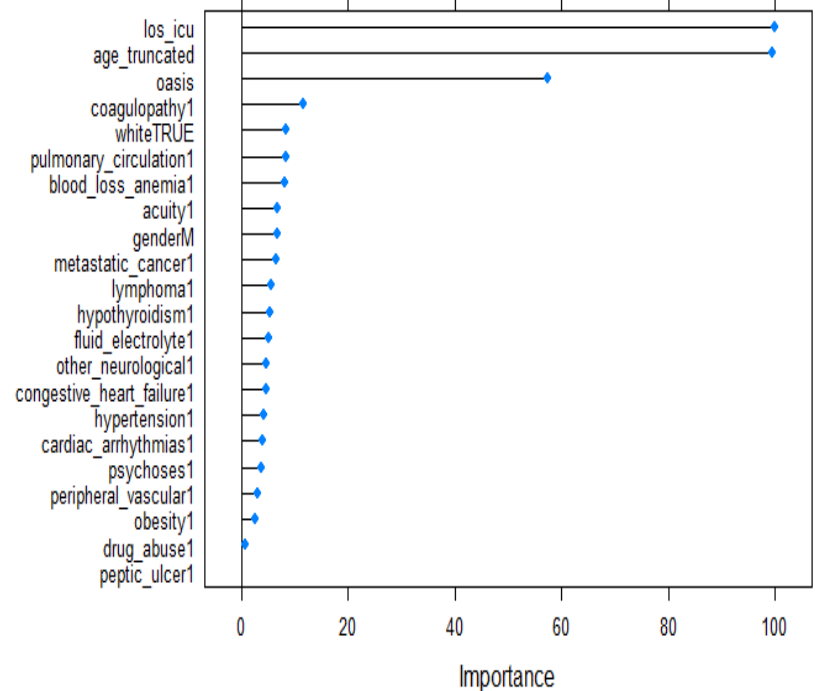
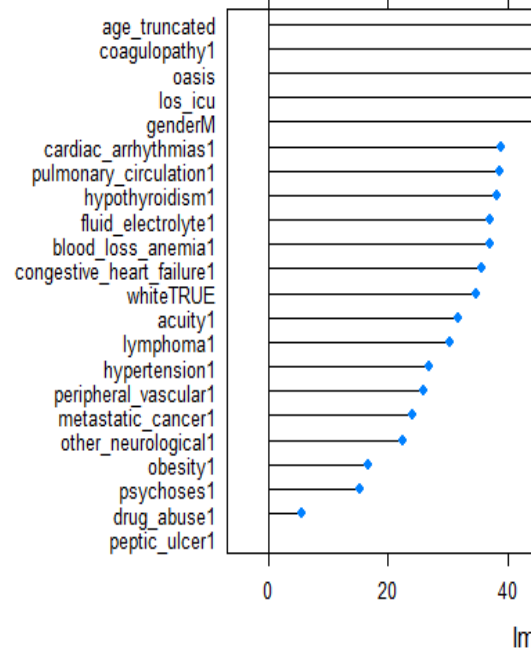
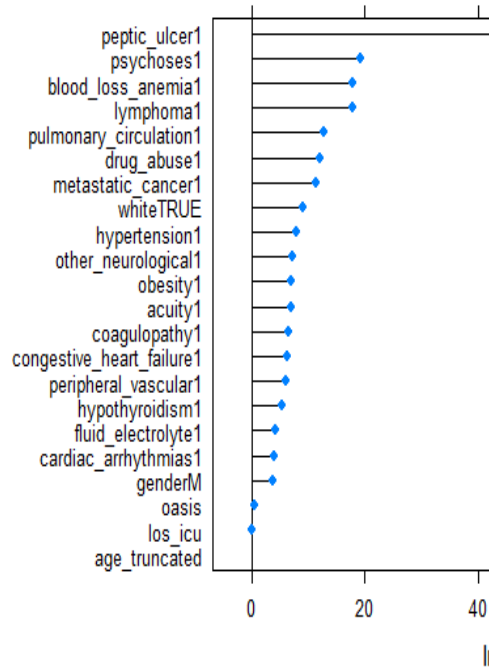
Descriptive Results



Predictive Results



Model Comparisons



Discussion + Future Directions

- Promising results!
PLACES (70%) v.s. LACE (62%)
- What is next? – NLP!

Nurses' Notes, continued		
<u>4</u>	<u>3/21/11</u> <u>0815</u>	<u>(4) Dr. J. Smith notified of change of status r/t abdominal pain, absent bowel sounds. Abdomen series x-rays ordered, NPO, and lab work ordered STAT. -----</u> <u>----- E. Darwin, LVN</u>
	<u>0825</u>	<u>(4) Lab work drawn, client transported to radiology via gurney with portable O₂ via NC at 2 L.-----</u> <u>----- E. Darwin, LVN</u>
<u>4</u>	<u>0900</u>	<u>(4) Lab and x-ray results called to Dr. Smith. #16 Salem sump NG tube inserted left nares without difficulty and set at low intermittent suction at 20 mm Hg. NG draining dark, fluid with noted flecks of feces. States that the pain remains at a 7. Per physician's orders, explained to client that pain medication cannot be given at this time due to the possibility of masking symptoms r/t abdominal pain.</u> <u>Repositioned to (supine ERROR ED)* semi-Fowler's position. Dr. Smith called and notified of contents of NG drainage. -----E. Darwin, LVN</u>
<u>4</u>	<u>0910</u>	<u>(4) Call placed to Dr. Verdant for surgical consult. Pt rated abdominal pain rated at 8; distention increased since 0800. VS 144/94-124-24 101.4° F -----</u> <u>-----E. Darwin, LVN</u>





**Thanks for
your attention!**