



*Using Electronic Health Records Data to Identify
Incarcerated Persons at Increased Risk for HIV
Acquisition*

Session: 1213

Presenter: Alex Treacher, PhD

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Team and collaborators

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Development and successful deployment of a high-performance machine learning models requires an interdisciplinary team to maximize both performance, and clinical impact of a predictive model.



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Background/Introduction

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Incarcerated persons experience disproportionately high rates of HIV acquisition.



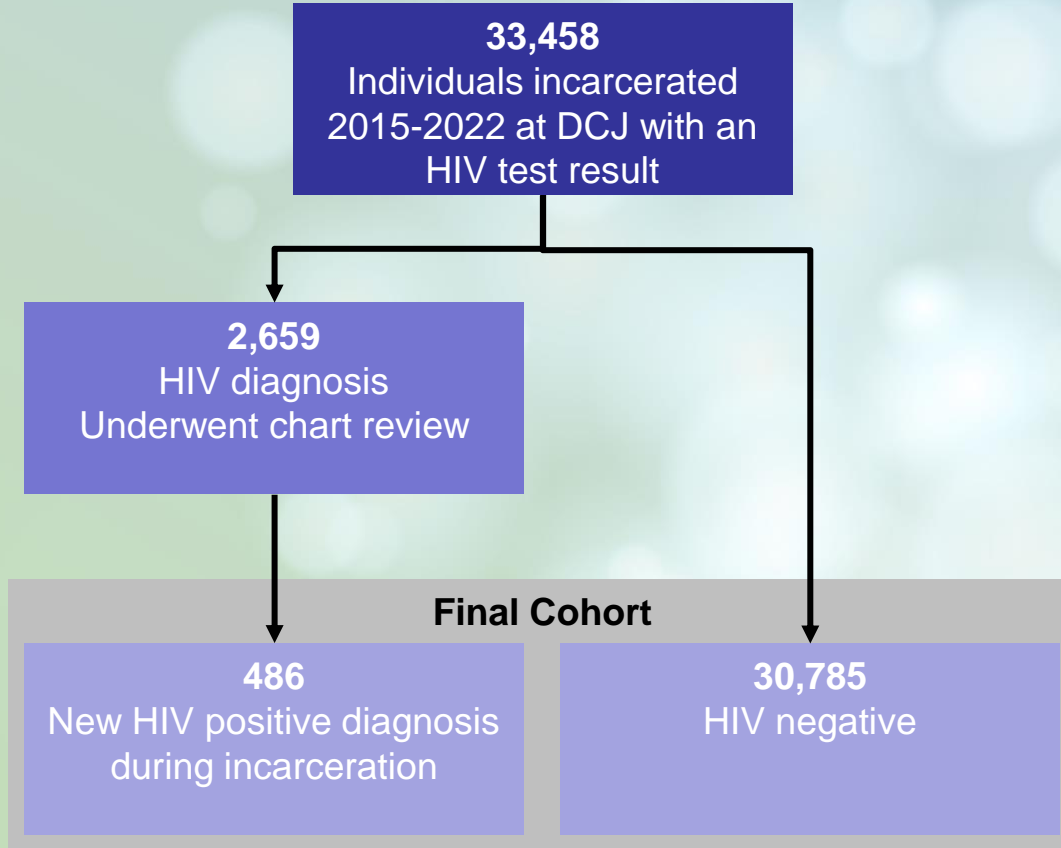
Development of tools to help identify incarcerated individuals with elevated HIV risk can optimize allocation of resources for testing, counseling, and prevention.



We developed a predictive risk model to estimate individuals' future HIV risk using electronic health records from the 8th largest US jail.

Dataset and Processing

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Final dataset:

- Demographic
- Historical
- Medical data

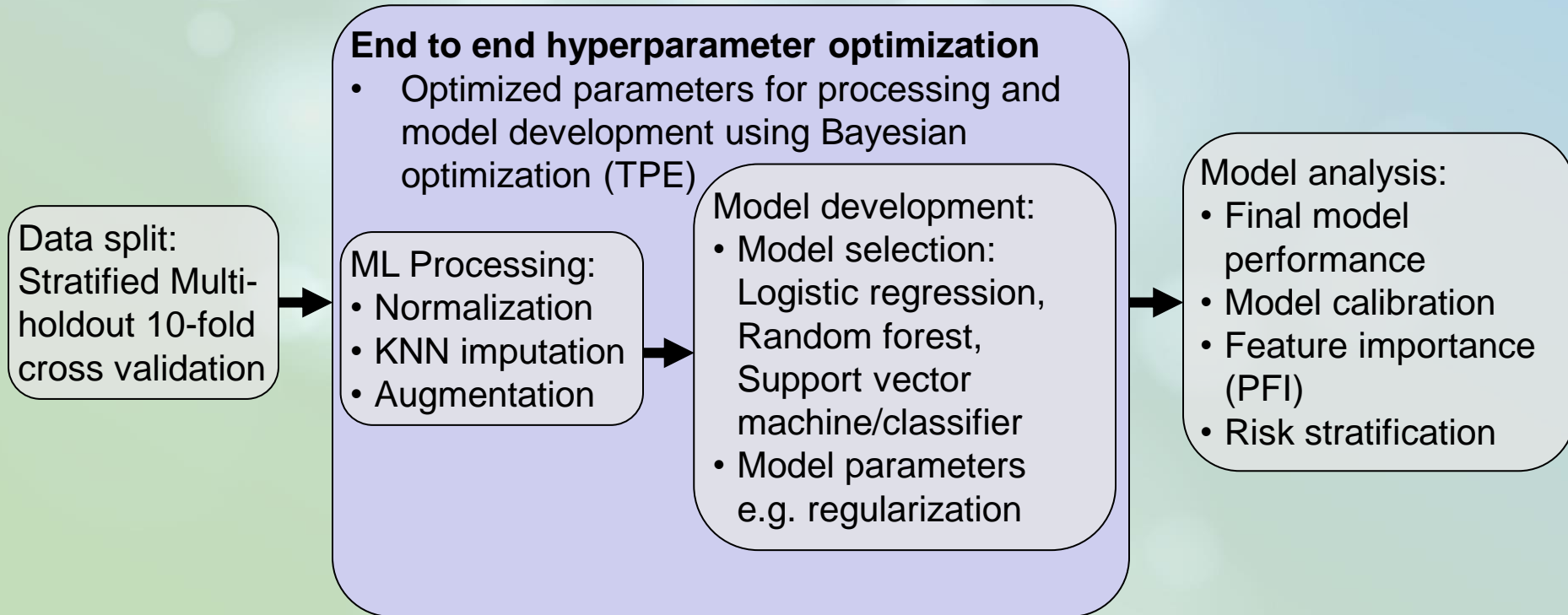
Includes data up until 3 days after start of latest incarceration, or incarceration prior to HIV+ diagnosis (when applicable).

Modeling Approach

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Goal: Create an optimized classification model to predict patients with a future HIV+ diagnosis, and use the prediction probability to estimate risk.



Results: Model Performance



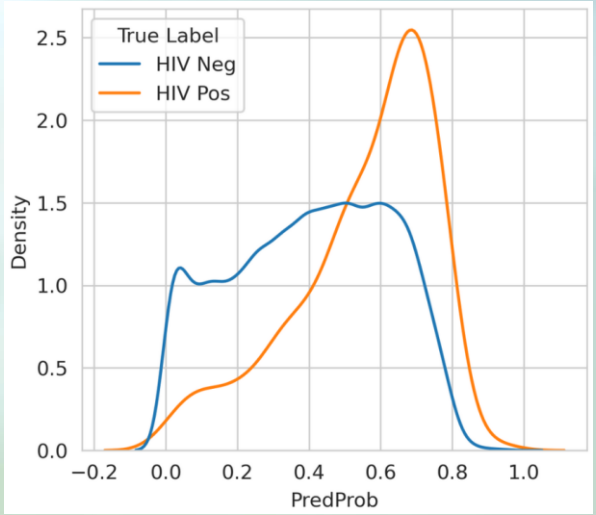
Test Performance

AUROC	.702
Bal Acc	.655
Sens	.687
Spec	.624

Neg HIV	18763	12022
	144	342
Pos HIV	Neg HIV	Pos HIV

Risk

% Pop. High Risk	Bal Acc	Sens	Spec
5	.580	.208	.952
20	.672	.538	.805
50	.668	.831	.505

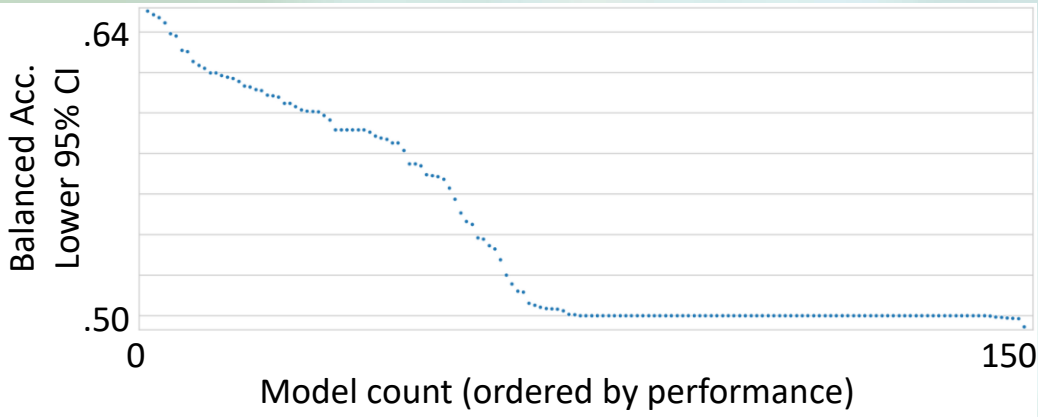


Results: HPO and Feature Importance

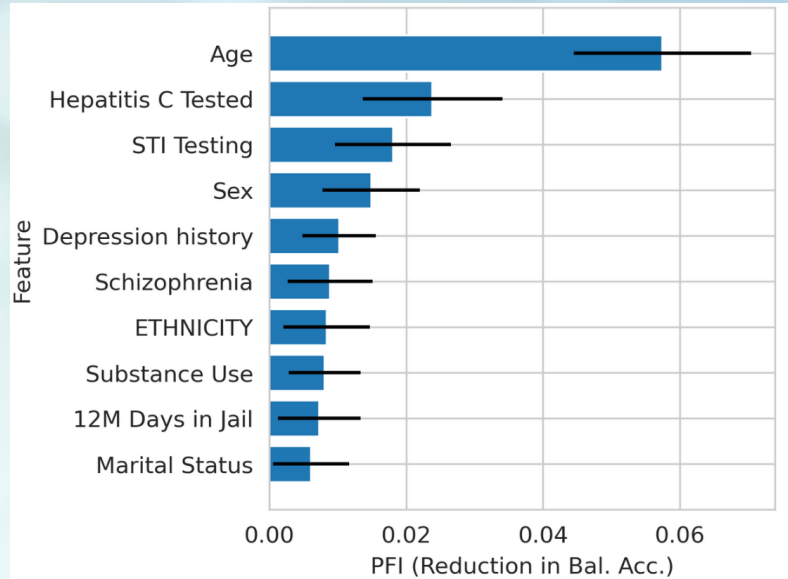
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Hyperparameter Optimization (HPO)



Feature Importance (PFI)



Future Work

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Evaluation of performance on newly available data



Develop/build deployment pipelines



Prospective implementation to evaluate performance in identifying people entering the jail who need HIV and STI testing and may be potential PrEP candidates



Integrate features available from Parkland Health EHR

Summary

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- Created HIV dataset/cohort from the 8th largest jail in the US.
- To our knowledge, this is the first HIV prediction model developed for an incarcerated population.
- Predictive performance with good calibration is likely in a range that can improve efficiency for HIV prevention resources in jails.
- Limitations of the performance are likely due to limited information from jail EHR.
- Given the large population of individuals at risk for HIV who pass through US jails, the potential population-level impact of a jail HIV prediction model is substantial and warrants prospective evaluation.