

# Improving Accuracy of Administrative Data for Perforated Appendicitis Classification

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## BACKGROUND

- Appendicitis is a common indication for urgent surgery in the United States
- Perforated appendicitis is associated with substantial morbidity and cost. Perforated appendix admission rates are important quality metrics
- International Classification of Diseases, Tenth Revision (ICD-10) codes are commonly used to identify perforated appendicitis in administrative data
- Accuracy of initial ICD-10 codes in identifying perforated appendicitis has been shown to be poor
- No scalable solution to correct ICD-10 coding errors exists

## RESEARCH OBJECTIVE

To develop a validated algorithm that can improve the accuracy of ICD-10 codes for perforated appendicitis classification

## METHODS

Pediatric Health Information System (PHIS) from 2015 – 2018 and from 8 participating hospitals

### Inclusion criteria

- $\leq 18$  years old
- Had a ICD-10 diagnosis code indicating either perforated or non-perforated appendicitis

### Clinical Validation

- Perforation status was validated after review of electronic medical record.

### Study variables

- Classification and Regression Tree (CART) and Lasso Logistic Regression algorithms were compared against existing ICD-10 based algorithms (ICD-10 code K352 or K353 and ICD-10 code K352)
- Performance compared using Receiver Operating characteristic curves

**Clinically validated administrative data can be used to develop algorithms that improve the accuracy of ICD-10 codes for perforated appendicitis in administrative databases**

**Our Classification and Regression Tree algorithm represents an accurate method of classifying perforated appendicitis and can be easily used by clinicians and health services researchers.**

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## RESULTS

- 1037 encounters from 8 hospitals included in final analysis
- ICD-10 code K352 or K353 AUC: 0.80 (95% CI 0.78,0.82); ICD-10 code K352 AUC: 0.78 (95% CI 0.75-0.80); CART AUC 0.91 (95% CI 0.89-0.93); Lasso AUC 0.90 (95% CI 0.89 – 0.92)

Figure 1. Classification and Regression Tree Algorithm

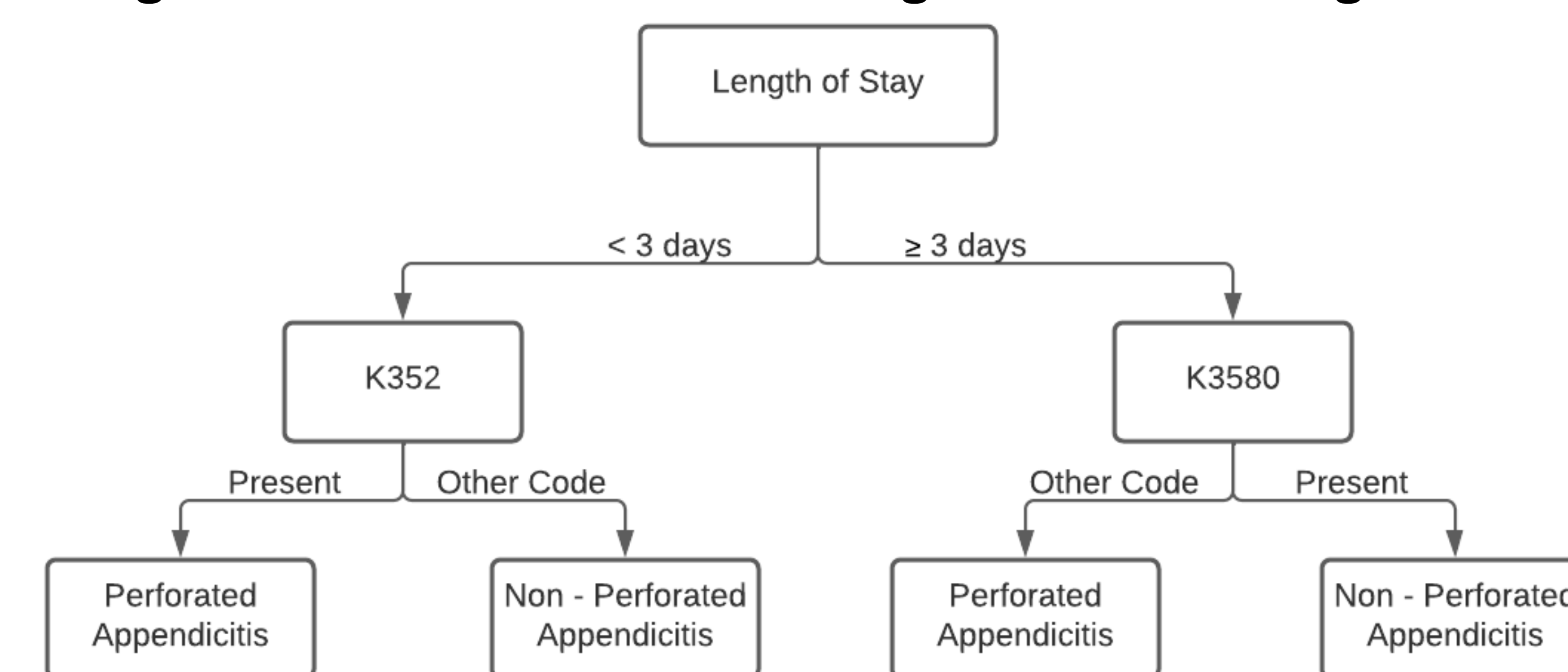
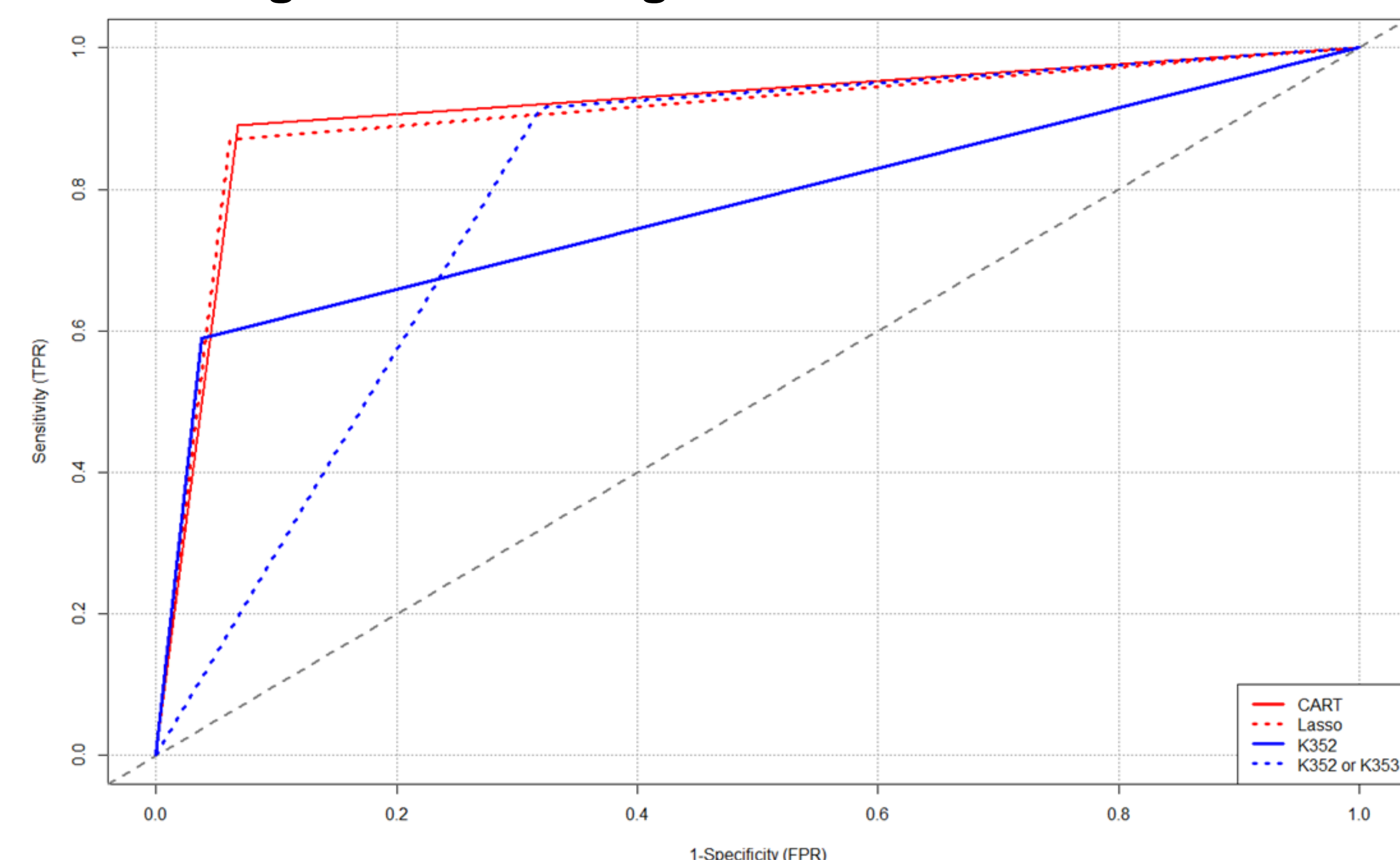


Figure 2. Comparison of ROC Curves Between Machine Learning and ICD-10 Algorithms



## LIMITATIONS

**Baseline error rate** in appendicitis identification

**Only includes the PHIS database** and may not be applicable to other administrative databases

Reference standard based on **retrospective review**