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

• ≤ 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.

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).

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.

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.