

Title

Validation of ICD-10 Algorithms Incorporating Present-on-Admission Status for Accurate Identification of Ambulatory and Hospital-acquired Acute Symptomatic Pulmonary Embolism.

Authors

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Background

Pulmonary embolism (PE) research using administrative data relies on International Classification of Diseases, 10th Revision (ICD-10) codes. Algorithms incorporating discharge position and present-on-admission (POA) indicators have been proposed to improve identification; but validation outside U.S. settings is limited.

Methods

We conducted a retrospective validation study at a tertiary care center in Spain (2021-2024). PE-coded encounters were classified by discharge coding position as principal or secondary diagnoses. PE events were independently adjudicated as ambulatory or hospital-acquired by chart review. All PE-coded encounters were reviewed (n = 1,055). To identify false-negative, high-risk encounters were selected using ICD-10 codes for anticoagulant use or prior venous thromboembolism (n = 21,358), from which a stratified control cohort underwent adjudication (n = 1,075). Performance was assessed with and without POA.

Results

Among 1,055 PE-coded encounters, PE was confirmed in 89.8%. Overall sensitivity was 98.0%, specificity 90.7% and accuracy 94.0%. For ambulatory PE, principal-position coding showed moderate sensitivity (77.9%) and high specificity (89.7%), whereas secondary-position coding identified hospital-acquired PE with high sensitivity (89.1%) but lower specificity (67.3%). POA reduced sensitivity and F1 score for both subtypes,

particularly hospital-acquired PE (sensitivity 43.3%; F1 score 47.6%), without improving overall accuracy.

Conclusions

ICD-10–based algorithms reliably identify PE in administrative data. Principal and secondary discharge coding positions showed different capacities to identify ambulatory and hospital-acquired PE. POA did not improve diagnostic performance and substantially reduced sensitivity for hospital-acquired PE, highlighting the need for setting-specific validation.