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Exploring the added value of Nationally Linked Healthcare Datasets in Algorithms Designed to Predict Dementia

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Introduction

Machine learning algorithms using electronic health record (EHR) data show promise for identifying those with dementia, but the value of linking the EHR with comprehensive administrative datasets remains unexplored. We extended a model previously developed on hospital EHR data via the addition of a comprehensive, nationally linked dataset incorporating items relating to medication, hospitalisation, specialist appointments, and aged care access.

Methods

We repeated development of three structured predictive models of varying complexity (originally trained on a cohort of individuals assessed for dementia by specialists at a single health service [$n = 1082$]), using the same variables and same individuals, but with items informed by a national, linked administrative dataset rather than local EHR. The cohort included individuals aged ≥ 60 years with confirmed specialist dementia diagnosis and controls. The linked dataset offered a broader view of healthcare utilisation patterns compared to the original hospital-based EHR data.

Results

The most basic structured model demonstrated specificity of 85.0% and sensitivity of 90.6% in the linked dataset cohort. Performance metrics exceeded the original development model (specificity 72.2%, sensitivity 80.6%). Incorporation of nationally linked administrative data improved discrimination.

Discussion

Combining linked administrative data with EHR data shows great promise for the improvement of dementia identification algorithms. The inclusion of nationally linked data provides improved capture of numerous features beyond hospital records, supporting scalable implementation of population-level dementia surveillance and service planning.

