

TARGETED LITERATURE REVIEW TO IDENTIFY US CLAIMS-BASED ALGORITHMS FOR ALZHEIMER'S DISEASE



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Amos A. Bugri^{1,2}
 April N. Naegeli,¹
 Margaret Hoyt,¹
 Julie Beyrer¹

1. Eli Lilly and Company, Indianapolis, USA
 2. Fairbanks School of Public Health, Indiana University Indianapolis

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OBJECTIVE

- To identify and describe studies evaluating the validity of Alzheimer's disease (AD) coding algorithms in United States (US) claims data.

CONCLUSIONS

- Most of the algorithms found were for dementia and not specific to Alzheimer's disease.
- Dementia algorithm specificities were frequently high (>80%), while sensitivities and positive predictive values (PPV) had wider variation and lower ranges.
- High specificity suggests that algorithms are suited for identifying patients with dementia, but the lower ranges of sensitivity and PPV suggests that many cases may be missed or misclassified. Dementia algorithms may be more appropriate for 'rule-in' applications (e.g., to create a cohort of patients with dementia for comparative analyses) than for describing incidence/prevalence or disease burden.
- Algorithms are needed for healthcare claims data research on Alzheimer's disease, especially in pre-dementia stages.

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BACKGROUND

Alzheimer's Disease

- Alzheimer's disease (AD) is a progressive neurodegenerative disorder and is the most common cause of dementia, accounting for about 60% to 80% of cases.¹
- Pathologically, AD is defined by the accumulation of amyloid plaques and tau neurofibrillary tangles (NFTs) in the brain.^{1,2}

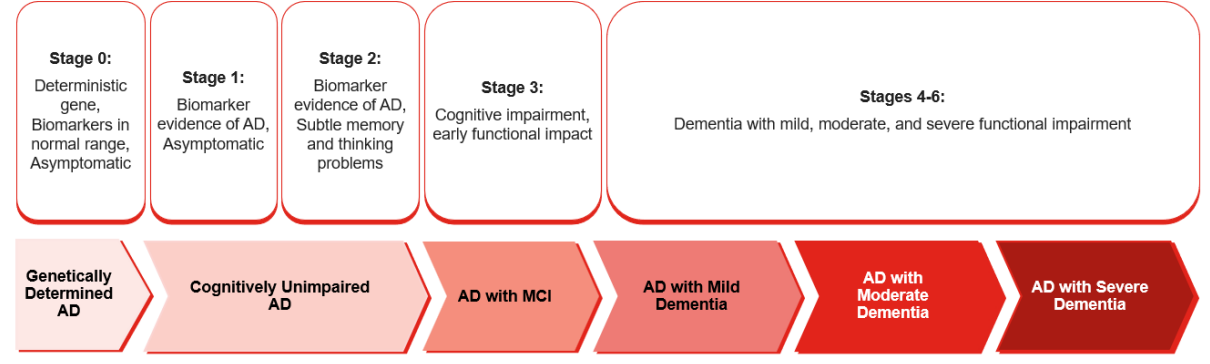
AD Continuum and Data Considerations

The AD continuum spans across multiple stages from

- Cognitively unimpaired (Preclinical) AD (Stages 1–2),³⁻⁶
- AD with mild cognitive impairment (MCI) (Stage 3),³⁻⁶
- AD dementia (mild, moderate, severe; Stages 4–6).³⁻⁶

Healthcare claims data are used in AD research, yet coding algorithms to extract relevant data elements may not be fit for purpose in different research contexts.

Figure 1. Alzheimer's Disease stage continuum³⁻⁶



STUDY DESIGN

Search Strategy

- Targeted literature review using a Natural Language Processing-based search (IQVIA NLP [formerly Linguamatics i2e]) to identify and assess validated algorithms for detecting Alzheimer's disease in US healthcare claims, including reported performance metrics (e.g., sensitivity, specificity, Positive Predictive Value (PPV). From January 1, 2015, to September 12, 2025 (Medline) and October 14, 2025 (Embase).

- An artificial intelligence enabled tool (Microsoft Copilot[®]) was used as an initial aid to support preliminary data extraction. All extracted data, interpretation of findings, and analyses were subsequently verified, completed, and finalized by human reviewers following full manual review of the source articles.

Additional Eligibility Criteria

- Any reference standard including physician judgment or clinical measures, such as Mini-Mental State Examination, Montreal Cognitive Assessment, or amyloid pathology to validate claims-based indicators.
- Articles in English.

KEY RESULTS

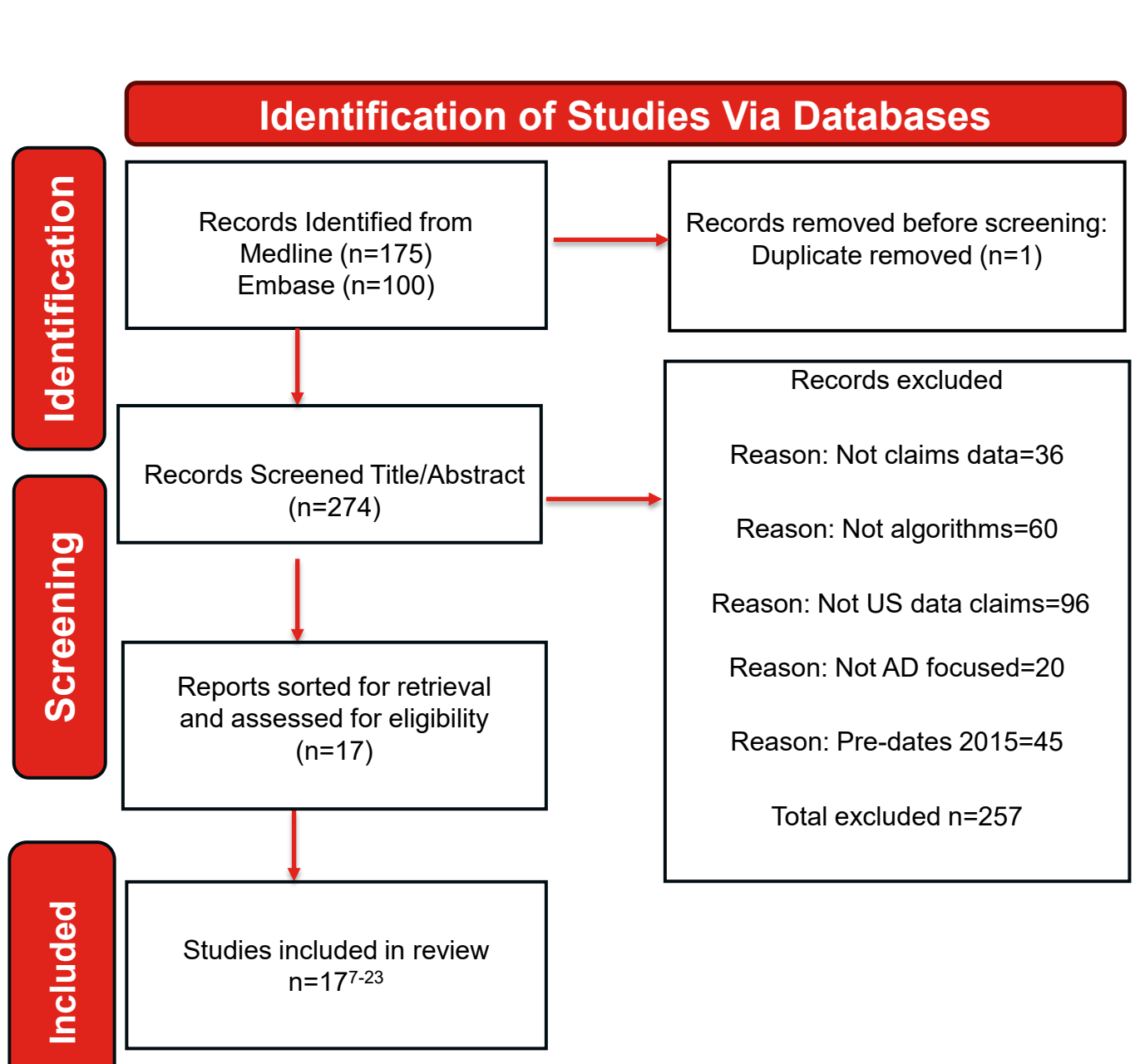
- Seventeen studies met inclusion criteria, primarily evaluating all-cause dementia algorithms (15/17).
- Only two studies assessed AD-specific or early-stage algorithms (AD with MCI or early symptomatic AD).
- Most studies relied on International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM; n=11) and Tenth Revision, Clinical Modification (ICD-10-CM; n=10) diagnosis codes, with five studies additionally incorporating symptomatic AD medications.
- Dementia algorithm PPV varied from 37-89%. For MCI, sensitivity was 0.03%, specificity >99%, and PPV 8-18%. For early symptomatic AD, sensitivity was 82%.

Table 1. Distribution of included studies by algorithm focus

Algorithm Type	Description	# of articles	# of algorithms
Chronic Conditions Warehouse (CCW)	1+ ICD diagnosis code for dementia over a 3-year observation period*	6	7
	1+ ICD diagnosis code for dementia if claim is inpatient, home health, or hospice or 2+ codes at least 7 days apart if outpatient or professional with a 1-year observation period	4	7
Other Rule-Based	Other combinations of ICD diagnosis or dementia medication codes	8	24
Machine Learning (ML)/Regression	Models including diverse predictors assigned a probability of disease	2	3

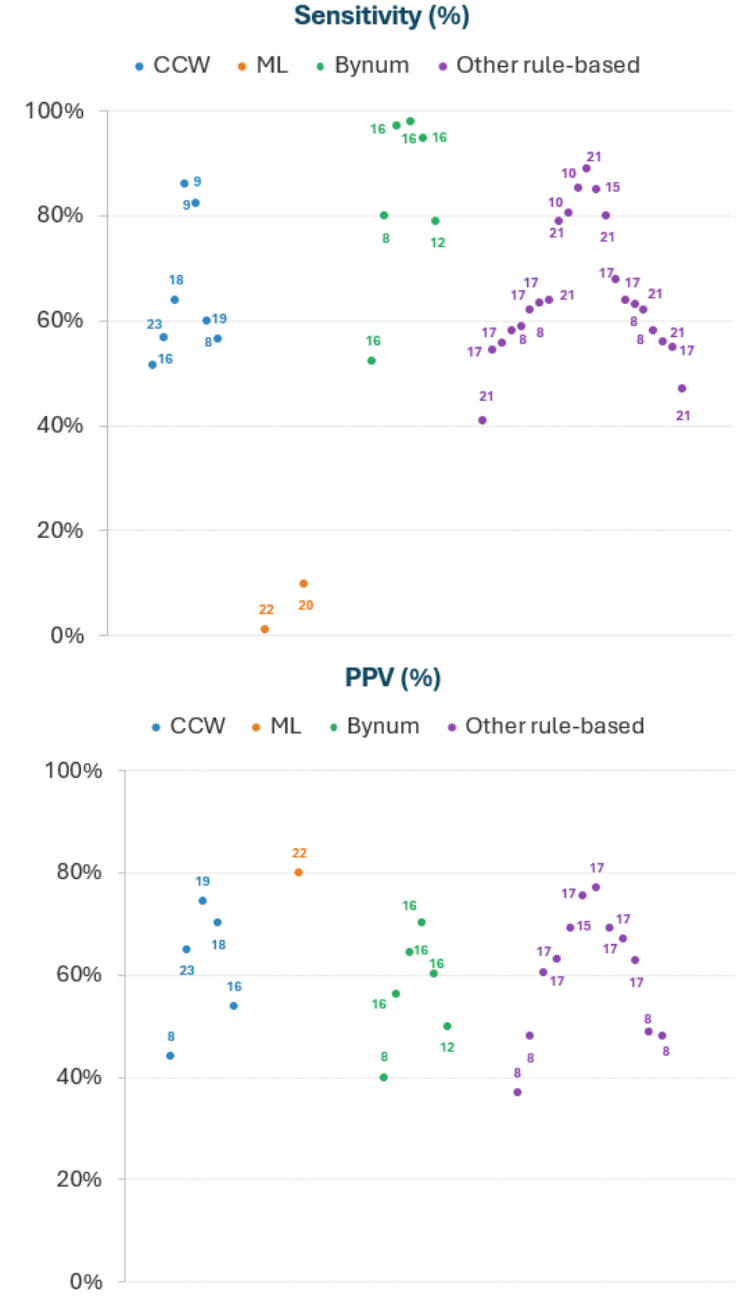
*CCW revised in 2022 to 2 years and to remove certain non-specific ICD-10-CM codes and add dementia with Lewy bodies

Figure 2. PRISMA Flow diagram for study selection process



KEY RESULTS

Figure 3. Reported Sensitivity and PPV by Algorithm type



7=Albrecht (2018) 8=Bhattacharyya (2025) 9=Chen (2019) 10=Fillit (2023) 11=Gianattasio (2024) 12=Grodstein (2022) 13=Grodstein (2024) 14=Jain (2020) 15=Lee (2019) 16=McCarthy (2022) 17=Moura (2021) 18=Niznik (2024) 19=Niznik (2020) 20=Nori (2019) 21=Power (2020) 22=Uspenskaya-Cadoz (2019) 23=Zhu (2019)

LIMITATIONS

- US administrative claims data focus may limit applicability of findings to other healthcare systems.
- Variability in validation approaches and metrics limited the ability to directly compare results across all studies.
- Algorithms that rely on ICD-9 may have limited utility for application to contemporary sources of data.

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