CTAD 2025 Poster 107: International Registry for Alzheimer's Disease and Other Dementias (InRAD): design, data model, and interoperability.

TOWARDS A TRUE GLOBAL AD DATASET: MINIMUM DATA SET COMPARISON AND INTEROPERABILITY CHALLENGES BETWEEN INRAD, US ALZ-NET, DUTCH ABOARD, AND SWISS ROMENS COHORTS

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Introduction

- Clinical trials in early Alzheimer's disease (AD) face numerous challenges, including pre-screening, lack of run-in data, and trial population representativeness.
- The International Registry for Alzheimer's Disease and Other Dementias (InRAD) is the only international cloud-based clinical practice-based disease registry aimed at collecting, organizing, and harmonizing real-world clinical data.
- The InRAD data entry Web app allows the capture of minimum data set (MDS) and extended data set (EDS), which were defined by international consensus [1] and include patient history, clinical and biomarker outcomes, as well as important safety profiles for newer AD treatments.
- Several national-level registries already exist, e.g. the US based ALZ-NET registry [2] mainly with the purpose to evaluate the effectiveness and safety of amyloid targeting therapies (ATTs), the Dutch ABOARD cohort [4-5], and the Swiss ROMENS cohort [6]. (Table 1).
- To answer questions not addressed in clinical trials in AD - like the application of biomarkers for earlier diagnosis, the new natural history of early AD, the long-term effectiveness, safety and value of ATTs - facilitating collaboration and data exchange between registries will be key. **However, even at the minimum data set (MDS) level, substantial heterogeneity persists between registries, impeding data integration and collaborative research.**

Objectives

- Compare the MDS of InRAD, ALZ-NET (USA), ABOARD (Netherlands), and ROMENS (Switzerland) cohorts.
- Highlight challenges and opportunities in data delivery models: prospective data entry (InRAD system) vs. secondary data reuse (interoperability).

Methods

- Comparative analysis of InRAD Observational study protocol [3] MDS elements (demographics, diagnosis, biomarkers, outcomes, etc.) across registries.
- Mapping of semantic standards.

Table 1: Overview of InRAD/ALZ-NET/ABOARD/ROMENS cohort

Description	InRAD	ALZ-NET	ABOARD	ROMENS
Countries covered	International	US (mainly)	NL	CH
Date of creation	Data collection starts in Nov 2025	Data collection started in August 2022	Data collection started in Feb 2022	Data collection started in Oct 2018
Number of patients to date	Data collection starts in Nov 2025	3,204 (October 2025)	14,000 of which 2,500 patients	13,000 patients
Patient population	AD patients diagnosed or in diagnostic work-up	AD patients diagnosed or in diagnostic work-up	All Dutch elderly >45, both cognitively impaired and cognitively healthy	Memory clinic visitors (Suisse Romande); diverse origins; from healthy to neurodegenerative cases
Data collection frequency	Baseline + annually (MDS)	Baseline + periodic (6-month)	Annual	Baseline + periodic (6-month)
Data collection duration	5+ years	5+ years	5+ years	5+ years
Data owner	Centres (InRAD is the Data Processor)	Sponsor is Alzheimer's Association	Study participants. Participanting memory clinics have access to medical data of patients affilitated to their centre	ROMENS Association Vaud-Genève
Funding	Independent non-profit foundation, centres, as data owners, are not generally compensated for data entry		Research grants (Dutch Government, EU, Alzheimer's Association)	Private Foundation Hospitals – University Hospitals of Geneva (HUG) and Lausanne (CHUV)

Main Overlap:

Table 2: MDS head-to-head variable level comparison between registries

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- All registries capture core AD variables (demographics, diagnosis, biomarkers, cognitive tests).
- Data models capture AD syndromic stages in line with NIA-AA 2024 criteria, even though ALZ-NET does not give the option to capture stages 0-2.
- Data models offer similar possibilities to add amyloid, tau, and neurodegeneration biomarker status that support the clinical diagnosis.
- MDS elements for patient profile (ID, consent, sex at birth, birth date, ethnicity, residence, education, height, weight) are present in all registries, though with some differences in terminology and granularity.
- Disease characteristics (medical history, family history, date of first consultation, symptom onset, diagnosis, amyloid/tau status, genetic status, imaging, cognitive screening, clinical staging, milestone events, functional scales, safety events, treatments, registry discontinuation) are included in the MDS of all registries, but with varying definitions and coding standards.
- WHO ATC codes are used for treatments in InRAD, ABOARD and ROMENS.

Main Differences:

- Different international semantic standards are used for MDS elements (e.g., MedDRA in InRAD, SNOMED-CT in ABOARD & ROMENS for diagnostic categories).
- Milestone events such as "Living, Driving and Employment" status are not recorded consistently across registries.
- Drug safety: ARIA (amyloid-related imaging abnormalities)/SAE (Serious adverse events) reporting is present across all registries: ABOARD has aligned with InRAD data dictionary. ROMENS currently limits ARIA/SAE collection to clinical trials although data workflow is ready for when ATTs are approved.
- Imaging: MRI information is not collected in ABOARD, but is collected in the other cohorts.

Data Delivery Models:

- InRAD currently supports prospective MDS (and EDS) data entry at point of care via its Web App, with a patient overview graph for the clinician with a built-in audit trail.

Figure 1a: Direct data entry by InRAD Centre

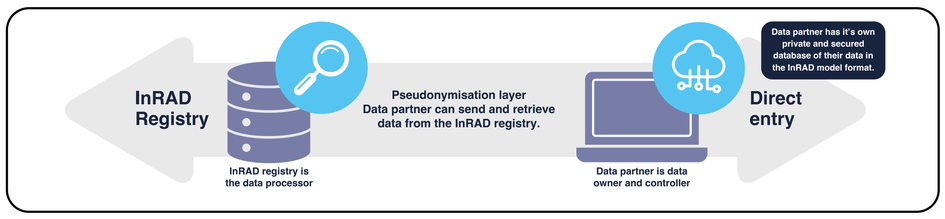
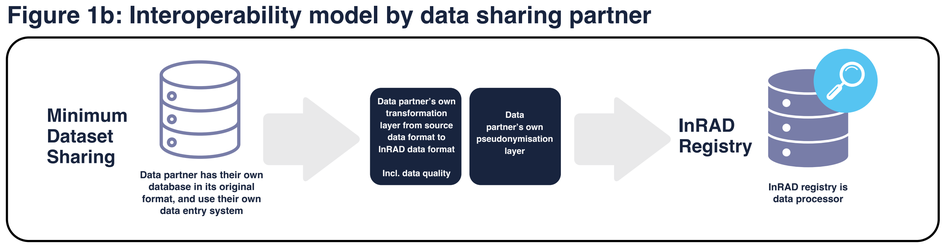


Figure 1b: Interoperability model by data sharing partner



Challenges Beyond Harmonization:

- Mapping external registry data to the InRAD MDS is a key harmonization challenge.
- True interoperability requires more than harmonized data sets, e.g. data quality (standardization of data collection including training; full audit trails, electronic signatures) and governance (consent for data sharing of pseudonymized data – a unique patient ID is required for longitudinal follow up).
- Having different data entry systems that would each have to be validated for data quality purposes can also be a barrier to achieving true interoperability especially for contributing data for regulatory-grade studies. Adopting the same data entry platform could be an advantage in that respect.

Conclusions

- **Addressing the MDS harmonization challenges will be important. Having a harmonized MDS across data partners, nationally and internationally, would already be a huge win for the Alzheimer's Disease data community.**
- **Recommendations on interoperability for InRAD data partners are being prepared and should be leveraged by data partners.**
- **It will also be relevant to compare the InRAD EDS with the other registries - in addition to the MDS e.g. to capture relevant meta-data for interpretation of tests e.g. amyloid status not just positive/negative (or consistent/ inconsistent with AD), but also provide option to capture assay, cut-off, actual value etc. (available in the InRAD EDS).**
- **True interoperability will also require alignment of diagnostic procedures in memory clinics, training for data capture, data models, semantic standards, and governance. Collaboration and investment in data infrastructure, training, and support are critical for sustainability and research impact.**
- **InRAD's approach—combining technical solutions with collaborative governance—offers a pathway, and ongoing effort is needed to realize the vision of a global, interoperable AD registry.**

References: 1. Perneczky R, Darby D, Frisoni GB, Hyde R, Iwatsubo T, Mummery CJ, Park KH, van Beek J, van der Flier WM, Jessen F . Real-world datasets for the International Registry for Alzheimer's Disease and Other Dementias (InRAD) and other registries: An international consensus. J Prevent Alzheimers Dis 2025. **2.** ALZ-NET CRFs: https://www.alznetproviders.org/Network-Operations/ALZ-NET-Data 3. InRAD Observational Study Protocol Study ID: InRAD-AD-OBS-V2.0 10th October 2025. ClinicalTrials.gov Identifier: NCT07213704. ABOARD Consortium. ABOARD: A Dutch public–private partnership for personalized medicine in Alzheimer's disease. Alzheimers Dement. 2024. https://pubmed.ncbi.nlm.nih.gov/40448198/ **5.** de Boer, C., Rhodius-Meester, H. F., van der Landen, S. M., Claassen, J., de Haan, R., Papma, J. M., ... & van der Flier, W. M. (2025). Towards a national registry for Alzheimer's disease and related dementias: rationale, design, and initial observations of the ABOARD cohort. Alzheimer's Research & Therapy, 17(1), 123. **6.** Wang C, Damian D, Lathuilière A, et al. ROMENS: An Automated Regional Real-World Data Registry for Dementia Research and Care in Western Switzerland [manuscript in preparation]. 2025.

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Table 2: MDS Head-to head variable level comparison between registries

	InRAD Minimum Data Set			ALZ-NET		ABOARD			ROMENS			
Section	**Field**	**Definition**	**Terminology**	**Field**	**Definition**	**Field**	**Definition**	**Terminology**	**Field**	**Definition**	**Minimum/ Extensive**	**Terminology**
Patient Profile/ Demographics	Name®/Patient ID	Patient globally unique ID for registry (created by system)		Name/Patient ID	Patient globally unique ID for registry (created by system)	Name/Patient ID	Patient globally unique ID for registry (created by system)		Patient ID	Patient globally unique ID for registry	Minimum	
	Consent for registry	N/Y, Date given / date withdrawn (Y required for registry participation)		Consent for registry	N/Y, Date given / date withdrawn (Y required for registry participation)	Consent for registry	N/Y, Date given / date withdrawn (Y required for registry participation)		Consent for registry	N/Y, Date given / date withdrawn (Y required for registry participation)	Minimum	
	Sex at birth	M/F/other/Not specified		Sex at birth	M/F/Unknown	Sex at birth	M/F/Intersexual/ Transsexual	Person Core Vocabulary (EU)	Sex at birth	Biological sex	Minimum	Person Core Vocabulary (EU)
	Birth date	Year and month only sent to registry		Birth date	Year and month only sent to registry	Birth date	Year and month only sent to registry	Person Core Vocabulary (EU)	Birth date	Year and month only sent to registry	Minimum	Person Core Vocabulary (EU)
	Ethnicity (if allowed; reference list can be customised)	Black/African, East Asian, Indigenous, Middle East/ North Africa, Mixed race, South Asian, White/ Caucasian, Other		Ethnicity (self-reported)	See CRF	Ethnicity	Self reported by participant through set of questions regarding country of birth, country of birth parents, and societal group they identify with.		Ethnicity	Self-identified ethnic or cultural background	Minimum	
	Place of residence	Country		Place of residence	Country (US, CA, Other)	Postcal Code	Has to be The Netherlands		Country	Country of residence	Minimum	ISO3166
	Education level	ISCED 0-8 (ISCED 0: Early childhood education; to ISCED 8: Doctoral or equivalent)	ISCED 2011	Education	See CRF	Education	Verhage scale	SNOMED-CT + mapping available to ISCED 2011	Education	Total number of years of formal education completed	Minimum	
	Height	cm		Height	cm	Height	cm		Height	cm	Minimum	
	Weight	Kg		Weight	Kg	Weight	Kg		Weight	Kg	Minimum	
Disease characteristics (diagnostic work-up)	Medical History	Relevant medical conditions (history and concomitant)[&]	MedDRA	Medical History	Relevant medical conditions (history and concomitant)[&]	Medical History	Relevant medical conditions (history and concomitant)[&]	SNOMED-CT	Medical History	Relevant medical conditions (history and concomitant)	Minimum	SNOMED-CT
	Family History of Dementia	First degree relative/ dementia type		Family History of Dementia	First degree relative/ dementia type	Family History of Dementia	First degree relative with dementia Y/N		Family History of Dementia	Family history of dementia, including relation, age at onset, and type	Minimum	SNOMED-CT
	Date of first consultation for screening for dementia	Date				Date of first consultation for screening for dementia	Date	SNOMED-CT	Date of first consultation for screening for dementia	Date	Minimum	SNOMED-CT
	Date of symptom onset	Date		Year of symptom onset	Year	Year of symptom onset	Year	SNOMED-CT	Age of symptom onset	Age	Extensive	
	Predominant Symptoms/ Syndrome	• No specific syndrome • Amnestic syndrome • Posterior cortical syndrome • Frontal syndrome • Primary progressive aphasia • Other atypical presentations		Predominant Symptoms/ Syndrome	Typical AD (amnestic), non-typical AD)	Predominant Symptoms/ Syndrome	Dementia or non-dementia	SNOMED-CT	Predominant Symptoms/ Syndrome	No specific syndrome amnestic/Non-amnestic - Language/Non-amnestic - Visual/Dysexecutive syndrome - Cognitive_ Behavioural/ Diffuse/other atypical presentations	Extensive	
	Date of diagnosis	Date and service		Reporting period	Peroid	Date of diagnosis	Date	SNOMED-CT	Date of diagnosis	Date	Minimum	SNOMED-CT
	Diagnosis	• Alzheimer's Disease • plus other dementias or degenerative diseases				Diagnosis	Alzheimer's Disease plus other dementias degenerative diseases (from picklist)	SNOMED-CT	Diagnosis	BNA etiological category (e.g., Alzheimer's disease, Lewy body disease, vascular, mixed, other)	Minimum	
	Amyloid status	Positive/negative/Indeter minate/not done		Amyloid status	Consistent with AD/not consistent with AD	Amyloid status	Positive/negative/ indeterm inate/not done		Amyloid status Positive	Positive/Negative; specify source (CSF/PET) and date (earliest positive or latest	Minimum	
	Tau status	Positive/negative/ Indeter minate/not done		Tau status	Consistent with AD/not consistent with AD	Tau status	Positive/negative/ indeterm inate/not done		Tau status	Positive/Negative; specify source (CSF/PET) and date (earliest positive or latest negative)	Minimum	
	Genetic status	Positive/negative/Variant of Unknown Significance/ not done for PSEN1,PSEN2, APP and APOE		Genetic status	APOE				Genetic status	APOE	Minimum	
	Imaging evidence of neurodegeneration or other findings	Atrophy/hypometabolism: normal/abnormal/ Indeter minate/not done		Imaging evidence of neurodegeneration or other findings	Consistent with AD/not consistent with AD	Imaging evidence of neurodegeneration or other findings	Atrophy: MTA + GCA scales		Imaging evidence of neurodegeneration or other findings	MTA, Koedam, Fazekas, CAA (siderosis, microbleeds central/ peripheral), stroke	Minimum	
Clinical outcomes	Cognitive screening test	N/Y (MoCA or MMSE; Test date, Test version, Score)		Cognitive screening test	N/Y (MoCA/MMSE/FAQ/ NPI; Test date, Score)	Cognitive screening test	N/Y (MoCA, MMSE, CDR, RUDAS; Test date, Score)	LOINC	Cognitive screening test	N/Y (MoCA or MMSE, CDR; Test date, Score)	Minimum	LOINC
	Clinical staging (Global AD Staging, NIA-AA 2018/24)	Asymptomatic, deterministic gene (0); Asymptomatic, biomarker evidence only (1); Transitional decline (2); Mild Cognitive impairment (3); Mild (4); Moderate (5) or Severe dementia (6)		Clinical staging	Mild Cognitive impairment (3) Mild dementia (4) Moderate dementia (5) Severe dementia (6)	Clinical staging (NIA-AA 2024)	Asymptomatic (not AD); Asymptomatic, deterministic gene (0); Asymptomatic, biomarker evidence only (1); Transitional decline (2); Mild Cognitive impairment (3); Mild (4); Moderate (5) or Severe dementia (6)		Clinical staging	BNA clinical stage (Worried well, Subjective cognition complaint (SCD),Mild cognition impairment (MCI),Dementia)	Minimum	
	Milestone events	**Living status** (Own Home (owned or rented), Intermediate Accommodation (not dementia specific), Dementia Specific, Residential Accommodation, Long Term Institutional Care (Nursing Home/Hospice), Other; Living arrangement; **Driving status; Employment status:** Employed (Part-time / Full-time), Retired, Student, Unemployed, Home-maker, Other; Reason for employment status change (due to Alzheimer; other)				Milestone events	Living	SNOMED-CT	Milestone events	Living/Driving /working status	Minimum	SNOMED-CT, ISCO- 88
	Functional Scales	Y/N				Functional Scales	Self reported by participant: EQ5D, Libra, QoLAD, DemQoL, Amsterdam-iADL		Functional Scales	HADS, EQ5D,Amsterdam iADL	Minimum	
Safety and relevant medical condition	ARIA	N/Y, medical event report (E/H or ICH>1cm)	MedDRA	ARIA	N/Y, medical event report (E/H or ICH>1cm)				ARIA	N/Y, medical event report (E/H or ICH>1cm)	Minimum	
	Other Medical Events (e.g. Serious Adverse Event (SAE) or other events of interest	Untoward medical occurrence (e.g., death, hospitalisation, illness resulting in major change)	MedDRA	Other Medical Events (e.g. Serious Adverse Event (SAE) or other events of interest)	Untoward medical occurrence (e.g., death, hospitalisation, illness resulting in major change)				Other Medical Events (e.g. Serious Adverse Event (SAE) or other events of interest)	Untoward medical occurrence (e.g., death, hospitalisation, illness resulting in major change)	Minimum	
	Infusion/injection reaction	N/Y, medical event report	MedDRA	Infusion/injection reaction	N/Y, medical event report							
	Specified medical events of interest	Serious malignancy, serious infection, other neurological conditions	MedDRA	Specified medical events of interest	Serious malignancy, serious infection, other neurological conditions							
	Medical History conditions[&]	Relevant medical conditions (history and concomitant)	MedDRA	Medical History conditions	Relevant medical conditions (history and concomitant)							
Imaging	MRI	N/Y – type, date of scan and reason: • Diagnosis • Clinical Follow up • ARIA monitoring • Other		MRI	N/Y – type, date of scan and reason: • Diagnosis • Clinical Follow up • ARIA monitoring • Other				MRI	N/Y – type, date of scan, FreeSurfer-derived morphometrics	Extensive	
Treatments	AD specific treatment	Treatment ID, name, start/ stop date	ATC	AD specific treatment	Treatment ID, name, start/ stop date	AD specific treatment	Treatment ID, name	ATC	AD specific treatment	Treatment ID, name, start/ stop date	Extensive	ATC
	Cognitive treatments of interest	Treatment ID, name, start/ stop date	ATC						Medication psychotropic	Treatment ID, name, dose, start/stop date	Minimum	ATC
	Other treatments of interest (Pharmacological and non-pharmacological)	Treatment ID, name, start/ stop date	ATC (pharmacological)						Medication somatic	Treatment ID, name, dose, start/stop date	Minimum	ATC
Registry discontinuation	Including death	Date and cause of death	MedDRA	Including death	Date and cause of death	Including death	Date and cause of death	Person Core Vocabulary (EU)	Including death	Date	Extensive	SNOMED-CT

®name (first/last) remains in centre database only the unique identifier is shared with the registry

& Medical History answer Yes or No to history of (neurological/neurodegenerative/cerebrovascular/cardiovascular/psychiatric/blood or lymphatic/malignancy/metabolic/immune or autoimmune/severe infections or infestations or other conditions. If yes enter condition MedDRA code, severity and dates

˙Allows for evolution in the diagnostic pathway (timeline) from asymptomatic presentation if seen prior to diagnosis to emergence of symptoms and biomarker test conduct