Development of psychiatric common data model (P-CDM) leveraging psychiatric scales

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Background

The limitations of a categorical diagnostic system in neuropsychiatric illness have become increasingly apparent. A diagnostic category such as depression captures a large heterogeneous range of presentations.[1] By categorizing various symptoms with only a diagnosis code, there is a loss of information.[2] To compensate for these issues, various psychiatric scales have been introduced and are used in practice.[3] However, the common data model does not include psychiatric scales. Therefore, we aimed to develop a common data model for psychiatry that utilizes the psychiatric scale.

Methods

First, we built the psychiatric CDM from the existing CDM of Ajou University School of Medicine (AUSOM). Specifically, the psychiatric CDM was created by extracting CDM records for patients with at least one visit to a psychiatry department since 2010. While extracting patients, we kept the existing CDM table and format. For the psychiatric scales, information was extracted from the EHR and loaded into the psychiatric CDM. We decided to extract common scales by asking four psychiatrists what scales they commonly use. Second, the extracted scales were mapped to SNOMED-CT concepts and loaded into the measurement table of the psychiatric CDM.

Results

The psychiatric CDM included 32,553 patients, 42.8% male and 57.2% female. The most common diagnosis was adjustment disorder, followed by sleep disorder, depressive disorder, and panic disorder. There were a total of 8 psychiatric scales selected for extraction (Hamilton Rating Scale for Depression (HAM-D), Hamilton Rating Scale for Anxiety (HAM-A), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Brief Psychiatric Rating Scale (BPRS), Positive and Negative Syndrome Scale (PANSS), MMSE, and Clinical Dementia Rating Scale (CDR)). The scales were mostly mapped to SNOMED-CT codes, with HAM-A mapped to omop-extension. After ETL, MMSE had the highest number of persons at 1,670, followed by HAM-D at 1,479. The other scales were HAM-A at 745, BDI at 562, BAI at 152, BPRS at 774, PANSS at 260, and CDR at 1,259.

Conclusion

We developed psychiatric CDM leveraging psychiatric scales, which may help capture psychiatric patients more accurately and facilitate their utilization.
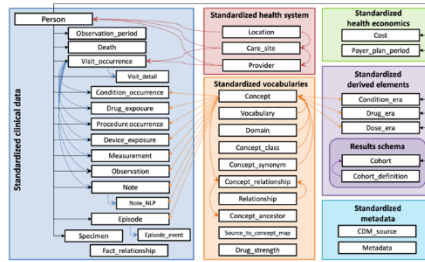
Acknowledgment

1. Patients extraction

AUSOM CDM
1994.3 – 2023.5
2.75 million

Psychiatric CDM
2010.3 – 2023.5
32,553

Extraction criteria
Individuals who had at least one visit to the Department of Psychiatry at Ajou University Hospital since 2010.

2. Mapping of Psychiatric Scales

Psychiatric scales ⟷ SNOMED CT

Name	Concept ID
Hamilton Rating Scale for Depression	4159709
Hamilton Rating Scale for Anxiety	40219532
Beck Depression Inventory	4167608
Beck Anxiety Inventory	4128244
Brief Psychiatric Rating Scale	4155657
Positive and Negative Syndrome Scale	4165141
MMSE	4169175
Clinical Dementia Rating Scale	4164818

3. ETL of Psychiatric Scales

AUSOM EHR

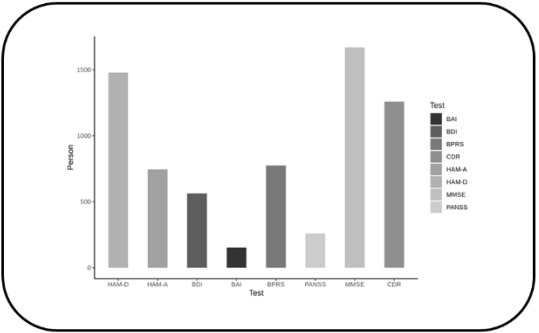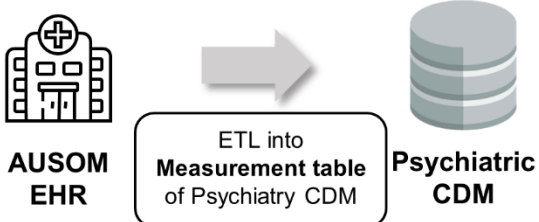ETL into **Measurement table** of Psychiatry CDM

Psychiatric CDM

Figure 1. The Schematic View of Psychiatric CDM Development
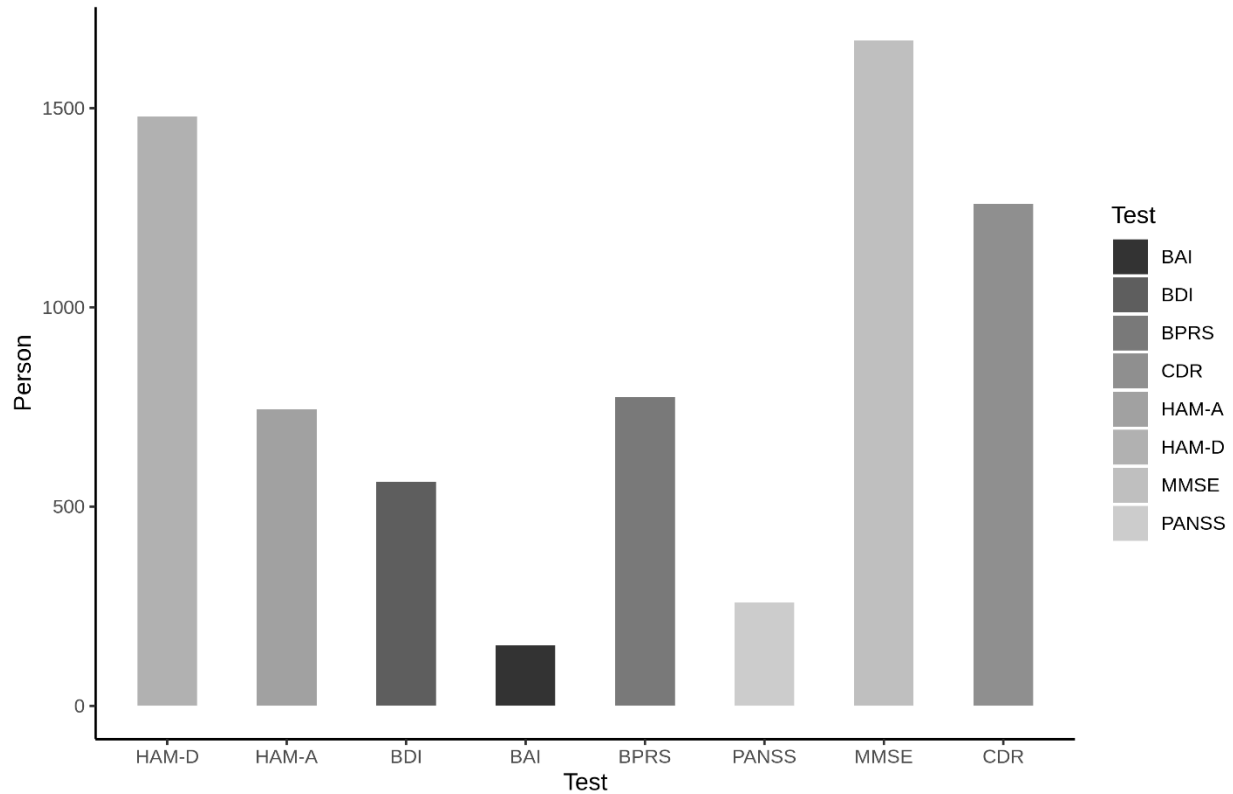
Figure 2. Number of Patients on Psychiatric Scales included in the Psychiatric CDM

References/Citations

1.   Zimmerman M, Ellison W, Young D, Chelminski I, Dalrymple K. How many different ways do patients meet the diagnostic criteria for major depressive disorder? *Comprehensive psychiatry*. 2015;56:29-34.
2.   McCoy Jr TH, Yu S, Hart KL, et al. High throughput phenotyping for dimensional psychopathology in electronic health records. *Biological psychiatry*. 2018;83(12):997-1004.
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