Using Real-World Data and Digital Phenotyping to Identify Candidates for anti-CGRP Migraine Treatment

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Background

Migraines affect approximately 15% of the total US population, but fewer than 20% of patients are correctly diagnosed. Only 3-13% of patients use preventive treatment, even though nearly 40% would benefit. In this study, a novel AI-based digital phenotyping method was applied to real-world data to help identify preventative treatment-naive patients clinically similar to those being treated.

Objective

To assess whether a digital phenotyping model could identify migraine patients who managed their condition with anti-CGRP preventative treatments before initiation, and to apply the derived phenotypic profile to identify additional patients with strong clinical similarities to those already treated.

Methods

This study was conducted using a real-world US dataset comprising linked claims and EHR data (the OM1 Real-World Data Cloud). The study inclusion period spanned May 1, 2018 to July 1, 2022. All patients were age ≥18, diagnosed with migraine or hemicrania. Patients with a qualifying anti-CGRP medication constituted the positive cohort, and those remaining constituted the negative cohort. The index date for the former was the date of first qualifying prescription, and for the latter, a random date after first qualifying diagnosis. Overall, 220,977 patients entered the positive cohort, and 435,293 the negative. These patients were divided into training and testing subcohorts. A digital phenotyping AI platform (OM1 PhenOM®) was calibrated to identify treatment-positive patients based on all available data at index by isolating common shared characteristics. The phenotype derived was applied to the negative cohort to highlight patients sharing key similarities with those treated.

Results

The digital phenotyping model identified treatment-positive patients with an area under the curve (AUC) of 0.82. Factors comprising the treatment profile included patients' prior history of medications to manage migraine; frequency of documentation of chronic migraine in the patient's record; and prior exposure to antidepressant medications. Patients without a history of anti-CGRP treatment, but with strong similarity to the treated group's phenotypic profile, were successfully highlighted.

Conclusions

- This study demonstrated that by applying a digital phenotyping model to large real-world datasets, a distinct profile from migraine patients' histories before anti-CGRP treatment could be derived for those eventually receiving treatment.
- Patients were also found in the dataset whose histories closely corresponded to this 'treatment phenotype', even though they had not been exposed to anti-CGRP treatment.
- This novel study shows that digital phenotyping can be useful in identifying treatment phenotypes, and untreated patients closely matching them, using available real-world data.

Figure 1. Analytic performance in identifying patients with chronic migraines treated with anti-CGRP medications.

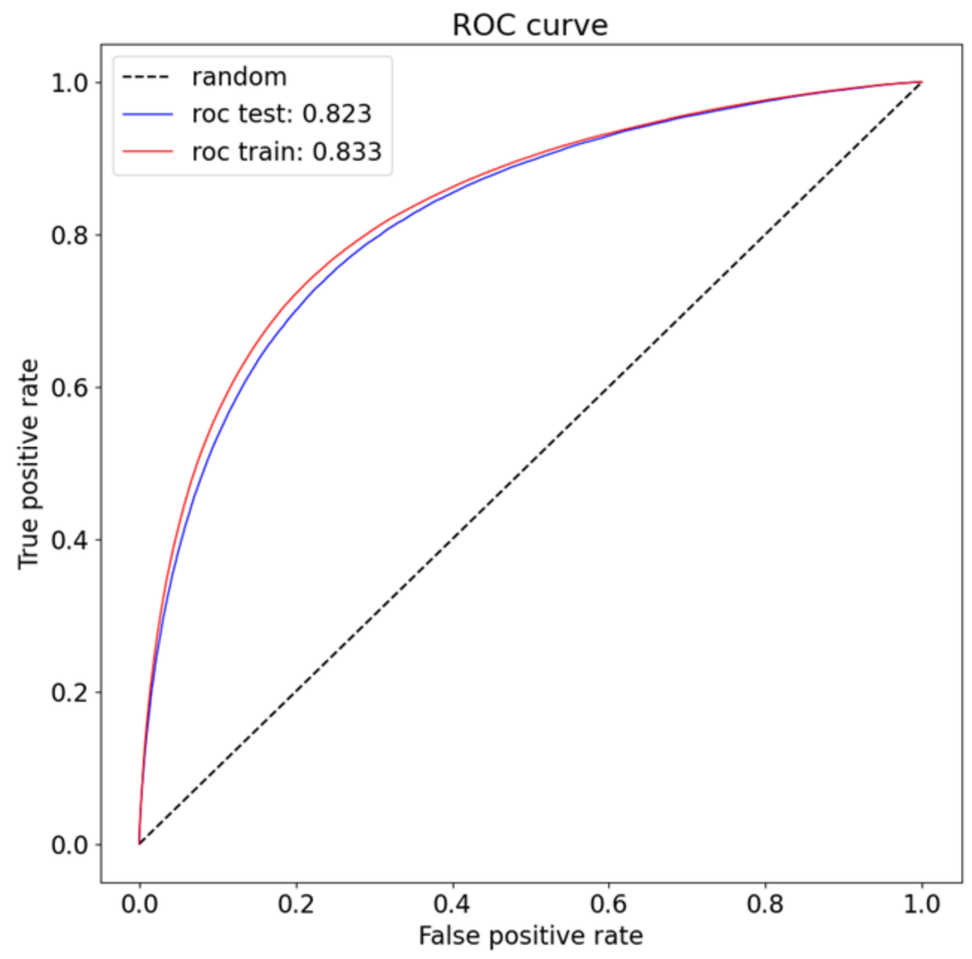

Figure 2. Likelihood of use of anti-CGRP medication, by phenotypic profile score ventile. Patients scored highest in the test dataset – most similar to the training set's cohort of anti-CGRP patients – were most likely to have qualifying medication.

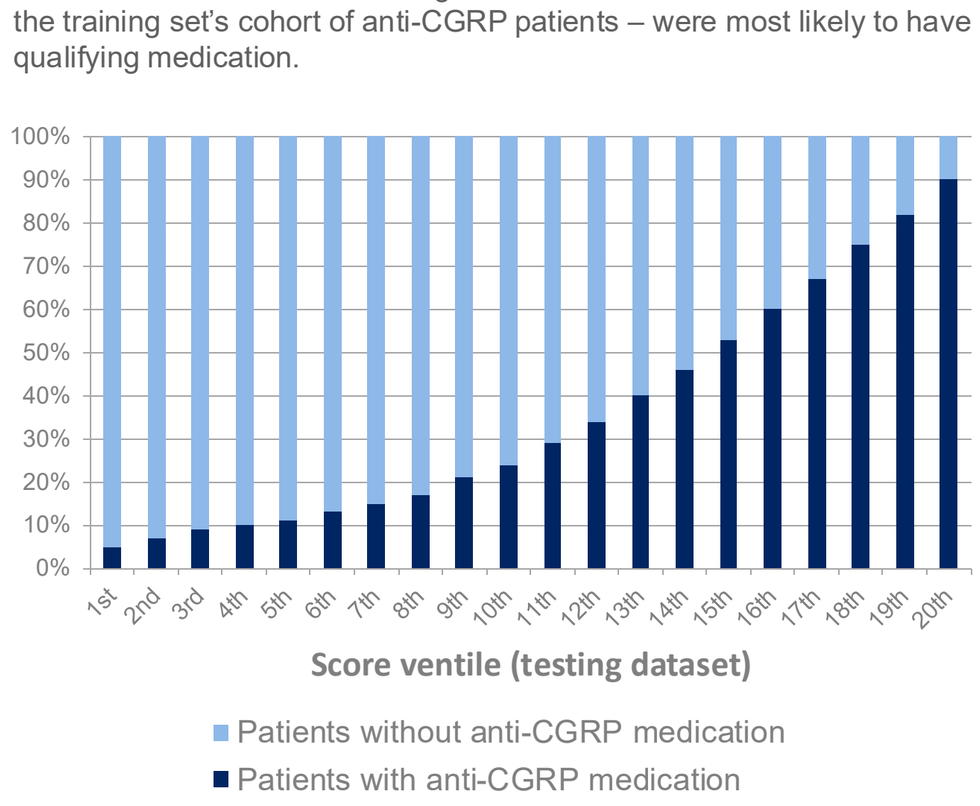

Table 1. Key differences in characteristics between the positive and negative cohorts.

	Prevalence (positive cohort)	Prevalence (negative cohort)	Difference (positive - negative)
other migraine treatments	58.5%	20.8%	37.7%
antidepressant medications	59.4%	36.0%	23.4%
indicators of high migraine severity	30.2%	10.3%	19.9%
beta blocker medications	34.3%	16.4%	17.9%
headache treatments	22.3%	7.7%	14.6%

Conference

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