Predicting Moderate-to-Severe Plaque Psoriasis from Prescription and Procedure Electronic Health Record Data

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BACKGROUND

- Plaque psoriasis (PsO) is a systemic, multifactorial chronic skin disorder characterized by dry, itchy, raised skin patches covered with scales.[1]
- Body surface area (BSA), which is the total percentage of a patient's body affected by PsO, is a routinely used measure of PsO extent and severity.
- New advanced treatments for PsO specifically target moderate and severe disease; however, in many real-world data sources, disease severity may not be collected routinely.
- An algorithm to identify moderate and severe PsO in real-world data sources based on commonly available data at the same visit would be beneficial to study this target population.

OBJECTIVES

- The objective of this research was to utilize only prescription and procedure data from electronic health records to distinguish moderate and severe PsO from mild PsO in patients within a database of specialty dermatology networks with routine collection of BSA.

METHODS

- Patients from 6 specialty dermatology networks within the OMNY Health real-world data platform from 2017 to 2024 with an assessment of BSA directly associated with PsO were included.
- Encounters were categorized into mild (BSA < 3%), moderate (BSA 3-10%), and severe (BSA > 10%) PsO; moderate and severe categories were combined.
- Logistic regression with 5-fold cross validation was employed where moderate/severe status was modeled as a function of prescriptions (topical corticosteroids, other topical agents, oral corticosteroids, cyclosporine, methotrexate, tapinarof, apremilast, deucravacitinib, biologics) and procedure codes (phototherapy, moderate or complex disease management) that occurred at the same encounter.
- Final variables were selected based on their strengths of association with the outcome.
- Model performance was assessed by the cross-validated area under the receiver-operating characteristic (AUROC) curve.

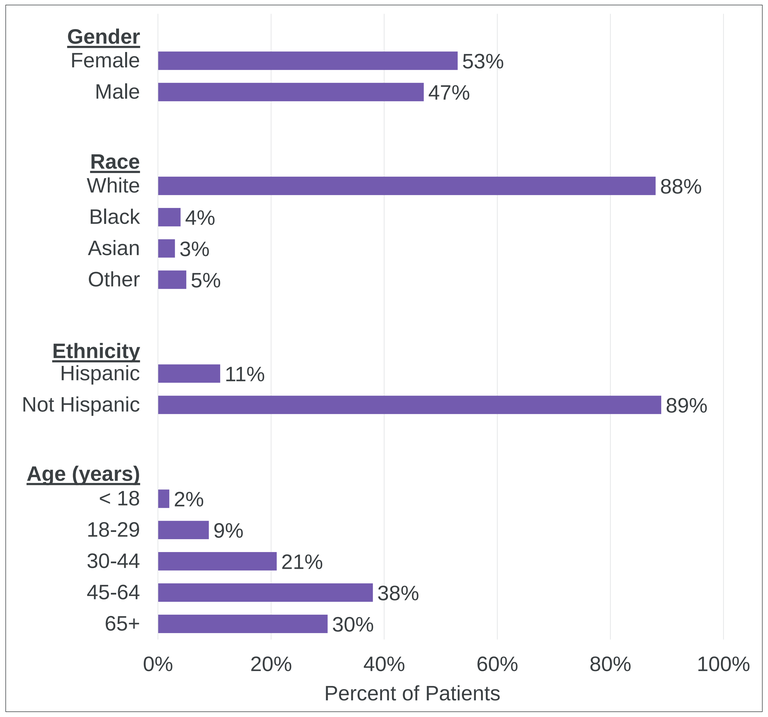
REFERENCE

1. Boehncke WH, Schön MP. Psoriasis. Lancet. 2015 Sep 5;386(9997):983-94. doi: 10.1016/S0140-6736(14)61909-7.

RESULTS

- Of 298,326 PsO patients, 126,494 had at least 1 BSA assessment comprising 328,107 unique encounters.
- Demographic characteristics of the patient population are presented in Figure 1.

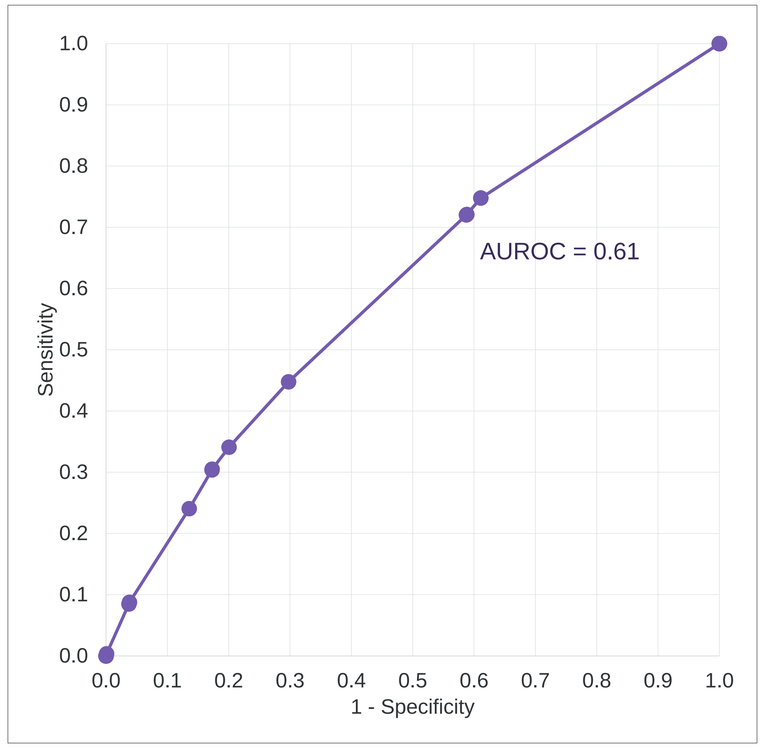
Figure 1: Demographic Characteristics of Patient Population



Note: Percentages were based on non-missing data.

- The cross-validated AUROC value using all treatment variables as predictors (including phototherapy) was 0.59. The analogous value for procedure codes associated with moderate or complex disease management was 0.55.
- Final selected variables positively associated with moderate/severe PsO status were as follows:
  - Prescriptions for topical corticosteroids, oral corticosteroids, other topical agents, and apremilast
  - Procedure codes for phototherapy and moderate or complex disease management.
- The cross-validated AUROC achieved was 0.61, indicating poor to fair discrimination between moderate/severe and mild disease severity (Figure 2).

Figure 2: Receiver-Operating Characteristic Plot for Final Model



DISCUSSION AND CONCLUSIONS

- The ability to identify moderate and severe PsO patients in electronic health record data is important to study advanced therapies in the real-world setting.
- Same-day prescription and procedure data alone may not be sufficient to distinguish moderate/severe from mild PsO in the real-world setting.
- Further research to develop a more discriminative algorithm may include integrating patient history, demographics, and natural language processing of clinical notes.

CONTACT INFORMATION

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