AI-Powered Patient Identification to Optimize Care

Ron Vender
MD, FRCPC
Associate Clinical Professor of Medicine
McMaster University
Director Dermatrials Research Inc.
Hamilton, ON, Canada

Charles W. Lynde
MD, FRCPC, DABD, FCDA
Chief Medical Director, The Lynde Institute
for Dermatology & Lynderm Research Inc.
Associate Professor, University of Toronto,
Department of Medicine.
Markham, ON, Canada

Introduction

- Patients with plaque psoriasis (PsO) will commonly report a profound impact on their health-related quality of life (HRQoL).[1] These include a significant impact on mental health conditions such as depression/anxiety and sleep disorders.[1]
- There is commonly a disconnect between the patient's and the dermatologist's perception of disease burden and treatment goals.[2]
- Approximately 1 in 3 people with PsO report not being satisfied with the effectiveness, convenience and/or safety of their topical or oral therapy.[2]
- To address treatment goals, intensity of therapy and the need for adjustments, it is important for dermatologists to be able to quickly identify moderate to severe plaque psoriasis patients in their practices who may not be reaching treatment goals based on their current disease severity and treatment plan.
- A seamless and comprehensive assessment approach could allow the dermatologist to self-audit their management of patients with moderate to severe PsO and determine if adjustments are required to reach treatment goals.
- We investigated the feasibility of developing a clinical algorithm to screen electronic medical record data for patients with moderate to severe PsO in clinical practice (the "Algorithm").
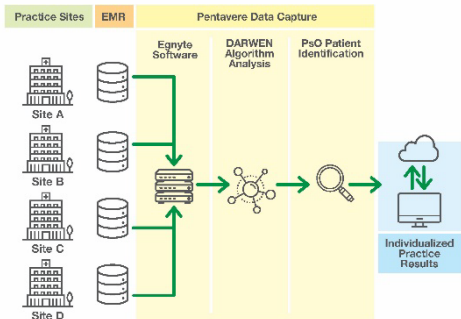
Methods

- An algorithm was developed by Pentavere Health with consultation with the dermatologist scientific committee leads. **(Figure 1)**

Figure 1 – Query criteria to identify patients with PsO

Query	Relevant Terms	Outcome
PsO Diagnosis	- Plaque - Psoriasis - PsO - Scaly plaques - Silvery scales - Psoriatic Arthritis, PsA - Nail/fingernail psoriasis - PASI - PGA - IGA - BSA - DLQI - Dactylitis - Enthesitis	Exclude: - Gustate - Pustular - GPP

- The DARWEN™ artificial intelligence (AI) engine is designed to quickly and economically extract real-world evidence (RWE) trapped in large repositories of existing unstructured healthcare data and transform it to reports that can be easily interpreted by the clinician.
- Using the proprietary DARWEN™ engine, the algorithm queried the clinical notes generated from regular clinical assessments and examinations for this data analysis. The engine was able to capture a diagnosis of PsO and the patient's disease severity based on their Psoriasis Area and Severity Index (PASI) score. **(Figure 2)**

Figure 2 - The DARWEN™ Engine data analysis process

- The PsO severity was classified based on the patient's PASI score **(Figure 3)**

Figure 3- Classification of Plaque Psoriasis Disease based on Psoriasis Area and Severity Index Score
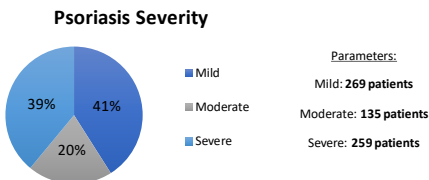
Disease Severity	PASI Score
Mild Psoriasis	0-6
Moderate Psoriasis	>6-12
Severe Psoriasis	>12

- Data security was the topmost priority. Pentavere utilizes encrypted data transfer and storage. Egnyte software was used for storing physician's patent data. Egnyte is a comprehensive enterprise content management, data governance, and file sharing platform. Egnyte maintains compliance with the strictest standards to ensure privacy and data protection. All data is stored in cloud-based storage that is hosted in Canada. All participants of this study provided research consent at each of the practice sites.
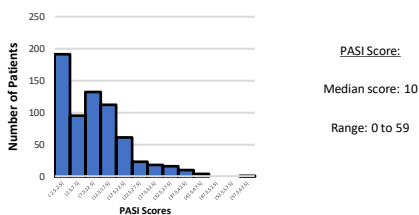
Results

- The algorithm scanned the EMRs of 10,295 patients in the four dermatologist practices in Canada sing the DARWEN™ engine between May 13, 2022 and December 2, 2022.
- The results of the queries identified 663 patients over these four dermatology practices with PsO. Within this group, 269, 135 and 259 patients were identified with mild, moderate or severe PsO based on their PASI scores, respectively. **(Figure 4)**

Figure 4 – Plaque Psoriasis severity of patients

Psoriasis Severity

- Mild 41%
- Moderate 20%
- Severe 39%

Parameters:
Mild: **269 patients**
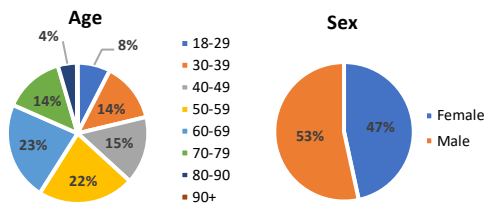Moderate: **135 patients**
Severe: **259 patients**

- The patients identified had a broad distribution of PASI scores ranging from 0 to 59 with the median score as 10. **(Figure 5)**

Figure 5 – PASI score distribution of identified PsO patients*

PASI Score:

Median score: 10

Range: 0 to 59

- The demographic distribution of the patients with PsO were also captured through the queries. There was close to an equal mix of male (53.3%) and female (46.7%) patients. The vast majority of patients with PsO identified were 40 years of age or older. **(Figure 6)**

Figure 6 – Demographic Information of identified PsO patients

Age
- 18-29: 8%
- 30-39: 14%
- 40-49: 15%
- 50-59: 22%
- 60-69: 23%
- 70-79: 14%
- 80-90: 4%
- 90+

Sex
- Female: 47%
- Male: 53%

- All dermatologist participants were provided with a report of the PsO patients identified, their PASI score, date of last PASI score and date of last appointment.

Discussion

- We clearly demonstrated the potential value of AI technology in quickly and efficiently identifying patients with PsO and assessing disease severity (i.e. PASI data at last visit, age and gender) within dermatologist EMR patient data
- By identifying the severity, dates of last PASI assessment and last visit, it will allow the dermatologist to determine if a patient may required another visit and assessment
- This program demonstrated that this technology can identify these patients who may require different interventions. This could include revisiting treatment goals, satisfaction with the treatment regimen, adherence and the need for intensification/modification of current pharmacotherapy
- The next planned steps consists of expanding the project to include a larger sample of physicians and evaluate pharmacotherapy usage to identify patients who have been cycling between treatments and/or are not having improved outcomes

References

1. Duvetorp A, Østergaard M, Skov L, et al. Quality of life and contact with healthcare systems among patients with psoriasis and psoriatic arthritis: results from the NORdic PAtient survey of Psoriasis and Psoriatic arthritis (NORPAPP). Arch Dermatol Res. 2019;311(5):351-360. doi:10.1007/s00403-019-01906-z
2. Lebwohl M, Langley RG, Paul C, et al. Evolution of Patient Perceptions of Psoriatic Disease: Results from the Understanding Psoriatic Disease Leveraging Insights for Treatment (UPLIFT) Survey. Dermatol Ther. 2021;12(1):61-78. doi:10.1007/s13555-021-00635-4

PLAQUE
Psoriasis **L**earnings **A**nd **Q**ueries **U**ncovered by EMR

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