The psoriasis patient journey: progression from topical to biologic treatment for psoriasis patients in the United States

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Objective

This study aims to describe the patient treatment journey of PsO-diagnosed patients who initially receive a topical prescription and then receive a biologic treatment during follow-up.

Methods

Retrospective observational cohort study

Database: IBM Watson Explorys (Figure 1)
- Electronic health records (EHR) database made up from 39 integrated delivery networks (IDNs) across US and comprised of approximately 55 million patients

Patient inclusion
- Index topical date: initial topical prescription b/w Jan 1, 2011 and June 30, 2015
- Adult patients: ≥ 18 years at index topical date
- PsO diagnosis: ICD-9 CM diagnosis code 696.1 or ICD-10 CM diagnosis codes (L40.0, L40.8, L40.9) between 6 months prior to or 2 months post index topical date
- Patients had either ≥ 2 PsO diagnoses made by any physician or 1 PsO diagnosis made by a dermatologist. Patients were required to not have a topical prescription 6 months prior to the index topical date. Patients were also required to have activity in the EHR for at least 12 months prior to the index topical date and at least 36 months after the index topical date. Outcomes were assessed in a 36-month follow-up period.

Patient exclusion
- Patients who received an oral or biologic agent prescription in the 12 months prior to the index topical date.
- Patients who had a confounding dermatological or non-dermatological condition (where a TNF inhibitor is indicated) that was diagnosed during or before the PsO diagnosis date.

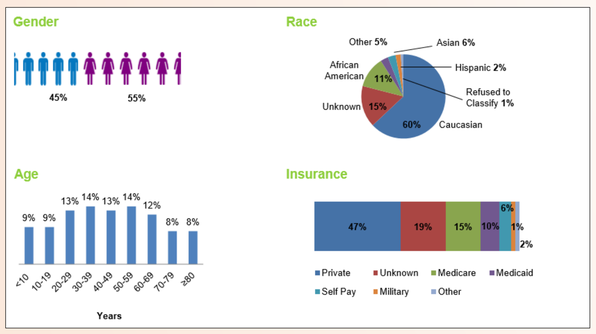

Figure 1: IBM Watson Explorys Universe Demographics

Prescription drugs classes included for analyses
- **Topical steroids:** grouped into class 1-2 or 3-7 steroids
- **Oral agents:** cyclosporine, methotrexate, acitretin, hydroxyurea, leflunomide, apremilast, azatioprine, dexamethasone, isoretinoin, methoxsalen, methylprednisolone, prednisone, tacrolimus, and sulfasalazine
- **Biologic agents:** etanercept, adalimumab, ustekinumab, infliximab, and secukinumab

Statistical analyses
- Between-group patient characteristics were compared using analysis of variance for continuous variables and Chi-square tests for categorical variables without adjustment. Multivariable Cox regression analysis was used to assess whether the difference between time to biologic was significantly different between patients who directly switched to or added on a biologic versus patients who initially received an oral agent prescription followed by a biologic prescription

Duration of Treatment Use Definitions
- For all drug types, no distinction was made between a patient switching medication(s) or adding on medication(s).
- **Topical drugs:** each new and refill prescription for a topical drug was assumed to be used for 30 days. A gap of 45 days or longer was assumed to be a stop or pause in topical treatment
- **Oral agents:** the duration of use was calculated by dividing the total quantity of tablets prescribed by the tablets administered per day, based on dosing instructions. When one of these fields was not available for a given prescription, we substituted the calculated median duration from prescriptions where it was available for each drug
- **Biologics:** the duration of use was calculated by multiplying the recommended maintenance dosing schedule for each medication by the number of syringes dispensed. Since infliximab is given intravenously, we assumed a duration of 56 days for each treatment as per the recommended maintenance dosing schedule

Results

Patient Cohort
- There were 33,397,271 adult patients aged ≥ 18 years in the Explorys database between January 1, 2011 and June 30, 2015, of whom 143,133 (0.4 %) had at least one PsO diagnosis.
- Of these patients, 38,390 had either ≥2 PsO diagnoses by any physician type or 1 PsO diagnosis made by a dermatology specialist and no confounding conditions before PsO diagnosis.
- Within this cohort, 24,481 patients received a topical prescription and 22,484 were defined as being topical treatment-naive. Of these patients, 6729 had a psoriasis diagnosis and started topical treatment, met all the study inclusion criteria and were included in the analysis. (**Table 1**)

Demographics
- Mean age of patients at time of switch to or add on of a biologic (48 years, SD 13.3) was significantly lower than mean age (54.5 years, SD 15.4) of patients at first topical treatment who never received a biologic in the 36-month follow-up period (P<0.001) (**Table 1**)

Duration of Topical Use
- Within the total patient cohort, 1712 (25.4%) stopped topical treatment in the 36-month follow-up period. The remaining 5017 (74.6%) patients continued, or stopped and then restarted, topical treatment in the 36-month follow-up period.
- *The median cumulative duration of any topical use was approximately 365 days (IQR: 233-558 days)* (**Table 2**)

Table 1. Patient Cohort Demographic

	Patient population (N=6,729)	Patients with biologic during 36-month follow-up:	
		No (n = 5988)	Yes (n=741)
Female sex, n (%)	53.8%	53.5%	56.4%
Mean age, years (SD)*	53.8 (15.3)	54.5 (15.4)	48 (13.3)
Median age, years (IQR)	55(43,65)	56(44,66)	48 (39,58)
Ethnicity			
African-American, n (%)	288 (4.3%)	246 (4.1%)	42 (5.7%)
Asian, n (%)	59 (0.9%)	53 (0.9%)	6 (0.8%)
Caucasian, n (%)	5890 (87.5%)	5257 (87.8%)	633 (85.4%)
Hispanic/Latino, n (%)	48 (0.7%)	37 (0.6%)	11 (1.5%)
Multi-racial, n (%)	36 (0.5%)	32 (0.5%)	4 (0.5%)
Other, n (%)	224 (3.3%)	193 (3.2%)	31 (4.2%)
Missing, n (%)	184 (2.7%)	170 (2.8%)	14 (1.9%)
Region			
East, n (%)	925 (13.7%)	848 (14.2%)	77 (10.4%)
Midwest, n (%)	3669 (54.5%)	3304 (55.2%)	365 (49.3%)
South, n (%)	1342 (19.9%)	1099 (18.4%)	243 (32.8%)
West, n (%)	550 (8.2%)	502 (8.4%)	48 (6.5%)
Missing, n (%)	243 (3.6%)	235 (3.9%)	8 (1.1%)

* p<0.001

Table 2. Estimated Median Cumulative Duration of Topical Use by Class (n = 5017)

Index Topical Agent for Patients who continued topical treatment in the 36-month follow-up period (N=5017)	Estimated median cumulative duration during 36-month follow-up period days (IQR)
Steroid Class 1-2	392.5 (247-572.5)
Steroid Class 3-7	368 (246-571)
Vitamin D	437.5 (301-633.5)
Calcipotriol / Betamethasone	401 (261-591)
NSAID	360 (270-590.5)
Vitamin A	396 (253-586)
Anthralin	310 (240-582)
Steroid 1-2	392.5 (247-572.5)

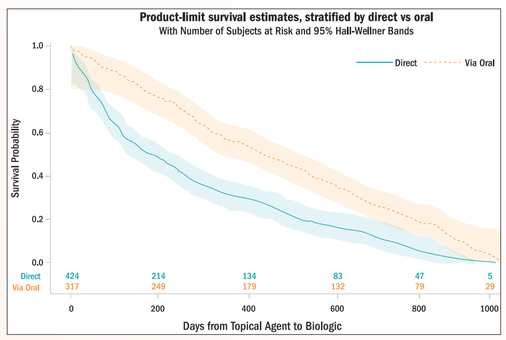

Figure 2: Time from Index Topical to Initiation of Biologic

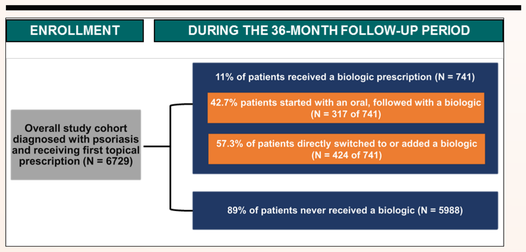

Figure 3: Patient cohort treatment patterns

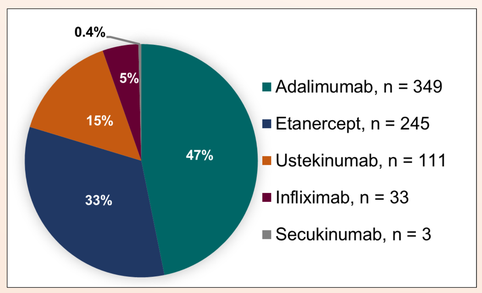

Figure 4: Biologics Prescribed First within Patient Cohort (n = 741)

Time to switch to/add-on of Biologic
- The median time from topical start date to biologic start date was significantly greater for patients (N=317) who initially received an oral agent prescription followed by a biologic prescription (488 days; IQR: 238 - 797 days), compared to patients (N=424) who directly switched from/added a topical to a biologic (206 days; IQR: 71.5 – 523 days) (p<0.0001). (**Figure 2**)
  - Patient groups were controlled for age, gender and ethnicity

Patient cohort treatment patterns
- During the 36-month follow up period, 317 (42.7%) patients received an oral agent prescription initially, followed by a biologic prescription; while 424 (57.3%) patients directly switched to or added on a biologic prescription.
- Of this second group, 160 (37.7%) subsequently received an oral agent prescription after the biologic. (**Figure 3**)
- Of the patients who directly switched to or added a biologic prescription first (N = 741), adalimumab was the most common treatment (N = 349 [74.1%]). (**Figure 4**)

Table 3A. Topical agents prescribed prior to biologic switch or add-on (N = 424)

Drug	Total patients n (%)
Steroids 1-2 (± another drug)	270 (63.7%)
Steroids 3-7 (± another drug)	176 (41.5%)
Betamethasone and Calcipotriene (± another drug)	65 (15.3%)
Vitamin D (± another drug)	51 (12.0%)

Patients were most frequently (63.74%) prescribed a class 1-2 steroid prior to biologic start (**Table 3A**)

Table 3B. Topical agents prescribed prior to biologic switch or add-on (N = 424)

Agent	Total patients n (%)
Methotrextate	164 (51.7%)
All_prednisone	117 (36.9%)
Dexamethasone	37 (11.7%)
Acitretin	28 (8.8%)
Sulfasalazine	17 (5.4%)
Cyclosporine	15 (4.7%)
Apremilast	14 (4.4%)
Leflunomide	5 (1.6%)
Hydroxyurea	2 (0.6%)
Methoxsalen	2 (0.6%)
Isotretinoin	1 (0.3%)
Methylprednisolone	1 (0.3%)
Tacrolimus	1 (0.3%)

Oral agents were prescribed directly before the switch to/add on of a biologic for a total of 317 patients and the top two were methotrexate (51.7%) and prednisone (36.9%) (**Table 3B**)

The median cumulative duration of use of specific oral agents prescribed before a biologic prescription was 123 days for methotrexate (IQR: 56-229), and 28 days for prednisone (IQR: 14-58).

Conclusions

- **Approximately 1 in 10 people starting topical treatment for psoriasis switch from topical to biologics over a 3-year period.**
- **The time to initiating the biologic after topical treatment is longer for patients who initially switched to an oral psoriasis treatment followed by a biologic treatment.**
- **Maintaining patients on an effective topical treatment may help minimize the need for a switch to biologics**

Limitations:

- **The results of this study were derived from a large retrospective EHR database which primarily covers provider administrative data, including written prescriptions. However, no medication dispensing data is included. Therefore, these results mainly describe provider prescribing behavior, rather than actual medication use, which could be used by the patient, and could be slightly different.**
- **It is important to note that yearly psoriasis prevalence among eligible patients in the database varied from 0.4-0.5%, which is a rather small prevalence.**
- **It is possible that some patients with a biologic do not receive a topical treatment first; these patients would been excluded by our methodology.**
- **As the database grows, more patient behavior related results can be presented.**

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