

BACKGROUND

- Onychomycosis is a common nail fungal infection that accounts for approximately 50% of reported nail disorders[1].
- Patients with onychomycosis may experience discomfort and pain caused by a variety of nail abnormalities, such as discoloration, subungual hyperkeratosis, onycholysis, splitting and nail plate destruction[2].
- At the time of this analysis, there are four pharmacological agents approved by Health Canada to treat onychomycosis: ciclopirox and efinaconazole (topical drugs) as well as itraconazole and terbinafine (oral systemic drugs).

OBJECTIVES

This research aims to understand:

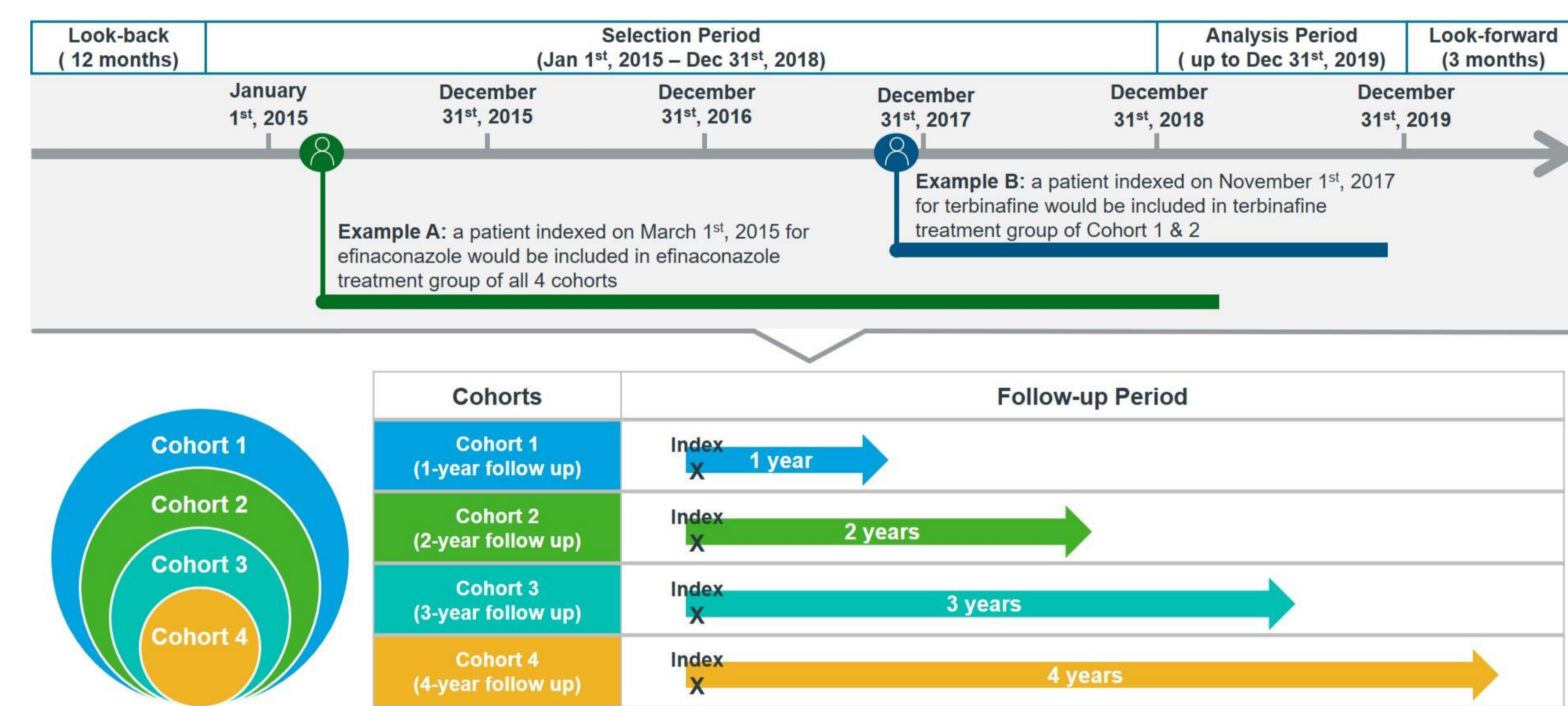
- The demographics among patients who were on onychomycosis treatments in Canada.
- The switch patterns among patients being treated for onychomycosis in Canada.

METHODS

Study Design and Data Sources:

- Patients who initiated any of four drugs (topical ciclopirox, topical efinaconazole, oral itraconazole and oral terbinafine) as their first onychomycosis treatment from January 1st, 2015 to December 31st, 2018 were selected and followed for up to 4 years using the IQVIA's longitudinal Private Drug Plan database (PDP).
- A 12-month look-back period prior to the index date was used to ensure patients have been enrolled in their drug plan for at least one year without prior use of index medication. A 3-month look-forward period following the analysis period was used to ensure the claimant was still active in the plan.
- Patients who were under 25 years old at index date in Ontario were excluded to avoid the impact of OHIP+, an Ontario health insurance plan that aims to help cover medication costs for youth not covered by private plans.
- Patients were assigned into one of four treatment groups based on their index onychomycosis therapy and further assigned into each cohort by number of years of follow-up shown in **Figure 1**.

Figure 1. Schematic of Study Design and Cohort Generation



Study Analysis:

- Demographic characteristics (age, gender, geography, index year and market experience) among selected patients in each treatment group were reported.
- For each cohort, switch from index drug to other onychomycosis treatments, number of patients who switched onychomycosis treatment, and time to switch were analyzed within the follow-up period.

RESULTS

Cohort Generation:

- A total of 266,171 patients with at least 1-year of follow up were included in Cohort 1. Sample sizes for cohorts 2, 3, and 4 are shown in **Table 1**.
- In Cohort 1, there were 161,452 (60.7%) patients who indexed on efinaconazole, 53,926 (20.3%) on terbinafine, 36,999 (13.9%) on ciclopirox, and 13,794 (5.2%) on itraconazole.

Table 1. Selected patients in Each Cohort by Index Drugs

Cohort	Total Patients, N	Index Drugs			
		Efinaconazole	Terbinafine	Ciclopirox	Itraconazole
Cohort 1	266,171	161,452 (60.7%)	53,926 (20.3%)	36,999 (13.9%)	13,794 (5.2%)
Cohort 2	161,031	92,474 (57.4%)	33,835 (21.0%)	25,958 (16.1%)	8,764 (5.4%)
Cohort 3	93,384	50,309 (53.9%)	19,947 (21.4%)	17,801 (19.1%)	5,327 (5.7%)
Cohort 4	41,922	19,815 (47.3%)	9,547 (22.8%)	10,014 (23.9%)	2,546 (6.1%)

Demographics:

The demographic characteristics of total 266,171 patients in Cohort 1 were reported in **Table 2**.

- Efinaconazole and ciclopirox patients had an average age of 55, were generally older than terbinafine and itraconazole patients with an average age of 49 and 44 respectively.
- More than half of efinaconazole and ciclopirox patients were female, while more than half of terbinafine and itraconazole patients were male.
- Over 70% of efinaconazole, itraconazole and ciclopirox patients in the study were from Ontario and Quebec, compared to 62% for terbinafine patients.
- There were more efinaconazole patients indexed in 2018 (31%) than patients indexed in year 2015-2017 individually (20-24%); however for other three drugs, there were more patients indexed in 2015 (30%-44%).
- The majority of patients were naïve to onychomycosis treatment before initiating their index drug.

Switch Patterns:

- Among patients with 4-years of follow-up (n = 41,922), 82.8% of patients did not switch treatment. However, this differed by index product; while only 7.5% of efinaconazole patients switched in the four years post-index, 18.1% of terbinafine patients, 35.5% of ciclopirox patients and 18.2% of itraconazole patients switched to another treatment. Among patients with 4 years of follow-up, the switch occurred on average between 15-22 months after treatment initiation.
- Among patients in each cohort shown in **Figure 2**:
 - A higher proportion of terbinafine-indexed patients had switched to efinaconazole, compared to those who indexed on efinaconazole and switched to terbinafine
 - 5.1% vs. 1.3% in Cohort 1
 - 8.4% vs. 2.7% in Cohort 2
 - 11.3% vs. 3.8% in Cohort 3
 - 13.9% vs. 4.7% in Cohort 4
 - Ciclopirox had the highest percentage of patients who switched to efinaconazole in any switch group.

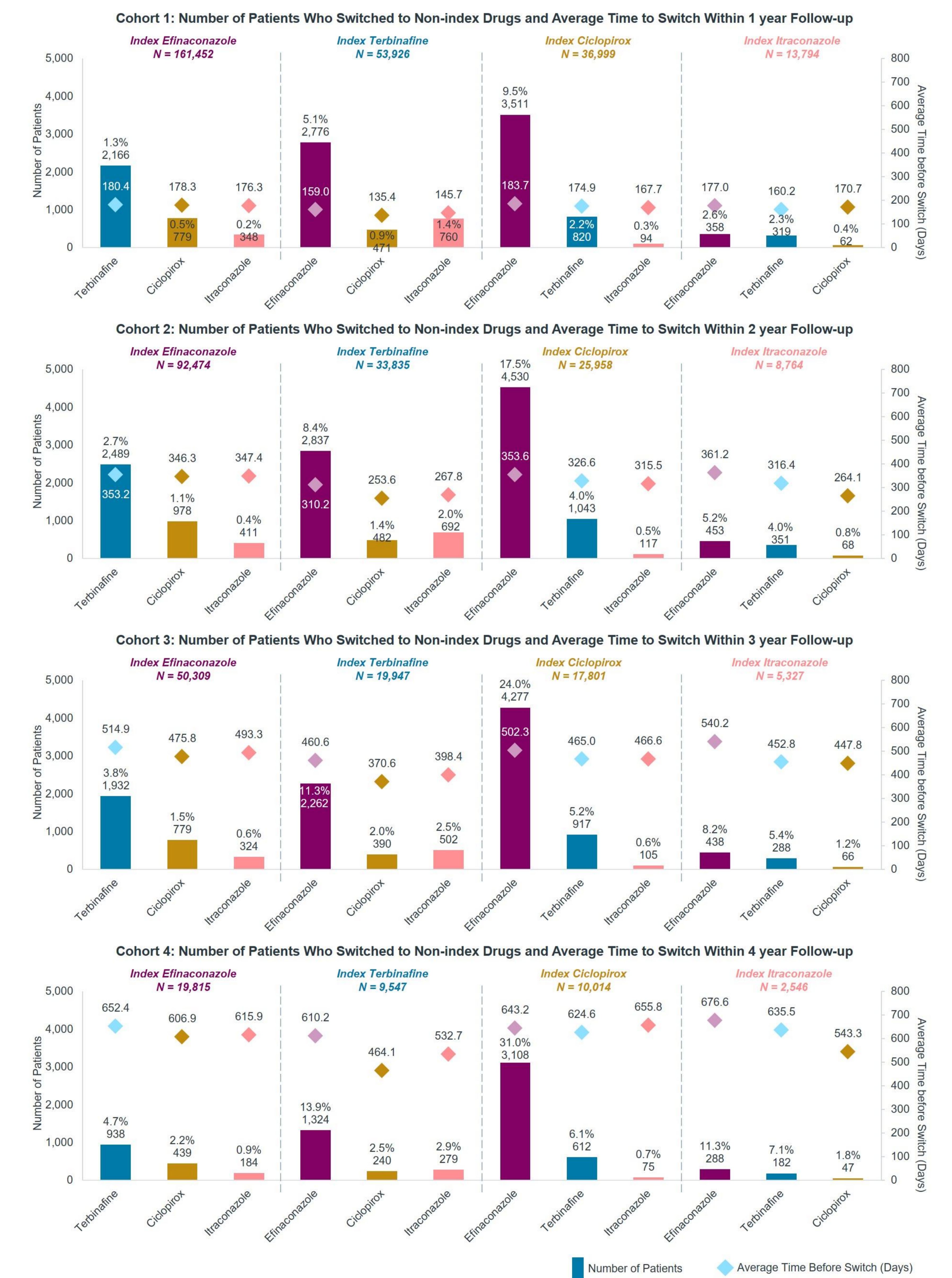
RESULTS (CONTINUED)

Table 2. Demographics by Index Drugs

Demographics	Category	Selected Patients by Index Drug (N = 266,171)			
		Efinaconazole	Terbinafine	Ciclopirox	Itraconazole
Patient number	Total, n	161,452	53,926	36,999	13,794
Age* at Index	Median (Q1, Q3)	56 (47, 63)	51 (40, 59)	56 (47, 63)	45 (35, 55)
	Mean (SD)	55 (13.0)	49 (14.5)	55 (13.9)	44 (13.9)
Age* at Index category	0-17, n (%)	1,297 (0.8%)	1,908 (3.5%)	600 (1.6%)	401 (2.9%)
	18-44, n (%)	30,435 (18.9%)	16,860 (31.3%)	7,119 (19.2%)	6,451 (46.8%)
	45-64, n (%)	94,421 (58.5%)	29,550 (54.8%)	21,003 (56.8%)	6,057 (43.9%)
	65+, n (%)	35,299 (21.9%)	5,606 (10.4%)	8,276 (22.4%)	885 (6.4%)
Gender	Female, n (%)	85,745 (53.1%)	23,054 (42.8%)	21,554 (58.3%)	6,529 (47.3%)
	Male, n (%)	75,346 (46.7%)	30,787 (57.1%)	15,384 (41.6%)	7,241 (52.5%)
	Unknown, n (%)	361 (0.2%)	85 (0.2%)	61 (0.2%)	24 (0.2%)
Province	AB, n (%)	14,159 (8.8%)	6,122 (11.4%)	2,385 (6.4%)	1,326 (9.6%)
	BC, n (%)	13,227 (8.2%)	6,213 (11.5%)	2,735 (7.4%)	1,029 (7.5%)
	MB, n (%)	2,046 (1.3%)	2,191 (4.1%)	571 (1.5%)	355 (2.6%)
	NB, n (%)	4,063 (2.5%)	1,156 (2.1%)	1,021 (2.8%)	246 (1.8%)
	NL, n (%)	1,982 (1.2%)	714 (1.3%)	545 (1.5%)	178 (1.3%)
	NS, n (%)	4,019 (2.5%)	1,227 (2.3%)	910 (2.5%)	336 (2.4%)
	NT, n (%)	20 (0.0%)	17 (0.0%)	17 (0.0%)	4 (0.0%)
	NU, n (%)	6 (0.0%)	13 (0.0%)	6 (0.0%)	2 (0.0%)
	ON, n (%)	84,364 (52.3%)	15,486 (28.7%)	17,109 (46.2%)	4,576 (33.2%)
	PE, n (%)	509 (0.3%)	211 (0.4%)	131 (0.4%)	58 (0.4%)
	QC, n (%)	34,355 (21.3%)	17,990 (33.4%)	10,969 (29.6%)	5,373 (39.0%)
	SK, n (%)	1,519 (0.9%)	2,245 (4.2%)	321 (0.9%)	208 (1.5%)
	YT, n (%)	42 (0.0%)	96 (0.2%)	38 (0.1%)	88 (0.6%)
Index Year	Unknown [†] , n (%)	1,141 (0.7%)	245 (0.5%)	241 (0.7%)	15 (0.1%)
	2015, n (%)	33,433 (20.7%)	16,197 (30.0%)	16,258 (43.9%)	4,457 (32.3%)
	2016, n (%)	38,616 (23.9%)	12,692 (23.5%)	8,510 (23.0%)	3,352 (24.3%)
	2017, n (%)	39,211 (24.3%)	12,005 (22.3%)	5,973 (16.1%)	2,950 (21.4%)
	2018, n (%)	50,192 (31.1%)	13,032 (24.2%)	6,258 (16.9%)	3,035 (22.0%)
Market Experience [†]	Y, n (%)	5,921 (3.7%)	2,907 (5.4%)	3,790 (10.2%)	879 (6.4%)
	N, n (%)	155,531 (96.3%)	51,019 (94.6%)	33,209 (89.8%)	12,915 (93.6%)

Note: * 2 patients with invalid age were not reported in the Age Categories.
[†] Unknown indicates the patients' province information is missing.
[†] Market Experience indicates whether patients had other onychomycosis drugs prior initiating the index drug.

Figure 2. Switch Patterns Among Onychomycosis Patients In Each Cohort



CONCLUSIONS

- The proportion of efinaconazole-indexed patients was highest (60.7%) followed by terbinafine at 20.3% among the four index drugs
- The majority of patients were naïve to onychomycosis treatment before initiating their index drug
- It is not common for patients to switch onychomycosis treatment, and overall, patients generally did not switch in the 4 years after starting on their index therapy
- Among those that switched, there was a higher proportion of ciclopirox-indexed patients who switched to efinaconazole although the time from initiation to switch is comparable across all therapies

LIMITATIONS

- This study observes the switches between indexed drug and other onychomycosis treatments, however the results cannot fully reflect patient's journey and lines of therapy for onychomycosis treatment.
- Given oral terbinafine and itraconazole are also approved for other indications than onychomycosis, this study may include terbinafine or itraconazole patients without onychomycosis.

REFERENCES

[1] Foley, K., Gupta, A. K., Versteeg, S., Mays, R., Villanueva, E., & John, D. (2020). Topical and device-based treatments for fungal infections of the toenails. The Cochrane database of systematic reviews, 1(1), CD012093.
 [2] Goldstein AO, Bhatia N. Onychomycosis: Epidemiology, clinical features, and diagnosis. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on November 18, 2020.)