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High rates of potentially unnecessary topical antifungal prescribing in a large commercial health insurance claims database, United States

Jeremy A. W. Gold, MD, MS^a, Kaitlin Benedict, MPH^a, Avrom S. Caplan, MD^b, Shari R. Lipner, MD, PhD^c, Dallas J. Smith, PharmD, MAS^a

^aMycotic Diseases Branch, Centers for Disease Control and Prevention, Atlanta, Georgia

^bRonald O. Perelman Department of Dermatology, NYU Grossman School of Medicine, New York, New York

^cDepartment of Dermatology, Weill Cornell Medicine, New York, New York.

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To the Editor:

Severe, antifungal-resistant dermatomycoses have emerged globally,¹ necessitating increased scrutiny of topical antifungal use and diagnostic testing.² Data are lacking in general outpatient populations on topical antifungal prescribing. We estimated outpatient topical antifungal prescribing rates and evaluated potentially unnecessary prescribing by specialty.

Using Merative MarketScan Commercial and Medicare data, we identified outpatients prescribed topical antifungals during 2023. By specialty seen, we examined patients whose topical antifungal prescription was potentially unnecessary, defined as those who did not have an associated fungal infection diagnostic code and also did not have associated diagnostic testing (Supplementary Material, available via Mendeley at <https://data.mendeley.com/datasets/9w9pgcpn4x/1>).

Among ~15,700,000 outpatients, 568,715 were prescribed a topical antifungal (rate: 36.2/1000 outpatients) (Table I). Among those, the median age was 47.0 years (interquartile

Correspondence to: Jeremy A. W. Gold, MD, MS, Mycotic Diseases Branch, Centers for Disease Control and Prevention, 1600 Clifton Road NE, Atlanta, GA 30329, jgold@cdc.gov.

Conflicts of interest

Dr Lipner has received research funding from Moberg Pharmaceuticals and Belle Torus Corporation. Drs Gold, Kaplan, Smith and Author Benedict have no conflicts of interest to declare.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (eg, 45 C F R. part 46, 21 C F R. part 56; 42 U S C. §241(d); 5 U S C. §552a; 44 U S C. §3501 et seq). MarketScan data are fully de-identified, so this analysis was not subject to review by the Centers for Disease Control and Prevention institutional review board.

range: 28–61). Most were female (60.8%) and Southern (46.5%) or Midwestern (22.1%) residents. Prescribing rates (per 1000 outpatients) were highest for patients ≥ 65 years (73.4), females (40.4), and Northeasterners (45.0). Ketoconazole had the highest prescribing rate (10.2), then clotrimazole-betamethasone (7.3), nystatin (6.4), and nystatin-triamcinolone (2.7). Overall, 16.0% of patients prescribed a topical antifungal received a diagnostic test; this percentage was $<25.0\%$ across age groups, sexes, regions, and most topical antifungals.

For over half (51.6%) of patients prescribed a topical antifungal, the prescription was categorized as potentially unnecessary (Table II). This percentage was highest for patients prescribed clotrimazole-betamethasone (73.0%) and nystatin-triamcinolone (60.3%); lowest for those prescribed allylamines (35.6%) and onychomycosis treatments (38.1%); highest for those seen by primary care physicians (49.5%), pediatricians (52.5%), and other or unknown specialty types (73.5%); and lowest for those seen by podiatrists (16.4%) and dermatologists (26.0%). For patients seen by dermatologists, $>50\%$ of prescriptions for polyenes, clotrimazole-betamethasone, and nystatin-triamcinolone were potentially unnecessary.

We estimated that topical antifungal prescriptions might have been unnecessary for over half of the $>560,000$ patients prescribed these medications in 2023. The highest rates of potentially unnecessary prescribing were for antifungal-corticosteroids (clotrimazole-betamethasone and nystatin-triamcinolone), which were among the most frequently prescribed topical antifungals in general, including for dermatologist-associated prescriptions. Antifungal-corticosteroid combination prescribing likely indicates physicians' attempts to cover both fungal and nonfungal skin rashes when the diagnosis is not confirmed.^{3,4} However, clotrimazole-betamethasone and nystatin-triamcinolone can cause systemic side effects and skin damage due to their potent steroid components; further, they may be associated with greater cost and lower cure rates compared with antifungal monotherapy.⁴ Clinicians can consider selecting antifungal monotherapy for fungal infections or dermatology referral in instances of diagnostic uncertainty.³ Diagnostic testing, which can help ensure proper diagnosis and treatment, was infrequent, potentially reflecting barriers to in-office microscopy (eg, lack of time or clinical experience, Clinical Laboratory Improvement Amendments-related restrictions), or low reimbursement.³

Study limitations include lack of information on over-the-counter topical antifungals, patient adherence, treatment outcomes, testing results, and non-commercially-insured populations, as well as potential undercoding and disease misclassification.

Our study found that a substantial proportion of topical antifungal prescriptions were not associated with a fungal diagnosis or diagnostic testing, highlighting potential opportunities to improve clinical practice in an era of emerging antifungal-resistant fungal skin infections.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table I.

Outpatients prescribed a topical antifungal, United States, 2023

	No. of patients prescribed topical antifungal	Column %	Denominator	Rate per 1000 outpatients	Received diagnostic test (%)
Total	568,715	100.0	15,710,050	36.2	16.0
Age group (y)					
<18	85,004	14.9	3,328,745	25.5	4.2
18-44	180,961	31.8	5,958,077	30.4	20.9
45-64	205,730	36.2	5,100,726	40.3	16.9
≥65	97,020	17.1	1,322,502	73.4	15.2
Sex					
Male	222,713	39.2	7,145,231	31.2	10.9
Female	346,002	60.8	8,564,819	40.4	19.2
US Census Region (n = 566,375)					
Midwest	125,126	22.1	3,630,739	34.5	14.8
Northeast	106,894	18.9	2,374,124	45.0	18.0
South	263,486	46.5	6,903,347	38.2	16.1
West	70,869	12.5	2,737,621	25.9	14.8
Rural status (n = 433,184)					
Rural	57,900	13.4	1,708,296	33.9	13.8
Non-rural	375,284	86.6	10,519,506	35.7	16.7
Any topical antifungal *	568,715	100.0	15,710,050	36.2	16.0
Azoles (excluding efinaconazole)	244,225	42.9	15,710,050	15.5	18.6
Ketoconazole	160,636	28.2	15,710,050	10.2	14.6
Terconazole	31,882	5.6	15,710,050	2.0	45.6
Clotrimazole	31,690	5.6	15,710,050	2.0	11.1
Econazole	18,087	3.2	15,710,050	1.2	18.8
Other azoles †	2,227	0.4	15,710,050	0.1	23.8
Allylamines ‡	2,769	0.5	15,710,050	0.2	16.1
Polynes (nystatin)	101,101	17.8	15,710,050	6.4	9.1
Other types	25,801	4.5	15,710,050	1.6	16.4
Ciclopirox (nonlacquer)	25,791	4.5	15,710,050	1.6	16.4

	No. of patients prescribed topical antifungal	Column %	Denominator	Rate per 1000 outpatients	Received diagnostic test (%)
Tolnaftate	10	0.0	15,710,050	0.0	0.0
Antifungal corticosteroids	156,912	27.6	15,710,050	10.0	17.2
Clotrimazole-betamethasone	114,460	20.1	15,710,050	7.3	14.7
Nystatin-triamcinolone	42,527	7.5	15,710,050	2.7	23.9
Onychomycosis treatments	43,586	7.7	15,710,050	2.8	14.2
Ciclopirox (lacquer)	36,310	6.4	15,710,050	2.3	13.7
Efinaconazole	6,325	1.1	15,710,050	0.4	16.9
Tavaborole	982	0.2	15,710,050	0.1	19.0

* Overall, 238,564 (42.0%) patients with a topical antifungal prescription had a diagnosis code for a fungal infection ($n = 207,401$, 36.5%) or seborrheic dermatitis ($n = 36,913$, 6.5%); of those with a fungal diagnostic code, dermatophytosis (61.8%) and candidiasis (30.0%) were the most frequent. Among the remaining 330,151 patients with a topical antifungal prescription who did not have a diagnostic code for a fungal infection or seborrheic dermatitis, the most common skin-related diagnostic codes were dermatitis and eczema ($n = 64,240$, 19.5%), acute vaginitis/vulvitis or other specified noninflammatory disorders of vagina ($n = 31,871$, 9.7%), and rash and other nonspecific skin eruption ($n = 25,520$, 7.7%). Overall, 1.1% of patients had >1 topical antifungal prescription on the same day.

[†] Sulconazole ($n = 856$), miconazole ($n = 787$), oxiconazole ($n = 493$), luliconazole ($n = 75$), and sertaconazole ($n = 16$).

[‡] Natifine ($n = 2293$), terbinafine ($n = 439$), butenafine ($n = 37$).

Table II.
Potentially unnecessary prescribing of topical antifungals, by physician or provider type*

Physician or provider type	All topical anti-fungals	Azoles	Allyl-amines	Polyenes (nystatin)	C-BM	Nystatin/triamcinolone	Onycho-mycosis treatment	Other
Any	293,642 (51.6)	99,280 (40.7)	985 (35.6)	60,451 (59.8)	83,507 (73.0)	25,642 (60.3)	16,584 (38.1)	9484 (36.8)
PCP	76,684 (49.5)	24,203 (39.9)	190 (32.3)	11,590 (51.1)	29,038 (66.8)	6019 (58.2)	4185 (32.1)	1962 (35.9)
Dermatologist	21,187 (26.0)	13,010 (22.7)	79 (15.1)	2180 (51.7)	2270 (52.6)	1320 (53.0)	842 (13.4)	1614 (21.2)
NP/PA	34,418 (40.2)	11,412 (28.6)	94 (29.2)	7709 (47.7)	10,463 (67.4)	3049 (47.0)	1210 (24.2)	742 (24.7)
Pediatrician	22,963 (52.2)	3981 (34.4)	14 (25.5)	16,069 (57.5)	1742 (85.9)	876 (65.1)	155 (27.9)	193 (29.3)
OB/GYN	23,169 (49.9)	5315 (31.7)	21 (41.2)	1847 (40.6)	11,938 (83.1)	4263 (40.6)	223 (29.6)	131 (29.1)
Podiatrist	5208 (16.4)	1914 (14.8)	58 (10.5)	387 (27.7)	1253 (26.4)	201 (33.1)	915 (11.6)	550 (12.4)
Emergency/urgent care	11,028 (43.6)	3734 (32.9)	23 (29.9)	2546 (47.7)	3447 (64.2)	933 (51.5)	252 (30.0)	179 (25.3)
Other/unknown	122,389 (73.5)	43,589 (66.5)	574 (62.7)	22,674 (77.9)	30,826 (84.6)	11,133 (78.4)	9633 (66.9)	4840 (67.2)

C-BM, Clotrimazole-betamethasone; NP, nurse practitioner; OB/GYN, obstetrician/gynecologist; PA, physician assistant; PCP, primary care provider.

*Data are shown as no. of patients prescribed a topical antifungal (% of patients whose prescription was categorized as potentially unnecessary). Provider types were those visited within 7 d before to 7 d after the prescription fill date. Patients could have visited more than 1 provider type.