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Comparative analysis of prescribing patterns of tetracycline class antibiotics and spironolactone between advanced practice providers and physicians in the treatment of acne vulgaris

To the Editor: Although topical treatments are often effective for mild acne, oral antibiotics may be indicated in moderate and severe cases.[1] Consensus guidelines recommend limiting the duration of antibiotic therapy to 3 to 4 months and prescribing them in combination with a topical retinoid or benzoyl peroxide (BPO) to reduce the development of antibiotic resistance.[1] Although prior studies have demonstrated that dermatologist and nondermatologist physicians sometimes fail to observe these guidelines,[2] little is known regarding the prescribing practices of advanced practice providers (APPs).

Using the 2007 to 2016 National Ambulatory Medical Care Survey (NAMCS), we evaluated the use of oral tetracyclines and spironolactone in the treatment of acne among dermatologists,

Table I. Oral tetracycline antibiotics (*TCAs*) and combination therapy use by provider type

Variable*	All providers	Dermatologists	APPs	*P* value†	Nondermatologist physicians	*P* value†
Overall number of visits	2686 (100)	1787 (66.5)	188 (7.0)		711 (26.5)	
Visits in which TCAs were prescribed	706 (26.3)	507 (28.4)	42 (22.3)	.079	157 (22.1)	.001
With a topical retinoid	362 (51.3)	293 (57.8)	18 (42.9)	.061	51 (32.5)	<.001
With BPO	211 (29.9)	163 (32.2)	8 (19.1)	.078	40 (25.5)	.113
With BPO or a topical retinoid	431 (61.0)	338 (67.6)	21 (50.0)	.029	72 (45.9)	<.001

APP, Advanced practice provider; *BPO*, benzoyl peroxide.
*Data are presented as number (%).
†Percentages of prescriptions made by APPs and nondermatologist physicians were compared with dermatologists using χ^2 tests.

Table II. Oral tetracycline antibiotics (*TCAs*) and spironolactone use by provider type

Variable*	All providers	Dermatologists	APPs	*P* value†	Nondermatologist physicians	*P* value†
Overall number of female visits	1700 (100)	1143 (67.2)	130 (7.6)		427 (25.1)	
Female visits in which						
Spironolactone was prescribed	113 (6.6)	91 (8.0)	11 (8.5)	.842	11 (2.6)	<.001
TCAs was prescribed	416 (24.5)	303 (26.5)	30 (23.1)	.399	83 (19.4)	.004

APPs, Advanced practice providers.
*Data are presented as number (%).
†Percentages of prescriptions made by APPs and nondermatologist physicians were compared with dermatologists using χ^2 tests.

nondermatologist physicians, and APPs. The NAMCS provides annual data from nonfederally employed office-based providers regarding a sample of outpatient visits that can be extrapolated to generate nationally representative estimates. All visits involving an *International Classification of Disease, 9th or 10th Revision*, code related to acne (706.1, L70.0, L70.8, or L70.9) were included. Provider type, specialty, and prescriptions for tetracyclines, spironolactone, BPO, and topical retinoids were summarized. The primary outcome was the frequency of oral tetracyclines prescribed with a topical retinoid or BPO, or both, by dermatologists, nondermatologist physicians, and APPs. Because spironolactone is a potential substitute for tetracyclines among women with moderate to severe acne,[3] a subgroup analysis was performed to compare prescriptions for these medications in this population.

Descriptive statistics are reported as percentages, and $\chi 2$ tests were used for categorical comparisons. The data analysis was performed using Stata 16 software (StataCorp, College Station, TX).

Tetracyclines were prescribed in 706 encounters (26.3%). Concomitant BPO or a topical retinoid, or both, use were more frequently among dermatologists (67.6%) compared with APPs (50.0%, $P = .029$) and nondermatologist physicians (45.9%, $P < .001$) (Table I). Among acne encounters with women, spironolactone was prescribed more frequently by dermatologists (8.0%) and APPs (8.5%) than nondermatologist physicians (2.6%, $P < .001$) (Table II). Tetracyclines were prescribed at a 3.3-, 2.7-, and 7.5-fold higher rate than spironolactone by dermatologists, APPs, and nondermatologist physicians, respectively.

Similar to prior studies,[2,4] our findings suggest that tetracycline monotherapy is common among all providers, occurring in more than one-third of acne encounters associated with a tetracyclines prescription. This prescribing pattern was more common among APPs and nondermatologist physicians, suggesting an opportunity for the dissemination of evidence-based guidelines to optimize tetracycline use. Dedicated teaching has reduced inappropriate antibiotic prescriptions among APPs in other settings,[5] suggesting a role for collaborative educational interventions.

Despite increasing evidence supporting spironolactone as a safe and effective alternative to oral antibiotics,[3] it is still likely underused.[4] In our study, tetracyclines were substantially more often prescribed in visits with female patients (24.5% vs 6.6%). Whereas APPs prescribed spironolactone at a similar frequency to dermatologists, there is a 7.5-fold ratio of tetracycline to spironolactone use among nondermatologists. Targeted education on the role of hormonal medications for acne may improve antibiotic stewardship among all providers.

This study has limitations inherent to its retrospective design. While it is possible that tetracyclines

may have been prescribed for other indications, by focusing on encounters for acne, the potential for misclassification is reduced. In addition, although some topical retinoid or BPO use may not have been recorded, it is unlikely that this would differ between clinician types. BPO use may also have been underreported in the NAMCS if purchased over the counter. Future studies are needed to identify which interventions are most effective in improving antibiotic stewardship and aligning patient management for acne with consensus guidelines.

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Raster-scanning optoacoustic mesoscopy imaging as an objective disease severity tool in atopic dermatitis patients

To the Editor: Accurate assessment of disease severity in atopic dermatitis (AD) is important in monitoring response to treatment and guiding subsequent management. Current disease severity markers have limitations. Eczema Area Severity Index and Scoring AD (SCORAD) are observer dependent,[1] whereas skin biopsies are invasive. Recent studies have described the role of imaging in assessing AD severity, including optical coherence tomography (OCT).[2] This study evaluates the feasibility of raster-scanning optoacoustic mesoscopy (RSOM) imaging as an objective disease severity tool for atopic dermatitis. RSOM imaging involves the detection of ultrasound waves generated in response to pulsed light illumination. Light absorbed by melanin results in thermoelastic expansion, producing ultrasound waves that are then detected by transducers and reconstructed to form a 3-dimensional image.[3]

This prospective study included 69 patients with AD and 22 healthy volunteers. All patients with AD were assessed by a dermatologist, and all participants had RSOM imaging using RSOM Explorer C50 system (iThera Medical, Munich, Germany). From the RSOM images generated, epidermis thickness, total blood volume, vessel diameter in the dermis, and the ratio of low- and high-frequency signals (LHFR) in the dermis were computed (Supplemental Fig 1, available at https://data.mendeley.com/datasets/2k96hrcgnm/1). We trained a linear kernel-based support vector machine model for eczema classification using epidermis thickness, total blood volume, and LHFR. A novel Eczema Vascular and Structural Index (EVSI) was formulated to assess eczema severity (Supplemental Methods, available at https://data.mendeley.com/datasets/2k96hrcgnm/1).

This study cohort consisted of 24 female subjects (26.4%), and a majority (95.2%) were of Fitzpatrick skin types III-IV (Supplemental Table I, available at https://data.mendeley.com/datasets/2k96hrcgnm/1). Sixty-nine patients with AD had SCORAD measured: