

Antibiotic use and guideline concordance in primary care acne management: A cross-sectional study

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Dear Editor,

Acne vulgaris, a prevalent dermatological condition, is common in primary care. Despite widespread use in acne treatment, antibiotics pose a significant concern due to their potential contribution to antimicrobial resistance (AMR)—an important public health issue.¹ Acne accounted for the highest volume of antibiotic prescriptions in Singapore primary care.² Antibiotic treatment frequently diverges from recommended guidelines, such as over-reliance on oral and topical antibiotic monotherapy, disregarding heightened AMR risks associated with this practice.³ Alarming, 44.5% of patients with newly diagnosed acne received long-term antibiotics.⁴ General practitioners frequently encounter challenges in management, such as uncertainty in using acne-related medications (ARM) and increased patient pressure to prescribe oral antibiotics.⁵

With current guidelines recommending treatment based on acne severity, it is vital to assess whether antibiotic prescribing and referral patterns in primary care align to these recommendations. Previous studies found that 70% of patients received ARM, but did not investigate whether treatment choices were guideline-concordant and tailored to severity.⁶ Referral patterns may often be influenced by physician habits or patient requests, inaccurately reflecting the need for referrals and increasing burden on specialty resources. This study aims to assess the quality of acne management in primary care, examining factors influencing antibiotic prescribing, adherence to severity-based guidelines and dermatology referral patterns.

A multicentre, cross-sectional study was conducted using medical records of patients aged >12 years, who were diagnosed with acne (International Classification Diseases-10 Diagnosis Code L70.0) at 7 public primary care clinics in Singapore from 2022 to 2023. Trained primary care physicians reviewed

case notes to assess acne severity, classified as mild (predominantly comedonal or limited papules or pustules), moderate (extensive papules or pustules or mild scarring) or severe (multiple nodules or cysts, widespread involvement or extensive scarring) based on the criteria set by the National Institute for Health and Excellence (NICE)⁷ and Dermatological Society of Singapore (DSS).⁸ To reduce assessment bias, acne severity was classified first, using only case note documentation, by reviewers who were blinded to treatment prescribed, referral status and physician experience levels. Treatments were categorised based on the combinations of topical antibiotics (clindamycin gel), oral antibiotics (doxycycline and erythromycin) and topical ARM (benzoyl peroxide, adapalene, tretinoin, and combination sulphur, salicylic acid and resorcinol cream or lotion). Guideline adherence was evaluated using the NICE⁷ and DSS⁸ criteria: (1) mild: ARM +/- topical antibiotic; (2) moderate: ARM + topical or oral antibiotic; (3) severe: ARM + topical antibiotic + dermatology referral or ARM + oral antibiotic.

Any combinations not listed above were considered non-concordant. Anonymised physician experience levels and dermatology referrals were matched to cases.

The study drew from a pool of 2000 patients with acne and used random stratified sampling across 7 clinics, targeting 55 patients per clinic. A minimum sample size of 323 patients was required (5% margin of error, 95% confidence interval [CI]). Data were analysed using SPSS Statistics software version 25.0 (IBM Corp, Armonk, NY, US). Chi-square tests were performed to determine associations between acne severity and treatment, while multivariable logistic regression was used to identify factors influencing appropriate antibiotic use and dermatology referrals.

The study included 385 patients with a median age of 23 years (interquartile range [IQR] 18–29), near-equal sex distribution (52.7% male) and predomi-

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nantly Chinese ethnicity (74.8%) (Table S1). Management was provided by 183 primary care physicians with a median of 9 years of experience (IQR 7–15), 64.2% of whom were accredited family physicians. Insufficient documentation hindered acne severity determination in 27.5% of patients. Complementary ARM was not prescribed with antibiotics in 34.0% (n=131) of cases, and dual antibiotic therapy was given in 4.2% (n=16) of cases. Of the 142 acne cases referred to dermatology (36.9%), 52.8% were requested by patients despite a lack of clinical indication.

Among patients with documented acne severity, antibiotic choice was significantly associated with severity ($P<0.001$). Severe cases were more likely to receive oral antibiotics (odds ratio [OR] 12.0, 95% CI 3.84–37.6), while mild cases were more likely to receive topical antibiotics (OR 2.78, 95% CI 1.71–4.54).

Only 64.7% of patients received guideline-concordant care. On multivariate analysis, inappropriate treatment was more likely with increasing patient age (OR 1.049, 95% CI 1.021–1.079), while acne severity ($P=0.185$) and physician experience ($P=0.673$) had no significant impact (Table 1).

Acne severity was the strongest predictor of dermatology referrals, with moderate (OR 2.33, 95% CI 1.12–4.86) and severe (OR 27.7, 95% CI 7.68–99.7) cases more likely to be referred than mild cases after adjustment for confounders. In contrast, patient requests for dermatology referrals did not significantly affect referral likelihood (OR 1.62, 95% CI 0.75–3.48, $P=0.218$).

Our study highlights key findings regarding acne management in primary care. First, 27.5% of patient records lacked documentation of acne severity, hindering treatment evaluation and guideline adherence. More than one-third of patients did not receive guideline-concordant care, primarily due to the omission of adjunctive ARM with antibiotic therapy.⁶ Previous research showed knowledge gaps and uncertainties with topical treatment and guideline recommendations.⁹ This raises concerns about potentially reduced treatment efficacy and increased risk of AMR.¹⁰ Physicians generally adhered to evidence-based guidelines by reserving oral antibiotics for severe acne cases and opting for topical antibiotics for mild cases. However, increasing age was associated with inappropriate treatment; this may reflect challenges such as managing comorbidities, polypharmacy, diagnostic complexity in older adults—worsening time constraints during consultations. Dermatology referrals were significantly associated with clinical severity, suggesting that primary care physicians generally refer based on clinical judgement. While the high referral rate (36.9%) compared to severe cases (4.7%) suggested over-referral, with 52.8% due to patient requests without clinical indication, physicians effectively declined 72.0% (n=54) these requests, demonstrating sound gatekeeping and highlighting the importance of enhanced shared decision-making in acne management. Further research is needed to better understand referral appropriateness and patient expectations regarding dermatological consultations for acne. Our

Table 1. Multivariate logistic regression of factors affecting appropriateness for antibiotic treatment of acne.

Study variables	β	P value	OR	OR (95% CI)	
				Lower	Upper
Age	0.048	<0.001	1.049	1.021	1.079
Sex (male)	0.410	0.140	1.51	0.87	2.60
Race (reference = Chinese)		0.349			
Malay	0.681	0.132	1.98	0.81	4.79
Indian	-0.363	0.437	0.70	0.28	1.74
Others	-0.157	0.770	0.86	0.30	2.45
Acne severity (reference = mild)		0.185			
Moderate	-0.484	0.113	0.62	0.34	1.12
Severe	0.327	0.530	1.39	0.50	3.85
No. of years of physician experience	0.008	0.673	1.008	0.971	1.047
Accredited primary care physician	-0.023	0.934	0.98	0.56	1.70

CI: confidence interval; OR: odds ratio

study had several limitations, including a notable proportion of cases with insufficient documentation, which may have impacted the precision of the estimates and potentially reduced the study's power. Additionally, inherent biases associated with the study design and sampling methodology may have influenced our findings.

Our study demonstrated suboptimal adherence to acne management guidelines, with significant gaps in documentation and adjunctive therapy. Targeted interventions to improve guideline adherence and documentation may enhance patient outcomes and reduce antimicrobial resistance.

Supplementary materials

Table S1. Descriptive statistics of 385 patients and 183 physicians involved in acne management.

Table S2. Multivariate logistic regression of factors affecting dermatology referrals for acne.

Ethics statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and reviewed and approved by the Domain Specific Review Board (DSRB) of the National Healthcare Group on 28 June 2023, approval number 2023/00255. The study was conducted with the approval of relevant authorities and in compliance with all applicable institutional policies, regulations and guidelines. A waiver of consent was granted for this study, as it was deemed to be of minimal risk to the participants involved by DSRB.

Declaration

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