

Differences in management of high-risk skin cancers among providers practicing in rural, micropolitan, and metropolitan areas based on 2023 fee-for-service Medicare provider data

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Short Report

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Abstract

Geographic disparities in dermatologic care may contribute to differences in skin cancer outcomes across the United States. Mohs micrographic surgery (MMS) improves outcomes for high-risk non-melanoma skin cancers, but MMS providers are unevenly distributed, with relatively few practicing in rural areas.

In this study, we examine national, regional, and provider-level trends in treatment of skin cancers at high-risk anatomical sites (head and neck, anogenital area, hands, feet) using 2023 fee-for-service (FFS) Medicare data, and assess how treatment modality and provider distribution vary by rurality and region. Rurality was classified by Rural Urban Commuting Area (RUCA) code as metropolitan, micropolitan, or rural, based on provider billing address; regions were defined by US Census categories. Chi-squared tests assessed associations between rurality and procedure and provider counts, and two-sample t-tests compared the proportion of MMS use across metropolitan, micropolitan, and rural areas.

Of high-risk skin cancers treated in 2023, 76.51% underwent MMS, 15.92% destruction, and 7.59% excision. MMS use varied significantly by rurality (metropolitan 77.70%, micropolitan 60.65%, rural 62.35%; $p < 0.001$), with significantly higher MMS proportions in metropolitan versus micropolitan or rural areas nationally and in nearly all regions. Among 2,894 MMS providers nationwide, most practiced in the South (43.39%), followed by the West (24.95%), Midwest (16.01%), and Northeast (15.58%). MMS providers were disproportionately concentrated in metropolitan areas (45.88%) compared to micropolitan (27.09%) and rural (26.97%) areas, a pattern consistent across all regions. The ratio of MMS providers to all skin cancer–treating providers was also higher in metropolitan areas (51.15%) than micropolitan (35.57%) or rural (33.67%) areas.

Provider-level Medicare data reveal significantly lower use of MMS for high-risk skin cancers in micropolitan and rural areas compared to metropolitan areas, likely reflecting the geographic concentration of MMS providers. Given the higher recurrence risk associated with excision and destruction at high-risk sites, improving access to MMS in underserved rural regions may help reduce disparities in skin cancer outcomes.

Introduction

Geographic disparities in dermatologic care are an increasingly recognized driver of differences in skin cancer outcomes in the United States [1]. While Mohs micrographic surgery (MMS) improves outcomes for high-risk non-melanoma skin cancers [2], relatively few MMS providers practice in rural areas [3]. For example, melanoma patients in rural areas were less likely to receive recommended surgical treatment and experienced worse melanoma-specific survival [4]. These studies suggest that geography influences access to specialized dermatologic surgery, adherence to guideline-concordant cancer care, and patient outcomes. However, there is limited data on how surgical modality choice differs by rurality for skin cancers at high-risk anatomical sites and characterization of these trends at a nationwide and provider level. Addressing this gap is critical to understanding and mitigating geographic inequities in skin cancer

management. Uneven distribution of MMS providers may lead to notable differences in skin cancer management at high-risk anatomical sites in urban versus rural areas. Our study analyzed national, regional, and provider-level trends in treatment of these skin cancers using the 2023 fee-for-service (FFS) Medicare provider and service data [5].

Methods

We used the Part B Physician and other Practitioner Payment data, which contain payment data on fee-for-service (FFS) Medicare beneficiaries, to search for the following CPT codes: 17311 for MMS; 11620-11626, 11640-11646 for excisions; and 17270-17276, 17280-17286 for destructions of malignant skin neoplasms on head and neck, anogenital area, hands, and feet. Rurality based on provider billing address was defined by Rural Urban Commuting Area (RUCA) Code, with 1.0-3.0 representing metropolitan, 4.0-6.0 representing micropolitan, and 7.0-10.0 representing rural areas. Four providers without RUCA codes were excluded. Regional data was categorized based on the US Census [6]. Chi-squared tests measured significance between RUCA code stratified procedure and provider counts. Two-sample t-tests on the proportion of MMS by providers between metropolitan versus micropolitan and metropolitan versus rural measured directional significance.

Results

For skin cancers at high-risk anatomical sites in 2023, 76.51% were treated with MMS, 15.92% were treated with destruction, and 7.59% were excised. The percentage of tumors treated with MMS stratified by metropolitan, micropolitan, and rural locations were 77.70%, 60.65%, and 62.35%, respectively ($p < 0.001$) and t-tests confirmed a higher proportion of Mohs procedures in metropolitan versus micropolitan or rural areas (Table 1). All geographic regions had statistically significant higher proportions of tumors treated with MMS in metropolitan versus micropolitan or rural areas, except the metropolitan versus rural comparison in the West (Table 1).

Discussion

Of 2894 MMS providers nationwide, 43.39% practiced in the South, 24.95% in the West, 16.01% in the Midwest, and 15.58% in the Northeast. The proportion of MMS providers was consistently higher in metropolitan areas (45.88%) compared to micropolitan and rural areas (27.09% and 26.97%) nationwide, and in each region (Table 2). The ratio of MMS providers to all providers managing skin cancers was higher in metropolitan areas (51.15%) than micropolitan (35.57%) and rural areas (33.67%).

Study limitations include use of Medicare data that may not reflect the general patient population, assumption of accurate CPT coding, and acknowledgement that billing data is not a substitute for tumor incidence or appropriateness of treatment provided. Additionally, we acknowledge that we cannot attribute causality to lack of access. Further research is needed to explore reasons for the observed differences.

Overall, provider-level data showed a significantly higher proportion of skin cancers at high-risk anatomical sites treated with MMS in metropolitan areas and across U.S. regions, which may be due to higher concentrations of MMS providers in metropolitan areas. Skin cancers at high-risk anatomical sites treated with excision and destruction may have higher local recurrence rates. Improving access to MMS in rural areas may lead to better outcomes in high-risk skin cancers for patients in these areas.

Declarations

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Data availability: All relevant data can be accessed online via the following URLs:
<https://data.cms.gov/provider-summary-by-type-of-service/medicare-physician-other-practitioners/medicare-physician-other-practitioners-by-provider-and-service/data>

Author contributions: All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Eudora Lee. The first draft of the manuscript was written by Eudora Lee and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1. Proportion of Mohs, destructions, and excisions performed for skin cancer removal in high-risk anatomic sites stratified by urbanicity, and comparison across census regions.

	Metropolitan	Micropolitan	Rural	χ^2 p-value
Procedure Type				
MMS	821561 (77.71%)	41236 (60.65%)	9768 (62.35%)	<0.001
Destruction	160089 (15.14%)	17523 (25.77%)	4142 (26.44%)	
Excision	75601 (7.15%)	9227 (13.57%)	1756 (11.21%)	
t-test p-value ^a		<0.001	<0.001	
Total Procedures	1057251 (92.67%)	67986 (5.96%)	15666 (1.37%)	
Northeast				
MMS	136714 (84.80%)	2191 (54.18%)	736 (27.16%)	<0.001
Destruction	18129 (11.25%)	1253 (30.98%)	1592 (58.75%)	
Excision	6367 (3.95%)	600 (14.84%)	382 (14.10%)	
t-test p-value ^a		<0.001	0.028	
Midwest				
MMS	127096 (77.42%)	12432 (71.46%)	1466 (65.10%)	<0.001
Destruction	26962 (16.42%)	3350 (19.26%)	581 (25.80%)	
Excision	10099 (6.15%)	1616 (9.29%)	205 (9.10%)	
t-test p-value ^a		0.011	0.016	
South				
MMS	366539 (75.89%)	19219 (55.73%)	5861 (68.95%)	<0.001
Destruction	73288 (15.17%)	10631 (30.83%)	1711 (20.13%)	
Excision	43134 (8.93%)	4634 (13.44%)	928 (10.92%)	
t-test p-value ^a		<0.001	0.009	
West				
MMS	191212 (76.82%)	7394 (61.31%)	1705 (77.36%)	<0.001
Destruction	41710 (16.76%)	2289 (18.98%)	258 (11.71%)	
Excision	16001 (6.43%)	2377 (19.71%)	241 (10.93%)	
t-test p-value ^a		<0.001	0.813	

^at-tests show significance of proportion of MMS for Micropolitan or Rural as compared to Metropolitan regions

Abbreviations: MMS, Mohs micrographic surgery.

Table 2. Providers stratified by urbanicity compared to overall number of providers of all types. Additional comparison of number of providers that perform MMS procedures to those that do not, as well as stratified by census region.

	Metropolitan	Micropolitan	Rural	p-value
Provider Type				
All	1015179	83996	42510	N/A
Providers treating skin cancers ^a	5283 (0.52%)	447 (0.53%)	98 (0.23%)	
Provider Type				
MMS ^b	2702 (51.15%)	159 (35.57%)	33 (33.67%)	<0.001
Non-MMS ^b	2581 (48.85%)	288 (64.43%)	65 (66.33%)	
Northeast				
MMS	447 (51.68%)	6 (20.69%)	3 (21.43%)	<0.001
Non-MMS	418 (48.32%)	23 (79.31%)	11 (78.57%)	
Midwest				
MMS	438 (54.61%)	50 (43.10%)	6 (31.58%)	<0.05
Non-MMS	364 (45.39%)	66 (56.90%)	13 (68.42%)	
South				
MMS	1020 (44.82%)	62 (30.10%)	12 (25.53%)	<0.001
Non-MMS	1256 (55.18%)	144 (69.90%)	35 (74.47%)	
West				
MMS	797 (59.48%)	41 (42.71%)	12 (66.67%)	<0.01
Non-MMS	543 (40.52%)	55 (57.29%)	6 (33.33%)	

^aRefers to all providers that have billed for MMS, excisions, or destructions in 2023.

^bMMS providers are defined as any provider that billed for MMS in 2023, and non-MMS providers are defined as providers that billed for excisions and destructions in 2023.

Abbreviations: MMS, Mohs micrographic surgery.