# Senior Podiatrists in Solo Practice are High Performers of Nail Excisions

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**Background:** Nail excisions are indicated for onychocryptosis and nail spicules. They are technically demanding and require a refined skill set. We aimed to characterize practice patterns of US providers performing nail excisions.

**Methods:** We conducted a retrospective analysis of Medicare provider use and payment data, part D, for all claims of partial or complete nail/nail matrix excision with/without nail plate removal/destruction (current procedural terminology code 11750). High performers were defined as providers performing annual nail excisions 2 standard deviations above the mean. We analyzed demographic risk factors for nail excision high performers, including practice location, years of experience, household median income, practice type, and provider gender. Statistical analysis was conducted in SAS v9.4, with values of $P < .05$ considered statistically significant.

**Results:** Providers (n = 32,279) and high performers (n = 942) performed mean 34.7 and 173 nail excisions annually. Unsurprisingly, podiatrists constituted 99.7% of all nail excision performers. Providers in the South versus Midwest and Northeast were more often nail excision high performers (odds ratio [OR], 1.95; $P < .0001$, and OR, 1.46; $P < .0001$). Solo versus group practitioners were more likely, respectively, to be nail excision high performers (OR, 2.15; $P < .0001$). With linear regression analysis, for every 10-year increase in years of provider experience, there was an increase of 1.2 nail excisions annually per provider ($P < .0001$). For every $100,000 increase in household median income of practice location, there was a decrease of 9.9 nail excisions annually per provider.

**Conclusions:** Southern podiatrists, podiatrists with more years of experience, solo practitioners, and those practicing in regions with lower household median incomes were more likely to perform higher numbers of nail excisions. Identifying performance trends among podiatrists can help podiatrists understand how their performance of nail excisions compares to other podiatrists across the country. (J Am Podiatr Med Assoc 114(3), 2024; doi:10.7547/22-063)

Partial or total nail plate excisions are indicated for management of onychocryptosis, or ingrown toenails, and nail spicules.[1,2] Onychocryptosis can have significant physical and psychosocial impact. For example, in a study of 39 patients with onychocryptosis using a baseline European quality-of-life questionnaire, 95% of patients reported pain and discomfort, 56% reported mobility problems, 46% had issues with daily activities, and 38% reported anxiety and depression.[3] Nail procedures are technically demanding, time-intensive, and require a refined skill set to perform adequately and prevent adverse cosmetic and functional outcomes.[4] A systematic review of 11 studies in the available literature investigating the use of surgical management for onychocryptosis demonstrated a 63.6% to 95% overall patient satisfaction rate.

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Patients overall satisfaction rate for the cosmetic outcome was 52.7% to 85.5%.[3]

Dermatologists infrequently perform nail excisions likely because of limited training during residency or referral to other specialties, primarily podiatry.[5] Podiatrists receive the most training in nail excisions and thus are the primary performers of this procedure. As there is often intraspecialty variation in practice patterns, there may be individual practice variations in nail excisions performance across podiatrists of different practice types, gender, and regions of practice.[6-8] Thus, we aimed to characterize practice patterns of providers performing nail excisions using the Medicare part D database.

## Methods

A retrospective analysis of the Medicare provider use and payment data, part D, between the years 2013 and 2019 (most recent available) was performed.[9] The Centers for Medicare and Medicaid Services prepares this publicly available database which contains 100% of all final-action (all claim adjustments resolved) physician/supplier part B noninstitutional line items for the Medicare fee-for-service population. Physician and other health professionals provide demographic information at the time of enrollment, and the information is periodically updated. Any provider records with 10 or fewer claims for a single procedure are excluded from the data set to protect the privacy of Medicare beneficiaries.

We evaluated the data set for all claims with the Current Procedural Terminology (CPT) code 11750 (partial or complete nail/nail matrix excision with/without nail plate removal/destruction). This nail excision code is distinct from the CPT code 11755 (nail biopsy) and CPT code 11730 (nail avulsion). We determined the mean and standard deviation (SD) for the frequency of nail excisions performed annually per provider. Nail excision high performers were defined as providers performing nail excisions at a rate that was 2 SD above the mean.

To determine predictors of nail excision high performers, we assessed the following demographic variables: years of provider experience, specialty type, solo versus group practice, regional location of practice, and household median income. States were grouped into four US regions as defined by the census: Northeast, South, Midwest, and West. Rural-urban community codes, which classify US census tracts using urbanization, daily community, and population density, were also evaluated. Codes 1 to 3 were classified as metropolitan, codes 4 to 6 as micropolitan, codes 7 to 9 as small town, and code 10 as rural.

We obtained enumeration date of the provider and status as a solo or group practitioner from the National Plan & Provider Enumeration system.[10] We calculated years of experience by adding 4 years to the enumeration year and then subtracting from the year in which the claims data were being evaluated. Household median income was collected from US census data.[11] The provider's practice five-digit zip code was correlated to the household median income reported in the census.

Statistical analysis was conducted in SAS v9.4 (SAS Institute Inc, Cary, North Carolina) Logistic regression with high performers as the binary outcome variable was used to evaluate demographic factors correlated to high performer status. Significance was set at $P < .05$. As Medicare payment data provide deidentified patient data that are publicly available, institutional review board approval was not necessary.

## Results

A total of 32,279 providers completed at least 11 nail excisions in 1 calendar year between 2013 and 2019: 31,851 nail excision performers were podiatrists (99.7%), 60 were family medicine physicians (0.19%), 32 were internists (0.10%), and 11 were dermatologists (0.03%). The mean number of nail excisions performed annually per provider was 34.7, the median was 25, and the SD was 34.8. There were 956 high performers of nail excisions. The mean number of nail excisions performed by high performers was 173, the median was 137, and the SD was 104. There were 86 providers performing nail excisions at a rate greater than 7 SD above the mean.

Providers in the South constituted 53.7% of nail excision high performers and 41.7% of all nail excision performers (Table 1). Southern providers were more likely than providers in the Midwest and Northeast to be nail excision high performers (odds ratio [OR], 1.95 [95% confidence interval [CI], 1.63–2.33] [$P < .0001$]; OR, 1.46 [95% CI, 1.17–1.80] [$P < .0001$] (Table 2). Midwestern providers constituted 16.9% of high performers and 25.1% of all nail excision performers (Table 1). Providers in the Northeast and West were also more likely than those in the Midwest to be nail excision high performers (OR, 1.34 [95% CI,

**Table 1. Demographics of High Performer Nail Excision Provider Outliers versus All Nail Excision Providers from the Medicare Provider Utilization and Payment Data, Part D Data Set Between the Years 2013 and 2019**

| | High Performers of Nail Excisions | | All Nail Excision Performers | |
|---|---|---|---|---|
| Characteristic | No. | % | No. | % |
| Sex | | | | |
| Female | 97 | 10.3 | 5,261 | 16.4 |
| Male | 845 | 89.7 | 26,891 | 83.6 |
| Specialty | | | | |
| Podiatry | 932 | 99.0 | 31,851 | 99.7 |
| Dermatology | 0 | 0.00 | 11 | 0.03 |
| Family medicine | 8 | 0.85 | 60 | 0.19 |
| Internal medicine | 1 | 0.11 | 32 | 0.10 |
| Nurse practitioner | 0 | 0.00 | 0 | 0.00 |
| Physician assistant | 0 | 0.00 | 0 | 0.00 |
| Region | | | | |
| Midwest | 161 | 16.9 | 8,066 | 25.1 |
| West | 177 | 18.6 | 6,765 | 21.1 |
| South | 511 | 53.7 | 13,407 | 41.7 |
| Northeast | 103 | 10.8 | 3,884 | 12.1 |
| RUCA classification | | | | |
| Metropolitan | 788 | 82.5 | 27,346 | 84.8 |
| Micropolitan | 124 | 13.0 | 3,788 | 11.8 |
| Small town | 42 | 4.40 | 987 | 3.06 |
| Rural | 1 | 0.10 | 123 | 0.38 |
| Provider experience | | | | |
| ≤5 years | 169 | 17.7 | 8,688 | 26.9 |
| 6–15 years | 213 | 22.3 | 8,726 | 27.0 |
| 16–25 years | 317 | 33.2 | 8,760 | 27.1 |
| >25 years | 257 | 26.9 | 6,127 | 19.0 |
| Practice type | | | | |
| Solo | 372 | 38.9 | 18,486 | 57.3 |
| Group | 574 | 61.1 | 13,795 | 42.7 |

Abbreviations: RUCA, rural-urban community area codes; SD, standard deviation.

[a]High performers were defined as performing nail excisions at a rate 2 SD above the mean (those performing more than 104 nail excisions in a single year).

**Table 2. Logistic Regression Analysis for Quantifying Risk Factors for Nail Excision Provider Outliers versus All Nail Excision Providers as Defined by the Medicare Provider Utilization and Payment Data, Part D Data Set Between the Years 2013 and 2019[a]**

| Characteristic | OR (95% CI) | *P* Value |
|---|---|---|
| Region | | |
| Northeast versus Midwest | 1.34 (1.04–1.72) | <.0001[b] |
| West versus Midwest | 1.32 (1.06–1.64) | .01[b] |
| South versus Midwest | 1.95 (1.63–2.33) | <.0001[b] |
| South versus Northeast | 1.46 (1.17–1.80) | <.0001[b] |
| West versus South | 1.47 (1.24–1.75) | .5 |
| Northeast versus West | 1.01 (0.792–1.30) | .6 |
| Provider experience | | |
| >25 years versus ≤5 years | 2.20 (1.81–2.68) | <.0001[b] |
| >25 years versus 6–15 years | 1.75 (1.46–2.11) | .002[b] |
| >25 years versus 16–25 years | 1.17 (0.986–1.38) | <.0001[b] |
| 16–25 years versus ≤5 years | 1.89 (1.56–2.28) | <.0001[b] |
| 6–15 years versus ≤5 years | 1.26 (1.03–1.54) | .03[b] |
| 16–25 years versus 6–15 years | 1.50 (1.26–1.79) | 0.3 |
| Practice type | | |
| Solo practitioner versus group practitioner | 2.15 (1.89–2.46) | <.0001[b] |
| RUCA classification | | |
| Small town versus metropolitan | 1.50 (1.09–2.06) | .006[b] |
| Small town versus micropolitan | 1.31 (0.919–1.88) | .6 |
| Micropolitan versus metropolitan | 1.14 (0.941–1.38) | .2 |
| Provider sex | | |
| Men versus women | 1.73 (1.40–2.14) | <.0001[b] |

Abbreviations: CI, confidence interval; OR, odds ratio; RUCA, rural-urban community area codes; SD, standard deviation.

[a]High performers were defined as performing nail excisions at a rate 2 SD above the mean (those performing more than 104 nail excisions in a single year).

[b]Statistically significant ($P < .05$).

1.04–1.72] [$P < .0001$]; OR, 1.32 [95% CI, 1.06–1.64] [$P < .01$]) (Table 2).

Solo practitioners constituted only 38.9% of nail excision high performers but 57.3% of all nail excision performers (Table 1). However, solo practitioners were more likely than group practitioners to be nail excision high performers (OR, 2.15 [95% CI, 1.89–2.46] [$P < .0001$]) (Table 2). Men constituted 89.7% of nail excision high performers and 83.6% of all nail excision performers (Table 1).

Linear regression analysis demonstrated that, with high performers excluded, for every 10-year increase in years of provider experience, there was an associated increase of 1.2 nail excisions per year per provider ($P < .0001$). Providers with more than 25 years of experience, were more likely than providers with less than or equal to 5 years of experience, 6 to 15 years, and 16 to 25 years to be nail excision high performers (OR, 2.20 [95% CI, 1.81–2.68] [$P < .0001$]; OR, 1.75 [95% CI, 1.46–2.11] [$P = .002$]; OR, 1.17 [95% CI, 0.986–1.38] [$P < .0001$]). In addition, providers with 6 to 15 years of experience and 16 to 25 years of experience were more likely than those with less than or equal to 5 years of experience to be nail excision high performers (OR, 1.26 [95% CI, 1.03–1.54] [$P = .03$]; OR; 1.89 [95% CI, 1.56–2.28] [$P < .0001$]) (Table 2). In addition, linear regression analysis demonstrated that for every $100,000 increase in household median income of the practice location, there was an associated decrease of 9.9 nail excisions annually per provider.

## Discussion

Podiatrists are the primary performers of nail excisions. Podiatrists receive formal specialized training

in managing nail conditions and performing nail procedures, so this result is not surprising or novel. They all perform a more than adequate number of nail procedures during training such that they are confident and competent in performing nail procedures as attending physicians.[12] Most physicians do not perform nail procedures, because they receive no or limited formal nail specific training and likely do not feel comfortable performing nail excisions.[4,13,14]

What is a novel finding of this study is that southern podiatrists, podiatrists with more years of experience, solo practitioners, and those practicing in regions with lower household median incomes were more likely to perform higher numbers of nail excisions compared to their colleagues within the field of podiatry. Southern providers constituted over half of high performers and were more likely than midwestern and northeastern providers to be high performers. Moreover, providers in both the Northeast and West were more likely than providers in the Midwest to be nail excision high performers. One likely explanation for this finding is that the South has the largest number of podiatrists and Medicare beneficiaries, compared to all other census regions.[15,16] The proportion of podiatrists in the Midwest is notably lower than in both the South and Northeast, potentially explaining why there is a lower number of high performers in the Midwest.[17]

Our findings suggest that more experienced clinicians are more likely than less experienced providers to be nail excision high performers. With every increase in provider experience, there was an associated increase of approximately one nail excision per year per provider. We also found that solo practitioners were more likely to be high performers of nail excisions when compared to group practitioners.

We found that as household median income increased, the number of nail excisions per provider decreased. Patients in higher versus lower income groups may visit providers with more mild disease, and thus conservative management, as opposed to surgery, may be indicated. Further studies are needed to clarify this association.

We showed that men constituted a higher frequency of nail excision performers compared to women. Although there is a trend toward the percentage of female podiatrists increasing over time, in 2019, 72.8% of podiatrists were men.[18] Women are highly underrepresented in podiatry,[19] which explains why they are less likely to be high performers of nail excisions. Although underrepresented, it is important to note that female podiatrists are trained to perform operations of the nail and have expertise in this area of podiatry. This result more likely reflects higher numbers of male podiatrists, rather than men being more likely than female counterparts to be high performers of nail excisions.

This study has inherent limitations. Providers performing fewer than 11 nail excisions were excluded from the data set. In addition, because this data set only contains claims from Medicare part D beneficiaries, our study cannot describe nail excisions on patients who are privately insured, uninsured, or insured by Medicaid. Household median income was correlated to the provider's location of practice, rather than the zip code of the patient's residence. A patient may reside in one zip code and visit a provider in a different zip code thus affecting our results.

## Conclusions

In sum, southern podiatrists, providers with more years of experience, solo practitioners, and those practicing in regions with lower household median incomes are more likely to perform higher numbers of nail excisions. By characterizing practice patterns of podiatrists performing nail excisions, the podiatric medical community can better identify interprofessional differences among specific podiatric demographic groups.

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## References

1. Heidelbaugh JJ, Lee H: Management of the ingrown toenail. Am Fam Physician **79:** 303, 2009.
2. Geizhals S, Lipner SR: Review of onychocryptosis: epidemiology, pathogenesis, risk factors, diagnosis and treatment. Dermatol Online J **25:** 13030, 2019.
3. Stewart CR, Algu L, Kamran R, et al: Patient satisfaction with treatment for onychocryptosis: a systematic review. Skin Appendage Disord **6:** 272, 2020.
4. Baltz JO, Rubin A, Adigun C, et al: Expert consensus on nail procedures and selection of CPT codes. Dermatol Surg **47:** 1079, 2021.

5. Vélez NF, Jellinek NJ: Nailing it: promoting nail procedural training in residency and beyond. Dermatol Surg **41:** 424, 2015.
6. Wang Y, Lipner SR: Analysis of outlier nail biopsy practice patterns in the Medicare Provider Utilization and Payment database 2012-2017. J Am Acad Dermatol **85:** 986, 2021.
7. Aggarwal P, Neltner SA, Fleischer AB: Risk factors that are associated with outliers in Mohs micrographic surgery in the national Medicare population, 2018. Dermatol Surg **48:** 181, 2022.
8. Krishnan A, Xu T, Hutfless S, et al: Outlier practice patterns in Mohs micrographic surgery: defining the problem and a proposed solution. JAMA Dermatol **153:** 565, 2017.
9. Centers for Medicare and Medicaid Services: Medicare provider utilization and payment data: part D prescriber n. d. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Part-D-Prescriber. Accessed October 18, 2022.
10. NPPES NPI Registry: Search NPI records. Available at: https://npiregistry.cms.hhs.gov/. Accessed January 24, 2022.
11. United States Census Bureau: Census. Table Results for Income by Zip Code. 2019. Available at: https://data.census.gov/cedsci/table?q=medianincome&g=0100000US%248600000&tid=ACSST5Y2019.S1901. Accessed March 9, 2022.
12. Foster K: "Curricular Guide for Podiatric Medical Education AACPM Council of Faculties 2020 Edition Approved by the AACPM Board of Directors,' in *The Curricular Guide for Podiatric Medical Education*, American Association of Colleges of Podiatric Medicine, Rockville, MD, 2020.
13. Haneke E. Nail surgery. Clin Dermatol **31:** 516, 2013.
14. Wang Y, Lipner SR: Retrospective analysis of nail biopsies performed using the Medicare Provider Utilization and Payment Database 2012 to 2017. Dermatol Ther **34:** e14928, 2021.
15. APMA: Find a podiatrist. Available at: https://www.apma.org/Directory/FindAPodiatrist.cfm?Compact=0&FirstName=&LastName=&City=&State=ME&Zip=&Country=. Accessed March 21, 2022.
16. Kaiser Family Foundation: Total number of Medicare beneficiaries by type of coverage. Available at: https://www.kff.org/medicare/state-indicator/total-medicare-beneficiaries/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed January 25, 2022.
17. American Podiatric Medical Association: 2018 podiatric practice survey findings report. Available at: https://apma.cms-plus.com/files/2018%20Practice%20Survey%20Results_FINAL.pdf. Accessed October 18, 2022.
18. Data USA: Podiatrists. Available at: https://datausa.io/profile/soc/podiatrists. Accessed February 21, 2022.
19. Brower BA, Butterworth ML, Crawford ME, et al: The podiatric medical profession: a gender comparison. J Foot Ankle Surg **59:** 997, 2020.