

From the American Venous Forum

A review of United States endovenous ablation practice trends from the Medicare Data Utilization and Payment Database



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ABSTRACT

Objective: The growth of endovenous ablation in the United States over the last few years has raised concerns of overuse by many vascular societies and payers. Reasons for such growth are unclear (ie, increased awareness, less invasive procedure, or inappropriate overuse). The Medicare Provider Utilization and Payment database was analyzed to define metrics of current practice trends in Medicare patients by providers.

Methods: The Medicare Provider Utilization and Payment database was queried for endothermal ablation Current Procedural Terminology codes (36475, 36476, 36478, and 36479) from 2012 through 2015. These results were imported into a relational database program. Queries were designed to ascertain the practice trends of all providers, inclusive of all specialties, and the data were exported to a spreadsheet program for analysis. Analysis for ablations per patient was calculated by assessing the number of beneficiaries who underwent at least one ablation by a provider in relation to the total number of ablations performed by that provider.

Results: Most saphenous vein ablations were done by vascular surgeons (29%), cardiologists (21%), or general surgeons (14%). The remaining one-third was performed by 33 other provider specialties ranging from nuclear medicine specialists to ophthalmologists. Regional variation was significant with 51% of ablations being performed in the south (Florida, 15.7% and Texas, 11.4%). The Western region had the greatest percentage growth of 62% with the addition of 14,788 cases added between 2012 and 2015. Ablations per patient averaged 1.8 in the aggregate dataset. Over the 4-year period, there was a steady increase seen in the number of patients undergoing ablation, number of ablations performed, number of providers performing ablation, average amount of ablations being performed as well as the number and proportion of providers performing more than ablations per patient. The number of ablations per patient was higher than average in specialties without any formal vascular training.

Conclusions: Endovenous ablation is performed by a wide variety of subspecialists with different levels of formal training for the management of chronic venous disease. This data analysis can help to establish better guidelines and governance over the use of endovenous ablation, but care should be taken to realize this is only an average and many patients will require more than two ablations for appropriate care. As our health care system shifts from a fee-for-service to a value-based system, and taxpayer-funded resources in Medicare patients become less available, it is important that practice trends be scrutinized using data-driven initiatives so that the appropriate physician treats the appropriate patient for the appropriate reasons. (*J Vasc Surg: Venous and Lym Dis* 2019;7:471-9.)

Keywords: Endovenous ablations; CMS database; Average

Chronic venous disease is highly prevalent, affecting more than 20 million people in the United States. It has been observed that more endovenous ablation procedures are being performed each year. This finding may reflect an increase in diagnosis, awareness, true need, low threshold for treatment, remuneration, or a

combination of these causes. Anecdotal reports and opinions have been expressed on all of the preceding causes; however, no real metrics have been provided to perhaps better understand the true reasons.¹ As the focus becomes that of appropriate use and cost containment, more practices are likely to be scrutinized for their

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endovenous ablation strategies. It is important to determine the current practice trends to define appropriate use and patterns outside the norm. Therefore, the Medicare Provider Utilization and Payment (MPUP) data were examined to define the present metrics for ablation of the lower extremity veins.

METHODS

The MPUP database is an open source database. Institutional review board approval and informed consent was not required. The Physician and Other Supplier Public Use File was queried for endothermal ablation Current Procedural Terminology (CPT) codes (36475, 36476, 36478, and 36479) from 2012 through 2015. Results were imported into a relational database program. Queries were designed to ascertain the practice trends of all providers, inclusive of all specialties. The data were exported to a spreadsheet program for analysis to show changes in practice over the years, provider type prevalence, and average number of ablations per patient among the different provider types. Demographic data were not available in this provider-focused database and as such were not examined.

To demonstrate changes over time in the number of patients, procedures, and providers, time curves were plotted for the period available in the MPUP data. Increase in the number of ablations by US Census Bureau region was depicted by quantitate and qualitative plot over time.² A table was made to present the percent changes over time for the US Census Bureau population in relation to changes in patients and ablations. Percent of procedures by specialty and region were presented in pie charts.

Ablation practices, patient population, and providers by specialty were presented by time curves for vascular surgery, cardiology, general surgery, and the remaining 33 specialties combined because they each represented less than 10% of the providers.

Mean, median, and confidence intervals were calculated from the data using GraphPad (San Diego, Calif). A cutoff value of an "appropriate" number of ablations per patient was calculated by taking one standard deviation above the mean. A time curve was plotted to show the increase in providers performing ablations per patient above the designated value.

RESULTS

Query of the MPUP database resulted in 10,131 provider and CPT code pairs. These encompass 341,750 patients who underwent 619,029 procedures. Most procedures for saphenous vein ablation were done by vascular surgeons [29%], cardiologists (21%), and general surgeons (14%). The remaining one-third was performed by 33 other provider specialties, including ambulatory surgical centers, anesthesiology, cardiac surgery, clinical laboratory, critical care (intensivists), dermatology, diagnostic/

ARTICLE HIGHLIGHTS

- **Type of Research:** Retrospective review of prospectively collected data from the Medicare Provider Utilization and Payment Database
- **Key Findings:** Between 2012 and 2015, endovenous ablations increased in all regions of the United States, with 3244 unique providers performing 619,029 procedures with an average of 1.8 ablations per patient. Most ablations were done by vascular surgeons (29%), cardiologists (21%), or general surgeons (14%). Providers increased by 444 (23%), procedures by 37,682 (28%), and patients by 17,002 (23%) during the 4-year time period. The number of providers performing more than two ablations per patient increased throughout the study period.
- **Take Home Message:** Saphenous vein ablations has been increasing significantly in recent years. Attention should focus on avoiding inappropriate use of these procedures because they result in significant cost and mistreatment of patients.

interventional radiology, emergency medicine, family practice, general practice, geriatric medicine, obstetrics/gynecology/oncology, infectious disease, internal medicine, interventional pain management, nephrology, neurology, nuclear medicine, nurse practitioner, ophthalmology, orthopedic surgery, otolaryngology, pathology, pediatric medicine, peripheral vascular disease, physical medicine and rehabilitation, physician assistant, plastic and reconstructive surgery, podiatry, pulmonary disease, surgical oncology, thoracic surgery, and urology (Fig 1).

Regional variation was significant, with 51% of ablations being performed in the south (Florida, 15.7% and Texas, 11.4%). Given that the south region comprises 38% of the US population, the number of procedures is exceedingly higher compared to the rest of the country (Figs 2 and 3). The Western region had the largest percentage growth of 62% with the addition of 14,788 cases between 2012 and 2015. Major growth was noted in all regions between 2012 and 2013. Overall the growth was least in the Midwest and the Northeast (Fig 3).

Over the 4-year period, there was an increase in patients receiving ablation (Fig 4), the number of ablations performed (Fig 5), and the number of providers (Fig 6). Providers increased by 444 (23%), procedures by 37,682 (28%) and patients by 17,002 (23%; Fig 7). The provider and procedural growth rate over the time period of the database for vascular surgery was 21% and 26%, cardiology was 64% and 51%, and general surgery was -0.03% and -0.4%, respectively.

Procedures per patient averaged 1.8 in the aggregate dataset. Vascular surgery and cardiology trended below the average, whereas general surgery and the other less represented specialties trended above the average

Total Ablations by Specialty from 2012-2015

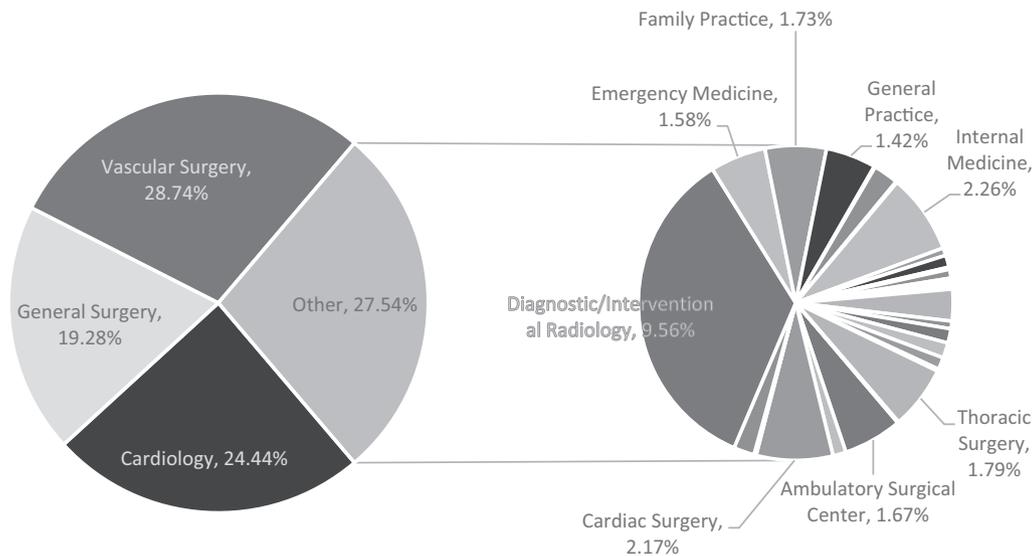


Fig 1. The total number of ablations by specialty from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

(Fig 8). An independent annual assessment of procedure per patient remained relatively constant: 2012, mean 1.8; 2013, mean 1.8; 2014, mean 1.8; and 2015, mean 1.9. The average amount of ablations (Fig 9) as well as the number and proportion of providers performing more than two ablations per patient (Fig 10) increased during the 4-year period.

The descriptive statistics resulted in a mean of 1.6, standard deviation of 0.6, and a median of 1.4. A 99% confidence interval was returned as 1.60 to 1.63. Based on the mean number of procedures and using a cutoff value for appropriate number of ablations per patient at one standard deviation led to the threshold of two ablations per patient. In 2015, 511 providers were above the threshold, representing 22% of providers and accounting for 80,156 procedures (Figs 9 and 10). This was an increase throughout the study period.

DISCUSSION

The number of ablations performed has increased nationwide over the 4 years as available in the MPUP database. Regional increases were noted in all US Census Bureau regions, with the greatest growth by absolute number and proportion in the Western region. Corrected to census growth, ablation use increased in all regions. Owing to the smaller population size in the Western region compared with the most populated Southern region, the Western region's growth is even more significant. The nationwide growth is due to more patients receiving more treatment by more practitioners. The increase outpaced population growth significantly, with most regions seeing the greatest change between 2012 and 2013.

Endovenous ablation is performed by a wide variety of subspecialists with different levels of training for the management of chronic venous disease. These specialties have a wide range of training from 36 specialties though most ablations are performed by vascular surgeons, cardiologists, and general surgeons with some formal training. Although every specialty in the less represented group has a significantly smaller total,

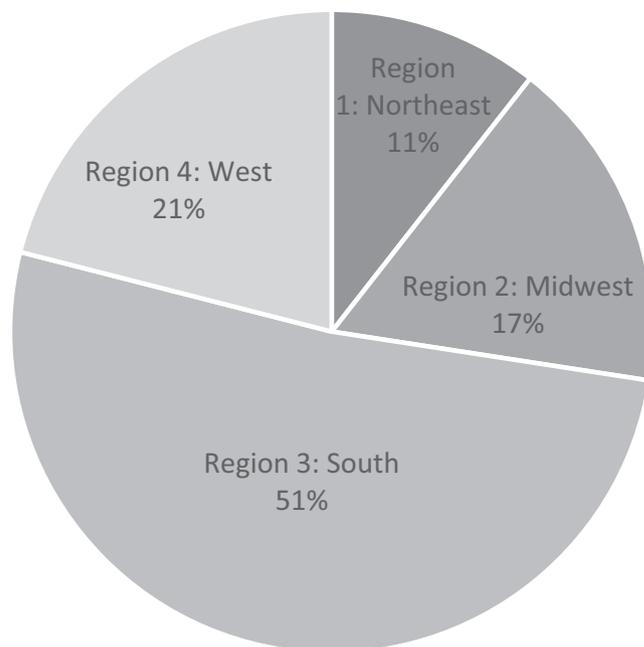


Fig 2. The total number of ablations by regions from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

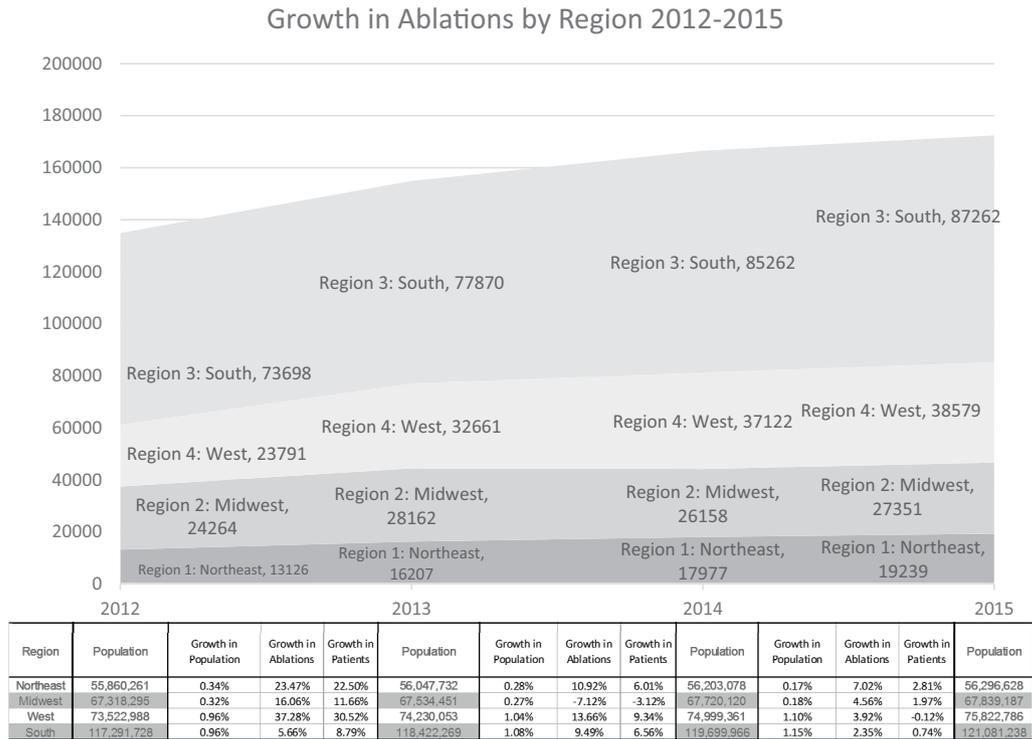


Fig 3. Total number of ablations by region from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database with accompanying table showing population and growth from United States Census for the same period.

the sums of these specialties comprise a huge number of procedures. The number of ablations per patient was higher than average in specialties without any formal vascular training. One should be concerned about the training and ability of these less represented specialties

to appropriately care for patients. Effort has been made to develop a phlebology specialist or vein specialist, but no formal training has been provided or used by a vast majority of providers. Best efforts by medical societies to provide legitimate training has only been used by a

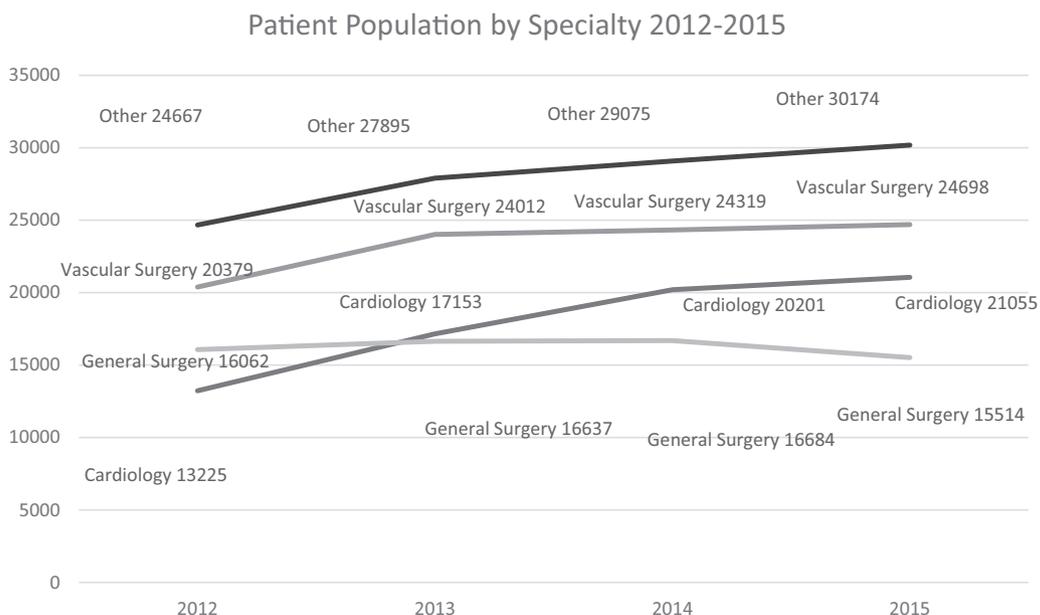


Fig 4. The total number of patients by the three main specialties and all other specialties group from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

Ablations by Specialty 2012-2015

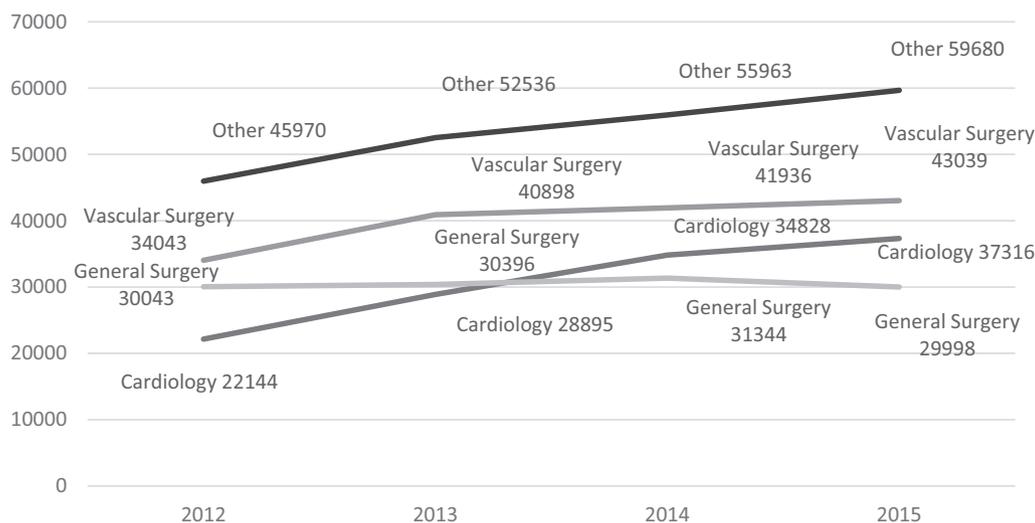


Fig 5. The total number of ablations by the three main specialties and all other specialties group from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

minority of providers each year. Internationally, multispecialty groups have come together to provide guidelines on phlebology but few countries, and also not the United States, recognize them.³ A weekend course or a few months of experience does not result in expert knowledge or mastery. The development of an international curriculum has advantages and disadvantages, as discussed by Fitridge et al.⁴ They noted the benefit of an international curriculum, allowing the movement of trainees between countries to be simplified with the standardization of assessment and clinical abilities as

well as providing assistance in countries with limited resources. A major barrier to this is international variability in care delivery models. Clearly, as a nation we must address this issue in providing proper care in a disease that has been over and under treated.

Another important issue being discussed in several countries, including the United States, is whether funds should be allocated to treating asymptomatic disease. It is obvious from multiple cross-sectional and epidemiologic studies that a significant number of patients have early disease without symptoms.⁵ The

Providers by Specialty 2012-2015

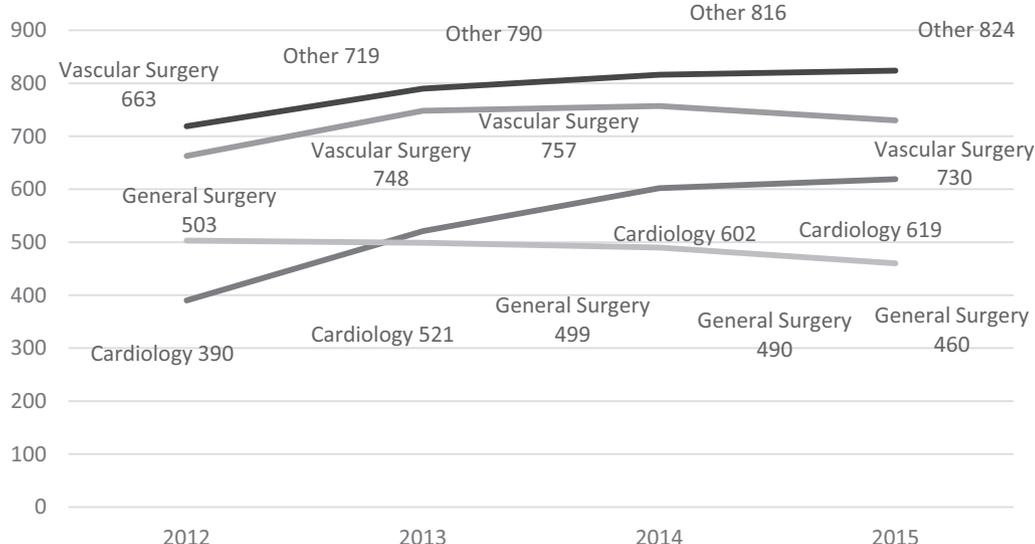


Fig 6. The total number of providers by the three main specialties and all other specialties group from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

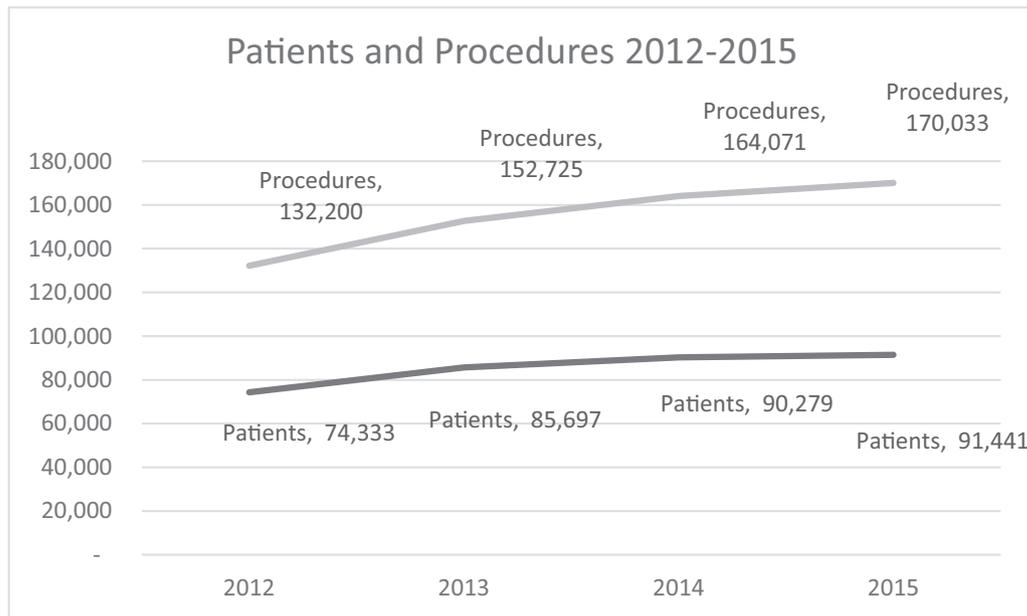


Fig 7. The total number of patients and procedures from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

most common issue is the presence of varicose veins. Recently epidemiologic data in the Bonn and Edinburg vein studies, which followed populations for 6.6 and 13.0 years, respectively, demonstrated significant progression of chronic venous disease. In the Bonn population, the incidence of chronic venous insufficiency was 14% after 6.6 years and disease progression of C2 to C3-C6 disease occurred in 31% if incompetent saphenous veins

were involved.⁶ The Edinburg group saw C2 disease progression of 57.8% over the 13 years of roughly 1 in 20 per year.⁷ One-third of patients with varicose veins went on to skin changes. Although several risk factors have been identified, none are modifiable besides obesity; therefore, it is hard to quell the progress of the disease. This finding argues against not treating asymptomatic patients. In contrast, a large number of patients do not have disease

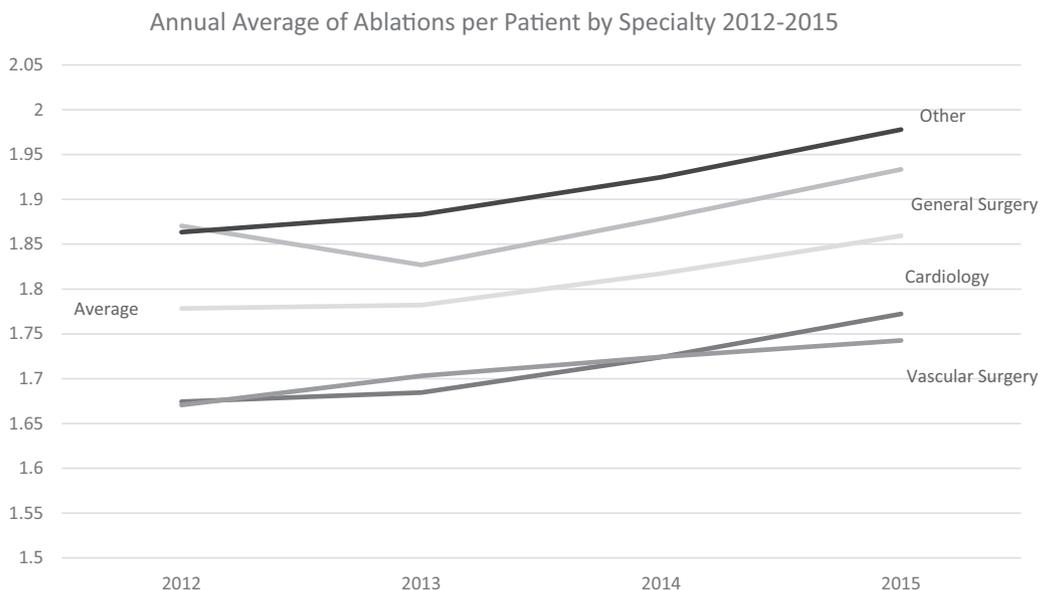


Fig 8. The annual average of procedures per patient by the three main specialties and all other specialties group and the corresponding average from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

Providers performing performing >2 ablations on average 2012-2015

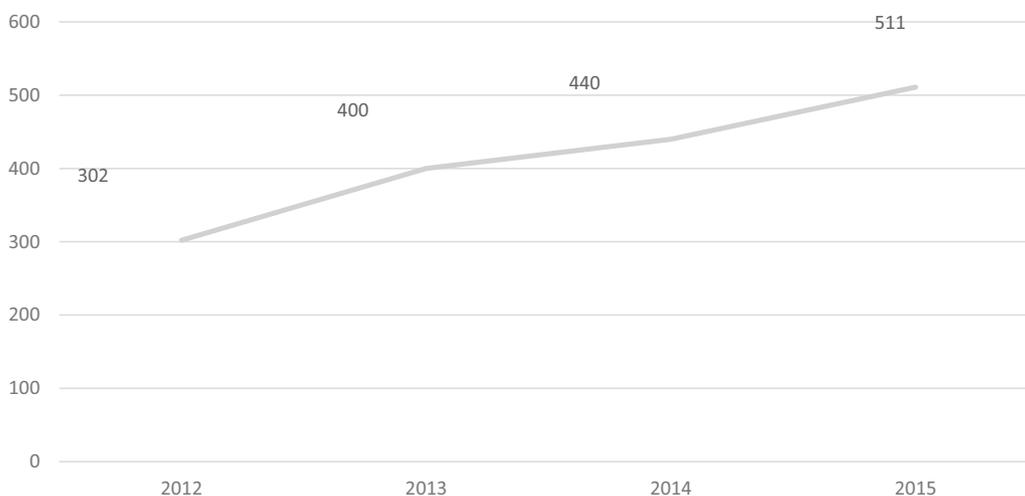


Fig 9. The total number of providers performing more than two ablations per patient on average from 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

progression. We need to identify which patients are at risk of progression and who is going to benefit from early intervention the most.⁸

More practitioners every year are falling into the category of providers who perform more than two ablations per patient on average. The mean average of procedures being above the median shows that this practice significantly skews the data. This is more concerning because, for a provider's average to be above this threshold, three or more ablations per patient in more than one-half of

their practice must be performed. A small part of this increase could be due to more complex patients being treated. However, most of this growth may be from overtreating patients. Overtreatment may be caused by unnecessary procedures performed for a cosmetic cause by doctoring the patient's story to ensure the asymptomatic varicose veins are now seen as symptomatic. This could also innocently be caused by naïve practitioners who have been enabled to perform the procedure through its simplification, although with a lack

Total Ablations by Providers who perform >2 Ablations per patient on Average 2012-2015

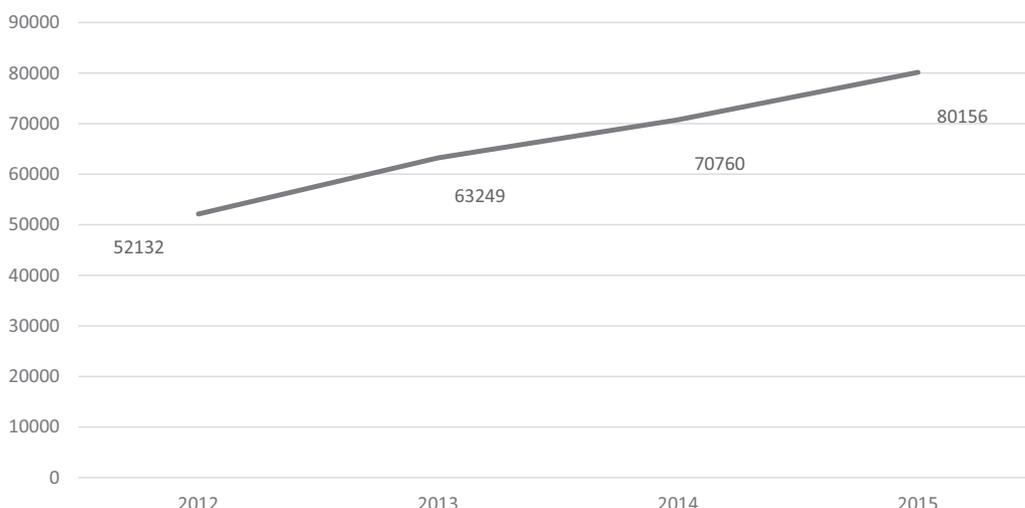


Fig 10. The total number of ablations performed by providers who perform more than two ablations per patient on average 2012 to 2015 found in the Medicare Provider Utilization and Payment (MPUP) database.

understanding of the disease process and hemodynamics. Also, given the increasing concern of abuse and overuse of medical resources, the media is saturated with stories of institutions and physicians being identified, fined, and in some cases imprisoned for fraud.⁹ To quantify the cost of the overuse, if we consider the group that performed more than two ablations on average must perform three or more ablations more than one-half of the time, as stated, and we decrease those three ablations just to two, cost-savings could amount to US\$24 million in 2015 alone, assuming a reimbursement of around US\$1000 per ablation. In addition to wasteful spending for unnecessary procedures, valuable time and energy are being spent developing policies and procedures to properly police and punish unethical providers treating patients with venous disease.

The limitations of this report are cemented in the way the data are recorded in the MPUP. It is a claims-based database that reports procedures performed based on CPT codes and number of patients per provider. A patient-focused database could give similar information and provide significant insight into demographics as well as ablation use. A patient-focused database could allow for more significant data mining and interpretation, which would allow better discernment between fraud and innocent inappropriate use.¹⁰ Another limitation is that, because patient identification is not entered, repeated procedures on the same patient in subsequent years are represented as another patient, inappropriately increasing the denominator. This would result in an inappropriately lower average.

It is known that regional variation exists among the number and types of procedures by vascular surgeons throughout the United States. This study showed clear differences in procedure use between Southern and Northern regions of the United States. This could simply be attributed to warm weather, that is, in Southern states patients are more likely to be outside with their legs exposed. Whether they seek treatment for heat-induced symptoms or simply cosmetic reasons is not clear from this study.

It is well-known that saphenous veins may have segmental reflux or even being normal with reflux in their tributaries alone.^{11,12} Finally, several reports have demonstrated that performing phlebectomy of varicose tributaries, without truncal vein ablation, may decrease saphenous trunk diameter and reflux.¹³⁻¹⁵ In cases with segmental saphenous reflux, ligation of the varicose tributary alone can eliminate the truncal reflux. In this article, we have assumed that all patients were treated for axial saphenous vein incompetence; however, it is possible that patients may have only had segmental reflux and small vein diameters and received treatment unnecessarily. It is also possible that normal truncal veins were inappropriately ablated in this cohort of patients.

CONCLUSIONS

Endovenous ablation reported in the MPUP database has had significant growth in numbers of providers, procedures, and treated patients. The growth in these procedures may be due to increased awareness among providers and patients, a reduced threshold for less invasive treatment, and/or fraud. The elimination of intentional or unintentional abuse needs to be a priority. This data analysis can help providers and payers to establish better guidelines and governance over the appropriate use of endovenous ablation. As our health care system shifts from a fee-for-service to a value-based system, and taxpayer-funded resources in Medicare beneficiaries become less available, it is important that practice trends be scrutinized using data-driven initiatives. Care and appropriate use of these data requires an understanding that an average cannot be reasonably used to set an absolute limit. Many patients appropriately require more ablations than the average; however, they should not comprise the majority. The ultimate goal is to have the right physician providing the right care to the right patient for the best results.

AUTHOR CONTRIBUTIONS

Conception and design: JC, AG, JA, SE, TW, BL, NO, SA, NL
Analysis and interpretation: JC, NL

Data collection: JC, NL

Writing the article: JC, NL

Critical revision of the article: JC, AG, JA, SE, TW, BL, NO, SA, NL

Final approval of the article: JC, AG, JA, SE, TW, BL, NO, SA, NL
Statistical analysis: JC, NL

Obtained funding: Not applicable

Overall responsibility: JC

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