Who is treating venous disease in America today?

Josh Gabel, MD,[a] Trevor O'Dell, BS,[a] Elna Masuda, MD,[b] Christian Bianchi, MD,[a] Sharon Kiang, MD,[a] Ahmed Abou-Zamzam, MD,[a] *and* Theodore H. Teruya, MD,[a] *Loma Linda, Calif; and Honolulu, Hawaii*

ABSTRACT

Objective: This study examined the specialty, board certification, and training of physicians who are treating venous disease in the United States.

Methods: Internet searches were performed to identify the websites of physicians who treat venous disease in large metropolitan areas. The websites of large multistate venous corporations were also searched. The American Board of Venous and Lymphatic Medicine (ABVLM) website was also used to identify venous providers. These providers were then searched for in the American Board of Medical Specialties website. The data were then analyzed statistically.

Results: Physicians treating venous disease were certified in a large variety of medical, surgical, and radiologic specialties; 17.6% of providers did not have an active certification. For the South, Northeast, and Mid-West regions, physicians without an active board certification were more common than any other specialty. Vascular surgery was the most common specialty in the Western region. Providers employed by large multistate venous corporations compared with the remainder of the study sample were less likely to have an active primary certification (72.0% vs 87.4%; $P = .001$), to have received formal endovascular training (22.4% vs 36.0%; $P = .013$), or to maintain an active certificate in vascular surgery (6.5% vs 22.1%; $P < .001$). Corporate-employed relative to non-corporate-employed providers were more likely to hold an ABVLM certification (38.3% vs 17.6%; $P < .001$).

Conclusions: There are a large number of physicians treating venous disease who do not have an active board certification. This was more common for physicians employed by a large multistate venous corporation. Physicians employed by a corporation were more likely to advertise a board certification from the ABVLM. (J Vasc Surg: Venous and Lym Dis 2019;7:610-4.)

Keywords: Varicose veins; Providers; Venous training

The majority of U.S. adults rely on the Internet as a source of health information.[1] Inquiries start at a search engine with a primary focus on disease description.[2] Repeated analysis of online behavior has shown that patients focus on the most highly ranked search results, driving three times as many visitors to hospital sites as nonsearch visitors.[3,4]

Despite the increased use of the Internet to drive treatment decisions by patients, lack of regulation has led to the reliability of information on vascular disease to be called into question.[5] Searches lead patients to providers with vested interests, as >40% of websites on vascular disease originate from organizations that provide treatment.[6] Validated tools to assess health information online have found varicose vein surgery to be the most inconsistently reported topic in vascular surgery.[7]

Our aim was to identify the most accessible providers found online who perform varicose vein surgery and to compare their prior medical certifications, training, and employment.

METHODS

The 20 largest U.S. cities by population were identified by census data and used as a regional focus for search inquiries.[8] Less populous cities were excluded as providers formally trained in surgical and nonsurgical procedures are more centralized in highly populated areas.[9] Regional divisions were used as identified by the U.S. Census Bureau.[10]

As the most widely used search engine by market share in the United States, Google was used to perform an Internet search using the terms "varicose vein" and "varicose vein surgery" in November 2017 from an Internet Protocol address in California.[11,12] The first five results returned by each location were recorded. Websites were excluded from analysis if they were not associated with a specific provider group or organization with clinical outreach.

Large multistate venous corporations were also searched from an Internet Protocol address in California.

From the Division of Vascular Surgery, Loma Linda University, Loma Linda[a]; and the Department of Surgery, University of Hawaii, Honolulu.[b]

Author conflict of interest: none.

Presented at the Thirtieth Annual Meeting of the American Venous Forum, Tucson, Ariz, February 20-23, 2018.

Correspondence: Theodore H. Teruya, MD, Division of Vascular Surgery, Loma Linda University, 25612 Barton Rd #110, Loma Linda, CA (e-mail: tteruya@llu.edu).

The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2213-333X

Published by Elsevier Inc. on behalf of the Society for Vascular Surgery.

https://doi.org/10.1016/j.jvsv.2019.03.009

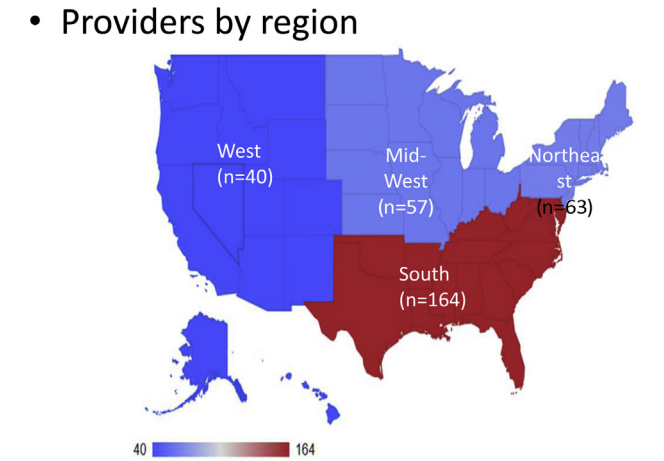

Fig 1. Providers by region.

All physicians employed by these companies were included in the database. Finally, all physicians listed on the American Board of Venous and Lymphatic Medicine (ABVLM) website were identified.

Each site was evaluated for providers identified as actively performing varicose vein procedures and catalogued by National Provider Identifier record.[13] Provider medical degree and specialty certification were queried from the American Board of Medical Specialties, American Osteopathic Association, and ABVLM.

Prior formal endovascular training was defined as having received a primary certificate in interventional radiology or vascular surgery. Provider employment status was identified and distinguished between those employed by independent provider groups or hospital-affiliated centers and large corporate entities with venous specialty clinics in two or more states.

Medical degree and specialty certification are presented as relative percentile of the total sample. Differences were assessed using χ^2 and McNemar-Bowker tests and considered statistically significant when $P < .05$. SPSS version 24.0 software (IBM Corp, Armonk, NY) was used to perform the statistical analysis.

ARTICLE HIGHLIGHTS

- **Type of Research:** Informational study
- **Key Findings:** Defining the type of physicians treating venous disease in the United States.
- **Take Home Message:** Venous disease is currently being treated by a wide range of specialists with varying training and board certifications.

RESULTS

Of 60 websites identified, 324 providers were identified in 24 states. Regional distribution of providers included the South (n = 164 [70.3%]), Northeast (n = 63 [19.8%]), Mid-West (n = 57 [19.8%]), and West (n = 40 [12.3%]; Fig 1). Active American Board of Medical Specialties or American Osteopathic Association certification was maintained by 271 (82.3%) providers (Fig 2). Fifty-eight (17.6%) were not actively certified in a primary specialty. Of providers who were actively certified, 90 (27.4%) were in a medical subspecialty, 61 (18.5%) in radiology, and 113 (34.3%) in surgery (Fig 3).

Within medical subspecialties, dermatology (n = 28 [8.5%]) was most common, followed by emergency medicine (n = 16 [4.8%]) and family medicine (n = 16 [4.8%]). The spectrum included a diverse range of providers from anesthesiology (n = 7 [2.1%]) to pediatrics (n = 1 [0.0%]; Table I).

Twenty-one (6.3%) providers were certified in diagnostic radiology, and 40 (12.1%) had pursued additional training in interventional procedures (Table II).

In surgery, practitioners performing venous procedures were dominated by those with specialization in vascular surgery (n = 55 [16.7%]), followed by general surgery (n = 32 [9.7%]) and cardiothoracic surgery (n = 14 [4.3%]). A broad range of specialties were represented, including plastic surgery (n = 7 [2.1%]) and obstetrics and gynecology (n = 5 [1.5%]; Table III).

Examining providers by region, those lacking an active board certification were more common than any other

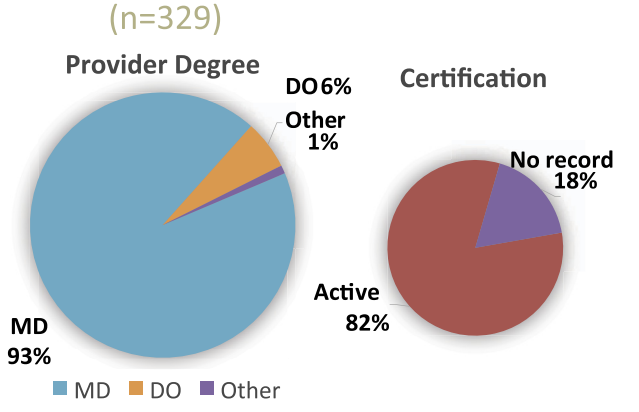

Fig 2. Provider degrees and board certification.

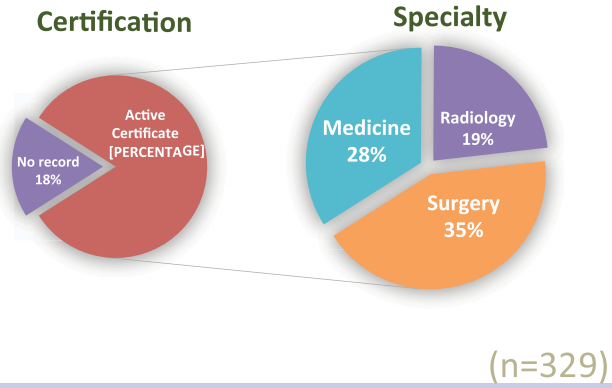

Fig 3. Provider board certification and specialty.

Table I. Distribution by primary specialty: Medicine

Active certification in specialty	Study sample (N = 329)
Medicine	90 (27.4)
Anesthesiology	7 (2.1)
Cardiology	8 (2.4)
Dermatology	28 (8.5)
Emergency medicine	16 (4.8)
Family medicine	16 (4.8)
Internal medicine	14 (4.2)
Pediatrics	1 (0.0)

Values are expressed as number (%).

Table III. Distribution by primary specialty: Surgery

Active certification in specialty	Study sample (N = 329)
Surgery	113 (34.3)
Cardiothoracic surgery	14 (4.3)
General surgery	32 (9.7)
Obstetrics and gynecology	5 (1.5)
Orthopedic surgery	2 (0.0)
Plastic surgery	7 (2.1)
Vascular surgery	55 (16.7)
Neurosurgery	1 (0.0)
Ear, nose, and throat	2 (0.0)

Values are expressed as number (%).

medical, radiologic, or surgical subspecialty in the South (n = 24 [14.6%]), Northeast (n = 17 [27%]), and Mid-West (n = 11 [18.0%]; Fig 4). Vascular surgery (n = 13 [32.5%]) was the most common subspecialty in the Western region.

Providers employed by large multistate venous corporations compared with the remainder of the study sample were less likely to have an active primary certification (72.0% vs 87.4%; $P = .001$), to have received formal endovascular training (22.4% vs 36.0%; $P = .013$), or to maintain an active certificate in vascular surgery (6.5% vs 22.1%; $P < .001$). Corporate-employed relative to non-corporate-employed providers were more likely to hold an ABVLM certification (38.3% vs 17.6%; $P < .001$; Table IV).

DISCUSSION

Patients increasingly turn to the Internet for health information before their first consultation with a specialist.[14] Providers seeking to connect with these patients have increased their online presence with concordant patient accrual and expansion of their clinical practice.[15] Online information about the treatment of venous disease can be of high quality but is difficult for patients to identify in a congested space that includes questionable authorship and commercial interests.

In our study, we found that the most accessible providers online represented a diverse range of medical, radiologic, and surgical specialties. Practitioners outside of vascular surgery predominated, and this discordance increased significantly in looking at large multistate venous corporations. This is consistent with a study by Baldwin et al, which found that the majority of online vascular-related topics were dominated by industry and specialists outside of vascular surgery.[16]

The finding that 18% of providers seeking to provide health information and to treat venous disease are lacking board certification is alarming. Certification maintains a minimum uniform competency that is the initial basis of trust in physicians by society. Even among minor vascular procedures, certification has been shown to significantly increase safety behavior and to reinforce treatment standards.[17] Maintenance of certification acknowledges ongoing medical advances and reduces the likelihood of inappropriate or unnecessary treatment.

There have been recent efforts to formalize training for practitioners performing venous procedures who are not certified in a specialty that involves formal endovascular training.[18] The ABVLM has set standards for minimum and observed procedural experience needed to obtain certification; however, this is not a certification endorsed by the American Board of Medical Specialties.[19] These standards are less rigorous than what is required to complete training in a surgical specialty.

The formal or informal training required to obtain competence in treating venous disease is unknown. The motivation for providers to seek careers in treating venous disease when they have not received formal training poses an interesting question.

Table II. Distribution by primary specialty: Radiology

Active certification in specialty	Study sample (N = 329)
Radiology	61 (18.5)
Diagnostic only	21 (6.3)
Interventional	40 (12.1)

Values are expressed as number (%).

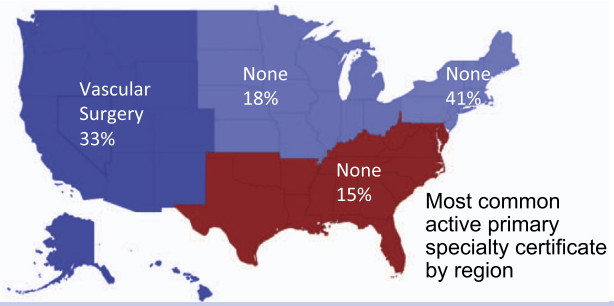

Fig 4. Most common active primary specialty board certification by region.

Table IV. Subgroup analysis by employer type

Provider characteristics	Study sample (N = 329)	Noncorporate (n = 222)	Corporate (n = 107)	*P* value
Active ABMS or AOA certification	271 (82.3)	194 (87.4)	77 (72.0)	.001
Medicine	90 (27.4)	67 (30.2)	25 (23.4)	.197
Radiology	61 (18.5)	43 (19.3)	17 (15.9)	.444
Surgery	113 (34.3)	84 (37.8)	35 (32.7)	.365
Vascular surgery	55 (16.7)	49 (22.1)	7 (6.5)	<.001
ABVLM certification	80 (24.3)	39 (17.6)	41 (38.3)	<.001
Formal endovascular training[a]	104 (32.6)	80 (36.0)	24 (22.4)	.013

ABMS, American Board of Medical Specialties; *ABVLM,* American Board of Venous and Lymphatic Medicine; *AOA,* American Osteopathic Association. Values are expressed as number (%).
[a] Formal endovascular training is defined as having completed training in an ABMS- or AOA- accredited program in vascular surgery or interventional radiology and carrying an active certification in that specialty.

Although vascular surgeons may not be able to treat all venous disease because of physician shortages and practice patterns, we chose to evaluate large cities where there are a large number of vascular surgeons. Quality care requires quality training and education.

Board certification is not required to provide quality care, and board certification does not guarantee quality care. However, with no board certification, the training and education of the provider is not regulated. This may lead to issues with care. It is not known whether the physicians without board certification were unable to obtain board certification and this led them to treat venous disease in an outpatient setting or whether the providers decided to let their board certification lapse and transition to a venous practice. There is great heterogeneity in the background and training of venous clinicians. In health care, this is not a prescription for consistent, high-quality care.

CONCLUSIONS

The widespread adoption of the Internet as a source of health information has led providers of a diverse range of specialties to attempt to meet patient demand online. The most accessible providers performing venous procedures nationwide lack formal endovascular training, and a significant portion do not participate in maintenance of any board certification. Stewardship is needed not only to maintain a standard of care among a diverse community of providers but to drive venous disease education, research, and public awareness.

AUTHOR CONTRIBUTIONS

Conception and design: JG, TO, EM, TT
Analysis and interpretation: JG, CB, SK, AAZ, TT
Data collection: JG, TO, TT
Writing the article: JG, TT
Critical revision of the article: TO, EM, CB, SK, AAZ, TT
Final approval of the article: JG, TO, EM, CB, SK, AAZ, TT
Statistical analysis: JG
Obtained funding: Not applicable
Overall responsibility: TT

REFERENCES

1. Pew Research Center. Internet/broadband fact sheet. Available at: http://www.pewinternet.org/fact-sheet/internet-broadband/. Accessed July 14, 2018.
2. Pletneva N, Cruchet S, Simonet MA, Kajiwara M, Boyer C. Results of the 10 HON survey on health and medical internet use. Stud Health Technol Inform 2011;169:73-7.
3. Pew Research Center. Fact sheets. Available at: http://www.pewinternet.org/fact-sheets/health-fact-sheet/. Accessed July 14, 2018.
4. The digital journey to wellness: hospital selection. Available at: https://www.thinkwithgoogle.com/advertising-channels/search/the-digital-journey-to-wellness-hospital-selection/. Accessed March 19, 2018.
5. Soot LC, Moneta GL, Edwards JM. Vascular surgery and the internet: a poor source of patient-oriented information. J Vasc Surg 1999;30:84-91.
6. Bailey MA, Coughlin PA, Sohrabi S, Griffin KJ, Rashid ST, Troxler MA, et al. Quality and readability of online patient information for abdominal aortic aneurysms. J Vasc Surg 2012;56:21-6.
7. Grewal P, Williams B, Alagaratnam S, Neffendorf J, Soobrah R. Quality of vascular surgery web sites on the internet. J Vasc Surg 2012;56:1461-7.
8. U.S. Census Bureau. American FactFinder—results. Available at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed July 14, 2018.
9. Jue JS, Spector SA, Spector SA. Telemedicine broadening access to care for complex cases. J Surg Res 2017;220:164-70.
10. U.S. Census Bureau. 2010 Geographic terms and concepts—census divisions and census regions. Available at: https://www.census.gov/geo/reference/gtc/gtc_census_divreg.html. Accessed July 14, 2018.
11. Google. Available at: http://www.google.com. Accessed March 19, 2018.
12. Statista. Search engine market share in the United States 2018. Available at: https://www.statista.com/statistics/267161/market-share-of-search-engines-in-the-united-states/. Accessed March 19, 2018.
13. Centers for Medicare and Medicaid Services. NPPES NPI Registry. Available at: https://npiregistry.cms.hhs.gov/. Accessed March 19, 2018.
14. Wu T, Deng Z, Feng Z, Gaskin DJ, Zhang D, Wang R. The effect of doctor-consumer interaction on social media on consumers' health behaviors: cross-sectional study. J Med Internet Res 2018;20:e73.
15. Wong WW, Gupta SC. Plastic surgery marketing in a generation of "tweeting. Aesthet Surg J 2011;31:972-6.

16. Baldwin M, Han DK, Wengerter SP, Vouyouka A, Tadros RO, Marin M, et al. IP199. #Vascular: discussions happening on social media without vascular surgeons. J Vasc Surg 2017;65:108S.
17. Chopra V, Kuhn L, Vaughn V, Ratz D, Winter S, Moureau N, et al. CE: original research: does certification in vascular access matter? An analysis of the PICC1 Survey. Am J Nurs 2017;117:24-34.
18. Zimmet SE, Min RJ, Comerota AJ, Meissner MH, Carman TL, Rathbun SW, et al. Core content for training in venous and lymphatic medicine. Phlebology 2014;29:587-93.
19. Comerota AJ, Min RJ, Rathbun SW, Khilnani N, Rooke T, Wakefield TW, et al. Program requirements for fellowship education in venous and lymphatic medicine. Phlebology 2017;32:459-73.

Submitted Sep 30, 2018; accepted Mar 27, 2019.