Vasectomy Reversal Online Marketing Practices: What Are We Putting Out There?

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OBJECTIVE To determine characteristics of providers marketing vasectomy reversal (VR) online, degree of information available online, the ease with which patients can compare providers, and the differences in VR practice patterns between academic and private practices.

MATERIALS AND METHODS We identified VR practices operating within the top 50 most populous metropolitan areas in the US. Practice websites were reviewed to obtain information such as provider educational background, level of magnification, ability to perform vasoepididymostomy, surgical volume, and cost. Based on information available, providers were assigned a novel REVERSAL score created by the authors. Descriptive statistics were used to compare results.

RESULTS Of the 107 providers identified (29 academic, 78 private), the majority were male urologists with a Doctor of Medicine degree. Academic providers were more likely to have fellowship training than private practice providers, 96.6 vs 43.6%, respectively ($P = 0.00001$). Compared to non-urologists, urologists were less likely to purchase online ads or disclose cost. Non-urologists charged significantly less than urologists, \$3,584 ± 1,554 and \$6,591 ± 1,518, respectively ($P = 0.00001$). Only one provider provided complete information as defined by REVERSAL score of 12, with the majority (61.7%) of providers achieving score ≤6.

CONCLUSION There is significant lack of transparency in publicly available information from VR practices. Practices should implement measures to improve dissemination of information to the public, so that patients can more easily compare providers and make informed decisions regarding VR. UROLOGY 00: 1–5, 2021. © 2021 Elsevier Inc.

KEYWORDS Vasectomy reversal, direct-to-consumer marketing, vasostomy, vasectomy, infertility

Of the 500,000 vasectomies performed annually in the United States (US), 6% of men ultimately pursue vasectomy reversal (VR) for various reasons.[1] Compared to sperm retrieval for *in vitro* fertilization, VR allows for natural conception and is cost-effective, particularly for couples desiring more than one child.[2,3] The competitive market for VR functions differently than the traditional health care market in respect to cost burden, price transparency, and market competition. VR, unlike most medical services, is rarely covered by insurance, leaving patients with most or all of the cost burden. Patients paying 100% out-of-pocket for VR have a strong incentive to shop around to compare prices and providers. Patients in this age cohort (<65 years) are much more likely to turn to the internet for health information compared to older patients.[4,5]

While cost is an immediate concern for patients, surgeon training, experience, and technique are essential for a successful outcome. VR is a technically demanding procedure that requires specialized microsurgical training to perform with consistent success, particularly when vasoepididymostomy (VE) is required.[1,6] The best outcomes are achieved with the use of an operating microscope to provide adequate magnification, in contrast to magnifying surgical loupes.[7] Furthermore, not all providers offer VE, which is required in up to 26% of cases due to epididymal obstruction.[8] Direct-to-patient marketing further complicates the delicate balance of procedure cost, surgeon experience, and geographic proximity facing patients. Even patients with strong health literacy may find it difficult to compare providers in this setting. In this study, we sought to identify providers specializing in VR as advertised online, by performing Google searches to assess how easily a prospective patient would be able to obtain information such as surgical volume, operative technique, success rates, and cost of procedure without a formal consultation. Our secondary objective was to

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Submitted: May 13, 2021, accepted (with revisions): June 25, 2021

assess for significant differences in practice patterns between academic and private practices.

MATERIALS AND METHODS

Identification of practices

An online search was performed for the 50 most populous metropolitan areas in the US to obtain a representative sample [9]. All cookies were cleared from the internet browser with each search to prevent them from influencing subsequent search results. A Google search was then performed to identify VR practices within each of the areas in question (e.g. Google search for "vasectomy reversal New York City"). Google searches comprise the majority of all internet searches, followed by Yahoo! And Bing [10]. When Yahoo! And Bing were queried, they yielded similar results to Google; therefore, only Google search results were included.

Evaluation of websites

The first three pages of each search result were reviewed. Practices were excluded if there was not a specific provider listed who performed VR at that practice, and if the practice website did not include any additional information beyond merely listing VR as a procedure performed. Websites that purchased Google advertisements and had an "Ad" annotation associated with their website were included. All content was then reviewed on the individual practice websites to obtain the following information: provider name; education (residency and fellowship training); level of magnification used (surgical loupes or operating microscope); reported ability to perform VE when clinically indicated; disclosure of literature and/or personal success rates; mention of current surgical volume; any mention of risks associated with VR; discussion of alternatives to VR; and total expense associated with VR. We utilized the website Healthgrades.com to obtain provider age.

Pertinent fellowship training, which will henceforward be referred to as an andrology fellowship, was defined as at least one additional year of training following completion of residency in microsurgery (this excluded weekend training courses), andrology, and/or male infertility. Websites that outlined indications for and/or explained VE were assumed to perform VE when clinically indicated unless otherwise noted. Current surgical volume was quantified as number of VRs per year. For practices that disclosed surgical volume as a range of weekly volume (e.g. 2 − 5 per week), yearly surgical volume was calculated by using the median and multiplying this by 48 weeks. Credit for disclosure of surgical volume was given for comments such as "Dr. X has performed over 200 vasectomy reversals," but not for claims made without an associated number of cases such as "high volume surgeon" or "X years of experience." Expenses of VR were defined as total cost to the patient and included anesthesia and facility fees (if applicable). Additional costs associated with upcharge for VE if required, or redo-VR, were not reported in the total procedure expense.

Practices were then assigned a total "REVERSAL score" to quantify provider experience and transparency based on the criteria and scoring system outlined in Table 1. A maximum REVERSAL score of 12 was indicative of an andrology fellowship-trained provider who provided all pertinent information necessary on his/her practice website for a patient to make an informed decision.

Statistical analyses

Continuous variables were reported as mean (±standard deviation [SD]) or median (interquartile range [IQR]). Categorical variables were reported as numbers and percentages. Mann-Whitney U test was used to compare means for continuous variables. Chi-squared analysis was used to test for significant differences between groups for categorical variables. 2-tailed P value < 0.05 was considered significant. Statistical analyses were performed using JMP Pro 14.1.0 (SAS Institute, Cary, NC).

Table 1. REVERSAL criteria and scoring system.

REVERSAL Criteria	Scoring System
Risks	1 No mention of risks of VR 2 Mentioned risks of VR
Education	1 Completed non-urology residency 2 Completed urology residency 3 Completed fellowship training in microsurgery, infertility, and/or andrology
Vasoepididymostomy	1 Information not available 2 Only performs VV regardless of clinical situation 3 Performs VE if clinically indicated
Expense	1 No disclosure of expenses associated with VR 2 Disclosed expenses associated with VR
Rates of success	1 Success rates not available 2 Referenced literature success rates 3 Referenced personal success rates
Surgical volume	1 No mention of surgical volume 2 Disclosed surgical volume
Alternatives	1 No mention of alternatives to VR 2 Mentioned alternatives to VR
Level of magnification	1 Information not available 2 Use of surgical loupes 3 Use of operating microscope
Total	-/12

VR = vasectomy reversal. VV = vasovasostomy. VE = vasoepididymostomy.

RESULTS

Provider characteristics

A total of 107 VR providers were identified, the majority of whom were male fellowship-trained urologists working in a private practice setting. Baseline characteristics of VR providers are summarized in Table 2. A map that includes the 50 metropolitan areas queried and geographic distribution of the providers included can be seen in Figure 1. Most providers were located in the South (34.7%), followed by West (31.7%), Midwest (19.7%), and Northeast (13.9%).

Academic versus private practice setting

Providers working in an academic setting were significantly more likely to have completed andrology fellowship training compared to those working in private practice (96.6 vs 43.6%, respectively, $P = 0.00001$), but less likely to disclose procedure cost online (13.8 vs 39.7%, respectively,

Table 2. Baseline characteristics of vasectomy reversal providers.

Total No.	107	(100)
No. practice type (%):		
Private	78	(72.9)
Academic	29	(27.1)
No. physician gender (%):		
Male	105	(98.1)
Female	2	(1.9)
No. physician credentials (%):		
MD	105	(98.1)
DO	2	(1.9)
Mean physician age (±SD)	52.3	(10.6)
No. residency training (%):		
Urology	100	(93.5)
General surgery	3	(2.8)
Family medicine	2	(1.9)
Obstetrics and gynecology	1	(0.9)
Orthopedic surgery	1	(0.9)
No. fellowship training (%):		
Andrology fellowship	62	(57.9)
No fellowship	39	(36.4)
Minimally invasive surgery fellowship	3	(2.8)
Oncology	2	(1.9)
Cardiothoracic surgery	1	(0.9)

Numbers in parentheses refer to percentages, except for "mean physician age" where it instead indicates the standard deviation (SD).

P = 0.011). No statistically significant differences were noted between practice settings for use of online advertisements, ability to perform VE, surgical volume, reference to literature or personal success rates, or mention of risks or alternatives to VR. Results are summarized in Table 3.

Urologists versus non-urologists

Of 107 providers, 100 (93.5%) were urologists and 7 (6.5%) were non-urologists (Table 2). All non-urologists disclosed pricing information online, compared to only 28.0% of urologists (P = 0.0001), and they were more likely to purchase advertisements (71.4 vs 15.0%, P = 0.0002). Disclosure of risks of VR was higher for non-urologists as well (71.4 vs 23.2%, P = 0.0052). No differences were noted between non-urologists and urologists when analyzing reporting of surgical volume, mention of any success rates, and discussion of alternatives to VR.

Cost

Of the 35 providers who disclosed online pricing, total mean cost was \$5,990 ± 1,935 (**Fig. S1**). Non-urologists were priced most competitively at \$3,584 ± 1,554 compared to urologists at \$6,591 ± 1,518 (p = 0.00001). Providers without pertinent fellowship training charged less than andrology fellowship-trained providers, \$5,405 ± 2,000 vs \$6,769 ± 1,590, respectively (p = 0.0316). No statistically significant differences were noted when comparing academic and private practices or providers with online ads versus those without ads.

Reversal score

Based on 8 domains (**R**isks disclosure; provider's **E**ducational background; ability to perform **VE**; **E**xpense disclosure; success **R**ate disclosure; **S**urgical volume disclosure; disclosure of **A**lternatives to VR; and **L**evel of magnification used for VR), providers were assigned a REVERSAL score out of 12 (Table 1). Only one practice achieved a maximum REVERSAL score of 12 (**Fig. S2**). Providers who had completed an andrology fellowship were more likely to have a higher total REVERSAL score (6.9 ± 2.4) compared to those who had not completed an andrology fellowship (4.8 ± 2.4) (P = 0.00001). No differences in total REVERSAL score were noted when comparing practice setting, use of online

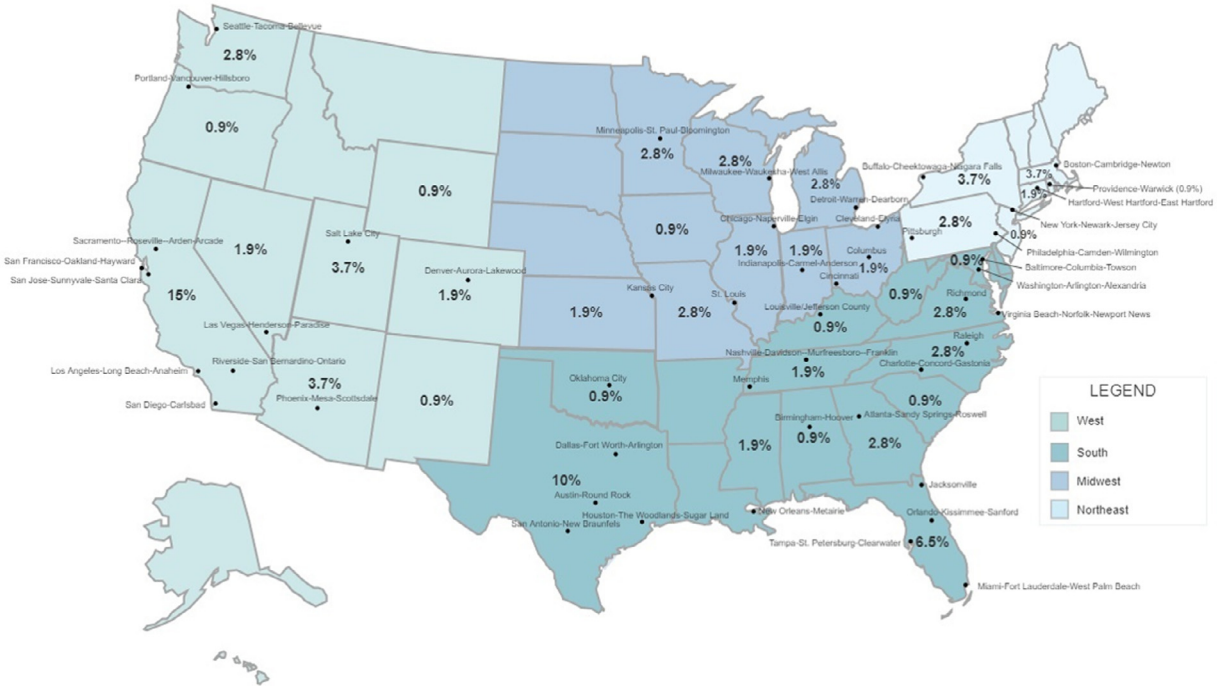

Figure 1. Metropolitan areas included in vasectomy reversal practice search. These are expressed as percentage of practices included in that state compared to total number of practices included in the study.

Table 3. Comparison of academic and private practices.

	All Practices	Academic	Private	p value
No. practice settings (%)	107 (100.0)	29 (27.1)	78 (72.9)	
No. use of online ads (%)	20 (18.7)	3 (10.3)	17 (21.8)	0.177
No. andrology fellowship (%)	62 (57.9)	28 (96.6)	34 (43.6)	0.00001*
No. able to perform VE (%)	79 (73.8)	20 (69.0)	59 (75.6)	0.485
No. mentioned experience (%)	33 (30.8)	9 (31.0)	24 (30.8)	0.989
No. referenced literature success rates (%)	49 (45.8)	17 (58.6)	32 (41.0)	0.104
No. referenced personal success rates (%)	23 (21.5)	4 (13.8)	19 (24.4)	0.237
No. disclosed VR cost (%)	35 (32.7)	4 (13.8)	31 (39.7)	0.011*
No. mentioned risks (%)	28 (26.2)	9 (31.0)	19 (24.4)	0.508
No. mentioned alternatives (%)	32 (29.9)	11 (37.9)	21 (26.9)	0.289

Numbers in parentheses refer to percentages, except for "mean physician age" where it instead indicates the standard deviation (SD).
* Indicates statistical significance.

ads, or residency type. Availability of online information was highly variable, with 61.7% of practices earning a REVERSAL score of 6 or less. The REVERSAL criteria most likely to earn practices a score of zero were failure to include education regarding risks, expense associated with procedure, surgical volume, and alternatives. Surgical volume was only available for 11 practices with a median yearly volume of 123 (IQR 75 – 187.5).

DISCUSSION

Over 70% of adults in the US report using the internet as the first resource they would look to for health or medical information[11]. Predictors of using the internet for health information include younger age, female gender, Caucasian race, higher education, and higher socioeconomic status.[5,12] Previous attempts to quantify and qualify providers performing VR have included analyzing American Board of Urology certification case logs, which only accounted for 1,930 VR procedures done by 487 urologists over a period of six years[13]. The authors reported that andrology/infertility fellowship trained urologists accounted for 58% of providers performing VR, similar to our findings in this study. Pathak *et al.* surveyed 74 members of the Society for Male Reproduction and Urology to assess VR practice patterns and found that most surgeons (24.3%) performed between 11 – 20 VR per year.[14] In contrast, we were only able to report a numeric surgical volume for 11 providers ranging from 40 to 750 annually, which likely represents a reporting bias amongst the highest volume providers.

Ours is the first study to evaluate providers marketing VR online, which is a unique niche within urology. It is similar to the cosmetic plastic surgery market in respect to out-of-pocket cost burden for patients. In a study by Kaplan *et al.*, patients considering cosmetic surgery who used an online cost estimator tool were 41% more likely to book a procedure.[15] The authors argued that price transparency can function as a lead generation source for patients paying for services out of pocket and reduce the "sticker shock" associated with consultations. The American Society for Aesthetic Plastic Surgery issues an annual report that includes the total number of cosmetic procedures performed in the U.S. as well as the average cost per procedure by extrapolating data collected from 288 participating plastic surgery practices.[16] Transparency in pricing may in part explain why cosmetic procedures have increased in price by less than 50% compared to the 118.6% increase in the price of medical care services between 2000 and 2020.[17]

Most providers were located in the South and West geographic regions, which mirrors US Census population data[18]. Only the largest 50 metro areas were included in our search, and thus may not reflect all VR providers with an online presence. Not surprisingly, most VR providers worked in the private practice setting, despite only 43.6% of these providers having andrology fellowship training compared to 96.6% of academic providers. This likely reflects private practice providers having a larger percentage of the market share and/or being more adept with marketing without many of the constraints that come with working at an academic center.

While non-urologists made up only 7% of providers in this cohort, their mean cost for VR was 45.6% less than that of urologists. While none of these providers disclosed surgical volume, 5 of the 7 purchased ads and solely perform VR (or vasectomy) in their practice. It therefore stands to reason that these individuals are likely performing a relatively high surgical volume of VRs. Many would argue that VR should be performed by a provider with specialty training in andrology, or at the least a surgeon with knowledge of scrotal anatomy who can manage post-operative scrotal hematoma or chronic orchialgia. It may be difficult for patients to discern the level of expertise required for this procedure. It is our responsibility as specialists in the field to provide accurate information, educate patients, and set the standard for the ethical practice of medicine.

This study is a limited analysis of providers found with an online search, and does not represent all providers who perform VR. Given the variability of the surgery setting (in office, ambulatory, or hospital) and billing structure (cash pay vs insurance), it is difficult to capture how many providers perform VR annually or their surgical volume. Furthermore, not all patients may use the internet to locate a provider, and instead may rely on referrals from other providers or patients. Here, we present the availability of information online for patients considering VR, which has not previously been reported. Patients can contact providers for

additional information, but this creates an additional barrier that may result in multiple phone calls with long wait times and/or multiple transfers. Most patients would likely be instructed to make a formal appointment to obtain basic information that could be included online.

To compare the degree of information available for each practice, we created a non-validated scoring system that we refer to as the REVERSAL score. Based on 8 domains, providers are assigned a score out of 12 (as described in Table 1). In order for a provider to achieve a perfect score of 12, he or she would need to be a provider who completed formal fellowship training in microsurgery, infertility, and/or andrology; explicitly states VE will be performed when clinically indicated; reports using an operating microscope for VR; and discloses procedure cost, surgical volume, personal success rates, risks, and alternatives to VR on his or her practice website. Only one provider achieved a REVERSAL score of 12, and the majority (61.7%) of providers achieved a score of less than or equal to 6 — highlighting significant room for improvement. The REVERSAL score is non-validated and not weighted for the individual domains; to do so is beyond the scope of the study design. It is not intended to be used by patients comparing VR providers, or for VR providers to claim superiority over one another. We would suggest it as a guide for VR providers to evaluate their own website to identify potential gaps in their online patient education resources.

We recognize limitations associated with the REVERSAL score. Formal andrology fellowships may not have been available for older providers who have been grandfathered in, and high-volume non-fellowship trained VR surgeons may be equally skilled at performing VR despite not having formal qualifications. It also stands to reason that a provider would disclose costs, surgical volume, surgical technique, risks, and alternatives of VR during a formal consultation despite not providing this information online. Among the 49 practices that provided literature success rates, all invariably provided rates consistent with those reported by Belker *et al.* [19].

Additional consideration should be given to the fact that for providers who are employed by a health system (e.g. academic providers, hospital-employed private practice providers), there are frequently institutionally imposed limitations on the type and amount of content that can be posted on websites. As such, it is quite possible that many providers would achieve higher REVERSAL scores if they had been permitted to disclose their practice information free from restrictions.

CONCLUSION

There is a significant lack of transparency that precludes the general public from obtaining basic information about VR practices, both academic and private. This limits patient access to accurate information, ability to compare providers, and educated assessment prior to scheduling a formal consultation. We strongly encourage all academic and private practices to disclose as much information as possible online, such that patients can more easily make informed decisions on where they seek care.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.urology.2021.06.027.

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