Testosterone Replacement Therapy and the Internet: An Assessment of Providers' Health-related Web Site Information Content

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OBJECTIVE To compare how providers of testosterone replacement therapy (TRT) in large metropolitan cities promote androgen replacement on their patient-oriented Web sites.

MATERIALS AND METHODS TRT provider Web sites were identified using Google search and the terms "Testosterone replacement" and the name of the 5 most populous US cities. These Web sites were assessed for (1) type or specialty of medical provider, (2) discussion of the benefits and risks of TRT, and (3) industry affiliations.

RESULTS In total, 75 Web sites were evaluated. Twenty-seven of the 75 clinics (36%) were directed by nonphysicians, 35 (47%) were overseen by nonurology or nonendocrine physicians, and only 13 (17%) were specialist managed. Fourteen of 75 (18.6%) Web sites disclosed industry relationships. Ninety-five percent of Web sites promoted the benefits of TRT including improved sex drive, cognitive improvement, increased muscle strength, and/or improved energy. Only 20 of 75 Web sites (26.6%) described any side effect of TRT. Web sites directed by specialists were twice as likely to discuss risks of TRT compared with nonspecialist providers (41% vs 20%; odds ratio = 2.77; $P < .01$). Nine of 75 (12%) of all Web sites actually refuted that TRT was associated with significant side effects.

CONCLUSION Urologists and endocrinologists are in the minority of providers promoting TRT on the Internet. Specialists are more likely to discuss risks associated with TRT although the majority of surveyed Web sites that promote TRT do not mention treatment risks. There is substantial variability in quality and quantity of information on provider Web sites, which may contribute to misinformation regarding this prevalent health issue. UROLOGY 85: 814–818, 2015. © 2015 Elsevier Inc.

Although testosterone has been used clinically for >75 years, its use has increased at an exponential rate over the last 10 years.[1] Hypogonadism is now one of the fastest growing diagnoses in the United States. An estimated 13.8 million men in the United States have been diagnosed with low levels of testosterone, and prescriptions for testosterone replacement therapy (TRT) are rising exponentially.[2,3] Testosterone prescriptions have more than doubled since 2006, and sales are expected to triple to >$5 billion by 2017.[4,5] In response to the increase in commercial advertising and patient awareness of hypogonadism, providers of testosterone replacement, including TRT-dedicated walk-in clinics and physician offices, have increased across the country.[2]

Patients are increasingly turning to the Internet to find medical information and clinical providers. In 2012, 72% of the Internet users reported that they searched online for health information within the past year.[6] Seventy-seven percent of online health seekers began their search at an engine such as Google Search, Bing by Microsoft, or Yahoo! Search, whereas only 13% reported use of a site that specializes in health information such as WebMD.[6] Because many patients are progressively turning to the Internet for medical information, providers of testosterone replacement are dedicating increased effort to improve their Web presence and attract patients. Unfortunately, because the Internet remains a largely unregulated source of advertising and promotion, patients may encounter considerable variability in quality and quantity of information and content. Furthermore, there is concern that the potential side effects of TRT may not be well discussed.[7-11] Although several studies exist, which explore the quality of the Internet information on

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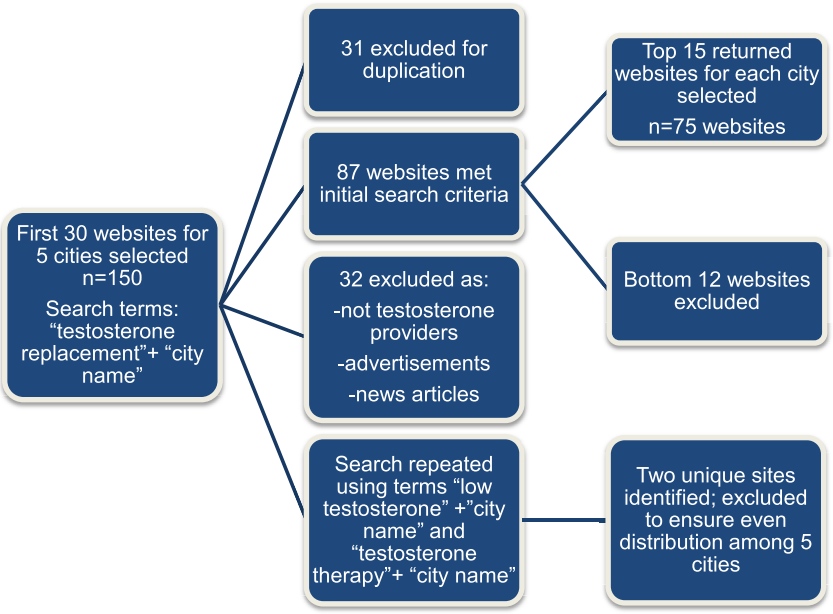

Figure 1. Flowchart of selection process for Web site inclusion. (Color version available online.)

health-related subjects such as diabetes mellitus and depression, to the best of our knowledge, there are no contemporary evaluations of the information provided to patients regarding TRT by health care providers.[12-14]

Our objective was to review how providers in large metropolitan areas promote TRT on their patient-centered Web sites with a focus on the potential risks and benefits of TRT, provider demographics, and potential industry sponsors. Our hypothesis was that provider Web sites have low levels of information regarding risks associated with TRT.

MATERIALS AND METHODS

We used a methodology for our Internet search based on systematic literature reviews, using standardized search string techniques; our methodology was in accord with the American Public Health Association criteria regarding the assessment of quality of health information on the Internet.[15] We searched English-language Internet Web sites in November 2013 using the search engine Google. The search engine Google was selected based on contemporary market data showing that Google is the most commonly used search engine (83% of all the Internet searches).[6] A preliminary review of the Internet Web sites was performed using a composite of different search terms to identify provider Web sites. Our initial review of the Internet providers included the use of terms "testosterone," "testosterone replacement," "testosterone replacement therapy," "testosterone clinic," and "low testosterone." After review of the top Google search results, it was decided that TRT providers were best identified using Google search and the search string "testosterone replacement" + "city name," representative of the 5 most populous US cities (New York City, Los Angeles, Chicago, Houston, and Philadelphia). The computer physically used for the Internet search was based in Chicago. Because fewer than one-third of all Web searches proceed beyond the first page of search results, we elected to limit our results to the first 3 pages (first 30 search results) of a Google search for each city to determine the total number of sites to review.[6] Figure 1 depicts a detailed flowchart on how Web sites were selected and excluded. The top 15 unique Web sites were evaluated for authorship and contents; duplicate Web sites were not double counted. To account for several different potential search terms, we re-reviewed using the same search criteria the first 150 returned sites using the terms "low testosterone" + "city name" and "testosterone therapy" + "city name." Of the 150 Web search returns, we found only 2 unique sites using these additional search criteria. In an effort to keep an even distribution of testosterone providers among the 5 cities included, the additional 2 unique sites were not included in our final data analysis. Two reviewers independently identified the validity of Web sites selected and the content provided. All Web sites represented a physical clinic or hospital that promoted testosterone replacement as a service provided at a physical location within the Metropolitan statistical area as defined by the US Census Bureau. The authorship of each Web site was determined to be a clinical provider of TRT, and each center was categorized as hospital (public or private) or clinical office (physician per group). Web sites were assessed for (1) the type of medical provider, (2) discussion of the benefits and risks of TRT, and (3) industry affiliation or sponsors.

For each search string, we also recorded the presence of sponsored links or advertisements on the results page. We categorized Web site author or director as urologist, other surgeon, endocrinologist, primary care physician, or nonphysician.

Our primary outcome of interest was the discussion of the potential benefits and risks of TRT. Secondary outcomes included industry advertisements or sponsorships and differences in provider-specific demographics. The chi-square statistics were used to assess this nonparametric cohort of Web providers. P values $\leq .05$ were considered statistically significant.

RESULTS

The results for 75 provider Web sites offering TRT were assessed. Sixteen Web sites were excluded because they