Original Study

Robotic Prostatectomy on the Web: A Cross-Sectional Qualitative Assessment

Hendrik Borgmann,[1,2] René Mager,[1] Johannes Salem,[3] Johannes Bründl,[4] Frank Kunath,[2,5] Christian Thomas,[1] Axel Haferkamp,[1] Igor Tsaur[1]

Abstract

Many patients diagnosed with prostate cancer search for information on robotic prostatectomy on the Web. We evaluated the quality, popularity, accessibility, reliability, and readability of 43 robotic prostatectomy Web sites. Results showed medium to high ratings in all domains of quality and poor readability of Web sites. Physicians should guide their prostate cancer patients to Web sites with high-quality and adequate readability.

Background: Many patients diagnosed with prostate cancer search for information on robotic prostatectomy (RobP) on the Web. We aimed to evaluate the qualitative characteristics of the mostly frequented Web sites on RobP with a particular emphasis on provider-dependent issues. **Materials and Methods:** Google was searched for the term "robotic prostatectomy" in Europe and North America. The mostly frequented Web sites were selected and classified as physician-provided and publically-provided. Quality was measured using *Journal of the American Medical Association* (JAMA) benchmark criteria, DISCERN score, and addressing of Trifecta surgical outcomes. Popularity was analyzed using Google PageRank and Alexa tool. Accessibility, usability, and reliability were investigated using the LIDA tool and readability was assessed using readability indices. **Results:** Twenty-eight Web sites were physician-provided and 15 publically-provided. For all Web sites, 88% of JAMA benchmark criteria were fulfilled, DISCERN quality score was high, and 81% of Trifecta outcome measurements were addressed. Popularity was average according to Google PageRank (mean 2.9 $\pm$ 1.5) and Alexa Traffic Rank (median, 49,109; minimum, 7; maximum, 8,582,295). Accessibility (85 $\pm$ 7%), usability (92 $\pm$ 3%), and reliability scores (88 $\pm$ 8%) were moderate to high. Automated Readability Index was 7.2 $\pm$ 2.1 and Flesch−Kincaid Grade Level was 9 $\pm$ 2, rating the Web sites as difficult to read. Physician-provided Web sites had higher quality scores and lower readability compared with publically-provided Web sites. **Conclusion:** Websites providing information on RobP obtained medium to high ratings in all domains of quality in the current assessment. In contrast, readability needs to be significantly improved so that this content can become available for the populace.

Introduction

For prostate cancer (PCa), 220,800 new cases and 27,540 deaths are predicted for 2015 in the United States, making this entity aside from skin cancer the most frequent malignancy and the second leading cause of cancer mortality in men.[1] Widespread prostate-specific antigen screening as well as increasing awareness of PCa have contributed to most men nowadays being diagnosed with localized disease in the Western world.[2] However, personal decision-making for a further treatment course might be challenging, because depending on patient- and tumor-specific characteristics, several options including radical prostatectomy, radiotherapy, and even active surveillance with their respective benefits, side effects, and risks currently belong to the internationally accepted curative therapeutic armamentarium.[3,4]

Besides health care provider counseling, patients increasingly refer to the Internet to seek for perspicuous and feasible information on their condition.[5] Recently, our group showed a promising quality of the common Web sites that show information on the diagnosis, "prostate cancer."[6] Particularly regarding surgery, which

[1]Department of Urology, University Hospital Frankfurt, Frankfurt, Germany
[2]UroEvidence@Deutsche Gesellschaft für Urologie, Berlin, Germany
[3]Department of Urology, St-Josefs-Hospital, Dortmund, Germany
[4]Department of Urology, University Hospital Regensburg, Regensburg, Germany
[5]Department of Urology, University Hospital Erlangen, Erlangen, Germany

Address for correspondence: Hendrik Borgmann, MD, Department of Urology, University Hospital Frankfurt, Theodor-Stern-Kai 7, 60590 Frankfurt, Germany
Fax: +49-69-6301-81137; e-mail contact: borgmann.hendrik@gmail.com

represents a frightening intervention in corporeal integrity, patients tend to use online information for decision-making twice as much as they do for medications and cancer screening.[5] Surprisingly, despite a high usage rate of the Internet among patients with PCa,[7] qualitative characteristics of the Web sites on its treatment options have been scarcely investigated using validated tools so far.

In the United States, robotic prostatectomy (RobP) is meanwhile the most common exstirpative treatment for PCa, recently having by far superseded open prostatectomy, which has been the gold standard for many decades, in its prevalence.[8] Amplified by widespread marketing and direct to consumer advertisement of the technology,[9] not yet robust but emerging evidence of advantageous functional outcomes of RobP over the open approach in terms of 12-month urinary continence[10] and potency recovery[11] presupposes that patients often search for counseling particularly about this approach. Of note, a study in 2011 reported a poor quality of the Web sites on RobP when applying principles of honest information presenting.[9] Taking into account a continuous evolution of the Internet, this information might be invalid now.

In addition to previous research regarding conformity of the online content on RobP with the current state of evidence,[12] we focused specifically on evaluation of the qualitative characteristics of the most frequented Web sites on RobP using validated tools with a particular emphasis on provider-dependent issues.

Materials and Methods
Search Strategy
On July 13, 2015, we performed an internet search for the term "robotic prostatectomy" on Google which currently covers 88% of the global search engine market.[13] To account for geographic differences, we carried out the search simultaneously on 2 different continents—in Europe (Frankfurt, Germany) and in North America (Vancouver, Canada). Ad boxes were not considered to avoid geographically specific results. The search was performed on a new-installed browser (Google Chrome, version 38.0 [www.google.com]) with the English language setting. We included the first 50 search results each because these encompass 99% of average click-through rates by search engine users.[14] This strategy covers 87% of the results that patients encounter during their online search for information on RobP. The Web sites that were duplicate (after searches in 2 different geographic locations), journal articles, PDF files, manufacturing company Web sites, or contained mainly videos were excluded for the final analysis. For each of the remaining Web sites undergoing final analysis, we granted a classification either of physician-provided if managed by a hospital or a health care provider's unit or of publically-provided if presented by an organization, association, or an information or news portal. The Web sites were then accessed for qualitative characteristics.

Quality
The *Journal of the American Medical Association* (JAMA) benchmarks for quality assessments of health Web sites include 4 criteria, namely, authorship, attribution, currency, and disclosure.[15] Authorship means that the Web site appropriately states the author's name, affiliations, and credentials. Attribution refers to an effective reference of the content presented on a Web site. Currency means providing dates of the original content posting and last update. Disclosure means that the Web site "ownership" as well as any advertising, sponsorship, or conflict of interest is clearly and completely disclosed.

The DISCERN instrument is a validated 16-item questionnaire that can be used to evaluate the quality of written information on health-related Web sites.[16] Questions from the DISCERN instrument were rated on a scale ranging from 1 ("no"), 2 to 4 ("partially," meeting the criterion to some extent), to 5 ("yes"). These questions were related to the section reliability (questions 1-8), quality of information on treatment choices (questions 9-15), and global quality of the publication (question 16). The maximum overall DISCERN score for all 16 questions was 80, and the overall quality of each Web site was classified as high ($\geq$ 65 points), moderate (33-64 points) or low (16-32 points).

One specific quality measurement for radical prostatectomy are the ideal "trifecta" outcome criteria comprised of cancer control, continence, and potency.[17] Web sites were assessed on addressing these outcomes.

Popularity
The Google PageRank, which was assessed above the Google Toolbar, is an algorithm used by Google Search to rank Web sites in its search engine results. It works by counting the number and quality of links to a page to determine a rough estimate of the importance of the site. The PageRank ranges from 0 (no rank assigned), > 3 (average), to 10 (best possible rank).

The Alexa traffic rank was assessed using the Alexa Web analysis tool (www.alexa.com). It determines the Web site popularity on the basis of 3 months of aggregated traffic data from 30 million Alexa Toolbar users. A high popularity results in a low rank.

Accessibility, Usability, and Reliability
The LIDA instrument is a validated 41-item online questionnaire (www.minervation.com/lida-tool) used to investigate the topic of accessibility, usability, and reliability of health care Web sites. Each question was rated with a score of 0 ("never"), 1 ("sometimes"), 2 ("mostly"), or 3 ("always"). Some domains of major importance contain subquestions resulting in a higher maximum score. Accessibility was investigated by questions 1 to 6 regarding conformance of the Web site to World Wide Web Consortium standards (www.w3.org/standards). Usability was assessed by questions 7 to 24 related to clarity of information, consistency of Web site design, presence of effective browsing and search functions, and inclusion of interactive media. Reliability was assessed by questions 25 to 41 on Web site update frequency, conflicts of interest, the methodology of content production, and the accuracy of content. LIDA scores were recorded as percentages of the maximum score of the respective topic. The overall LIDA score was calculated as the sum of the points of the 3 topics and recorded as a percentage of 168 points in total. Ranking of the Web sites was classified as "high" ($\geq$ 90%), "moderate" (50%-89%), or "low"($\leq$ 49%) relating to the separate topic or overall score.

Readability
Readability of the Web sites was assessed using an automated tool on www.readability-score.com. We used the widespread Flesch Reading Ease score and Flesch–Kincaid Grade Level, which