

Patient Perceptions and Current Trends in Internet Use by Orthopedic Outpatients

M. Tyrrell Burrus, MD · Brian C. Werner, MD · James S. Starman, MD · Gregory M. Kurkis, MD · Jonathan M. Pierre, BS · David R. Diduch, MD · Joseph M. Hart, PhD

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Abstract *Background:* Many studies have highlighted concerns about the completeness and quality of information found online and how this may affect patients' education about their medical problems. One aspect of internet usage that has received less attention in the literature, however, is patient perception of the information that is gathered online, and how patients use it related to their musculoskeletal care. *Questions/Purposes:* The objective of the study is to utilize a cross-sectional study design to describe internet usage and patient perceptions of orthopedic online information and to identify differences in usage patterns. *Methods:* One thousand two hundred ninety-six questionnaires were distributed to consecutive patients at orthopedic outpatient clinics which consisted of questions pertaining to patients' internet use. Basic demographic data were collected, and subgroup analyses were performed to examine the effect of three variables (age, gender, and clinic type) on various outcomes. *Results:* 84.9% of patients reported access to the internet. Of patients with internet access, 64.7% reported using the internet for obtaining orthopedic information. 43.1% of the respondents who searched for orthopedic information rated it as "very useful," 56.3% found it "somewhat useful," and 0.6% found it "not at all useful". Younger patients were more likely to have used the internet for health and orthopedic information and to have found this information either very or somewhat useful. Males were more likely to have found the internet information very useful. Overall, only

33.7% of patients who researched their current orthopedic complaint accessed the institutional website for information. *Conclusion:* A large proportion of patients use the internet to research orthopedic information and most patients, especially younger males, find the information useful.

Keywords Internet · Health information · Perception

Introduction

The importance of the internet to everyday life in America is undeniable, and data shows that access to this information resource continues to grow. As of December 2013, more than 300 million Americans had internet access, representing an increase of more than 62 million over just 5 years ago, and totaling 84.9% of the overall population. [14] Numerous articles have explored the evolving importance of the internet on the delivery of healthcare, including the impact on musculoskeletal care, and this topic continues to generate significant interest from providers and patients alike [3–6, 9, 11, 15, 17].

Many studies have highlighted concerns about the completeness and quality of information found in online sources and how this may affect patients' education about their medical problems. One aspect of internet usage that has received less attention in the literature, however, is patient perception of the information they gather online, and how they actually use it related to their musculoskeletal care [2, 7, 8]. In 2002, Gupte surveyed 369 orthopedic outpatients and found that among the 101 respondents who reviewed online information on their condition, 76% perceived it as subjectively useful. [7] 61.5% of the respondents planned to use the internet in the future for musculoskeletal information, and 35.2% of respondents were open to the idea of an online-based consultation for orthopedic care. In contrast, Jariwala published results of 403 patients surveyed at an outpatient fracture clinic in 2004 and found that 70% of

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M. Tyrrell Burrus, MD · B. C. Werner, MD (✉) ·
J. S. Starman, MD · G. M. Kurkis, MD · J. M. Pierre, BS ·
D. R. Diduch, MD · J. M. Hart, PhD
Department of Orthopaedic Surgery,
University of Virginia Health System,
PO Box 800159 HSC, Charlottesville, VA 22908, USA
e-mail: bcw4x@virginia.edu

those patients who found information online received different or conflicting information during their clinic visit [8].

It remains unclear how current patients presenting to orthopedic outpatient clinics use the internet to obtain information related to their diagnosis, how frequently that information is discussed at their visit, and how useful they perceive it to be. The primary objective of the present study was to describe current usage and patient perceptions of orthopedic online information and to identify differences in usage patterns and perceptions based on age, gender, and type of clinic attended.

Patients and Methods

After obtaining approval from the Institutional Review Board for Health Sciences Research, a one page questionnaire consisting of 12 questions was distributed to all orthopedic outpatient clinics at the University of Virginia, a tertiary care referral center located in a relatively rural area (Fig. 1). Verbal consent was obtained from all adult patients or from adult caregivers for minor patients. All participants

submitted paper surveys voluntarily and anonymously. The survey included no personal identifying or linked data.

Questionnaires were distributed consecutively to all presenting outpatients, with the sole exclusion criteria being prior completion of the survey on another office visit during the study period. Information was not collected on the number of patients or any demographics about those patients who elected not to participate in the study. (Note: As no patient identifiers were recorded, patients were asked prior to being handed the survey if they had previously completed it.) In pediatric clinics, the survey was completed by the presenting caregiver of the patient. Using a convenience sample model, a total of 1259 questionnaires were distributed and returned between April 1 and May 1, 2014. Surveys were anonymously collected prior to the patient being seen by their physician via a sealed envelope.

Survey questions assessed the following domains: (1) Demographics: age, gender, type of clinic attended; (2) Access to the internet: current access, use to access health-related information, use to access orthopedic information; (3) perception of completeness of information accessed about orthopedic

Orthopaedic Internet Usage Questionnaire Form

Please fill out the following questions to the best of your knowledge
Please do **NOT** place your name on this form

1. Date _____
2. Age _____
3. Gender **M / F**
4. Do you currently have access to the internet (at home or elsewhere)? **Y or N**
5. Have you **EVER** used the internet to obtain health-related information? **Y or N**
6. Have you **EVER** used the internet to obtain orthopaedic- health information? **Y or N**
7. If **YES** to #6, how would you rate the usefulness of the internet based orthopaedic information?
 - A. Very useful
 - B. Somewhat useful
 - C. Not useful at all
8. Have you used the internet for information on your **CURRENT** orthopaedic problem? **Y or N**
9. If Yes to #8, do you plan to discuss the information with your doctor? **Y or N**
10. Please circle all websites you have used to obtain orthopaedic information:
 - A. Google search
 - B. Yahoo search
 - C. Bing search
 - D. WebMD search
 - E. UVA orthopaedics website
 - F. Other (specify) _____
11. Have you looked at any internet information pertaining to your physician's reputation?
Y or N
12. Please circle the clinic type you are attending today
 - A. Hand/Elbow
 - B. Spine
 - C. Sport
 - D. Foot/Ankle
 - E. Pediatric
 - F. Tumor
 - G. Trauma
 - H. General
 - I. Adult Reconstruction

WHEN COMPLETED PLEASE PUT THE FORM BACK IN THE ENVELOPE AND PLACE IN MESSENGER MAIL

Thank you for your participation!

Fig. 1. The questionnaire as it was distributed to patients in the orthopedic clinics; however, the institution name's has been removed.

Table 1 Patient demographic information and questionnaires answers

	Number	Percentage
Age (years)	50.33+/-17.20	n/a
Female	662	57.0
Internet access	986	84.9
Used internet to investigate health questions*	772	78.3
Used internet to investigate orthopedic questions*	638	64.7
Used internet to investigate current orthopedic problem*	502	50.9
Planning to discuss with physician ^γ	329	65.5
Rated information as “very useful” [‡]	275	43.1
Rated information as “somewhat useful” [‡]	359	56.3
Rated information as “not at all useful” [‡]	4	0.6
Searched physician reputation online	320	27.6

n/a not applicable

*Only includes patients with internet access

^γOnly includes patients who used the internet to investigate their current orthopedic problem

[‡]Only includes patients who used the internet to investigate any orthopedic questions

condition and plans to discuss it with physician; (4) specific search strategies used; and (5) use of the internet to obtain information about physician reputation.

Statistical Analysis

Multivariable binomial logistic regression was used to examine the effect of variables on various outcomes while controlling for the remaining variables was performed using SPSS (SPSS, version 22, Chicago, IL) with clinical significance defined as *p* < .05. Continuous variable were reported with a *p* value, and categorical variables were reported as an odds ratio, 95% confidence interval, and *p* value.

Results

Of the 1259 surveys that were distributed and returned, 98 were incomplete or inappropriately completed, leaving a total of 1161 surveys for inclusion in the analysis. The average respondent age was 50.3 ± 17.2 years. Fifty-seven percent (662/1161) of respondents were female, and 84.9% (986/1161) reported having access to the internet [Table 1]. When only including patients who have internet access, 78.3% (772/986) of patients used the internet for obtaining health information, and 64.7% (638/986) used the internet for orthopedic information (with 50.9% (502/986) using it for their current

orthopedic complaint). Only 47.6% (239/502) of patients plan to discuss the information that they found online with a physician. The largest percentage of patients evaluated in this study came from the Sports Medicine clinic (27.9%) [Table 2].

When only including patients who used the internet to look up orthopedic information, 43.1% (275/638) of the respondents who searched for orthopedic information subjectively rated it as “very useful,” 56.3% (359/638) found it “somewhat useful,” and 0.6% (4/638) found it “not at all useful.” Of those patients who used the internet for their current orthopedic complaint, the most commonly cited search engine was Google (82.3%, 413/502), with only one-third accessing our institutional orthopedic website (Fig. 2). For patients who selected “Other” in the questionnaire, the top three websites accessed were “Mayo Clinic,” “YouTube,” and “Wikipedia.”

In the analysis of respondent data based on age groups, younger age was significantly associated with increased internet usage for health information (*p* = 0.002) and internet usage for orthopedic information (*p* = 0.004), including their current orthopedic complaint (*p* = 0.012), and were more likely to find the information to be either “very helpful” (*p* = 0.038) or “somewhat helpful” (*p* < 0.0001). Younger patients were more likely to use Google as their search

Table 2 A breakdown of the number of patients from each clinic who completed questionnaires

Clinic type	Number	Percentage of all patients
Spine	199	17.1
Sports	324	27.9
Adult reconstruction	192	16.5
Foot and ankle	233	20.1
Head and elbow	29	2.5
Pediatric	19	1.6
Trauma	47	4.0
Tumor	35	3.0
General	83	7.1

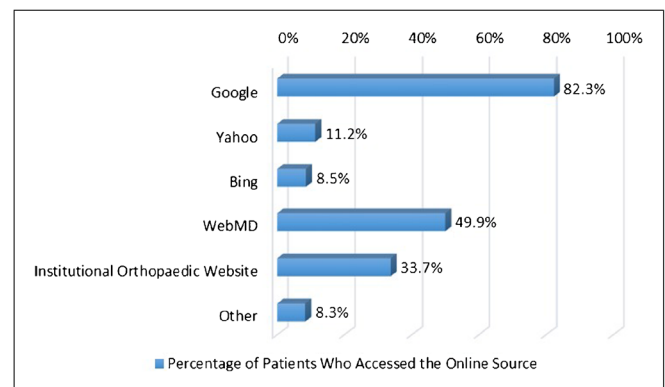


Fig. 2. The online resources accessed by the patients. Note that the sum of the percentages is greater than 100% since some patients utilized multiple websites.

engine over any others ($p = 0.001$). No other significant relationships were seen between the variables and the method of online healthcare research.

In the analysis of respondent data based on clinic attended, the type of clinic did not have a significant effect on patients' internet usage other than patients who attended the Sports Medicine clinic were less likely ($p < 0.05$) to utilize WebMD for their orthopedic-related questions. Gender was not associated with any internet usage trends except that males were more likely to find the online information to be "very useful" (38.7% (168/434) males compared to 19.4% (107/552) females).

Discussion

The current study indicates that younger age is associated with an increased utilization of the internet for general health information and orthopedic information and that this population is more likely to find this information useful. Males are more likely to find the information online to be very useful, and patients of both sexes are more likely to research their current orthopedic problem on various internet search engines rather than on the website of the institution where they are being treated.

Although this study has many strengths, including its large sample size, there are also some important limitations to note. Based on our obtained sample and typical clinical volumes at the different subspecialty clinics in our institution, this sample does not represent an equal sample size from each clinic. This may explain how patients from the Sports Medicine clinic were less likely to use WebMD as an online source, as we can provide no explanation for this conclusion. Also, no data was gathered related to the socioeconomic, educational, or insurance status of the respondents, which limited our ability to analyze the results based on these factors. These patients represent the internet habits of orthopedic outpatients at one institution and, thus, may not be generalizable to other clinics across the nation. Since pediatric patients may present to clinic with different caregivers, then it is possible that a single pediatric patient is represented more than once in this study. Data was collected over 3 years ago and, given the evolving pace of online resources and of the internet, some of these findings could be outdated.

The continued growth of the internet has provided patients with unprecedented access to medical information, and the conclusion that younger patients are more likely to use the internet for health care is not surprising due to the addition of smart phones and thus continuous internet access. This age-related difference may disappear over the next few decades as these younger patients who grow up utilizing the internet become the older population while they continue to rely on the internet. This study also demonstrates that these younger patients are more likely to find the information to be very or somewhat useful. This result may be due to this population's improved ability to navigate the internet and, as they perceive, to obtain satisfactory answers to their healthcare questions. The other conclusion was that males are more prone to find the

online information to be very useful. We are not aware of any previous research to explain these findings.

Although medical providers may consider much of this available online information as biased, incomplete, or altogether inaccurate [1, 4, 5, 15], it is clear from the results of this study that patient perceptions of online-based information are considerably more positive. Over half of the respondents in the present study rated the information they retrieved online as very useful or somewhat useful, and around 1% found it not helpful at all. It is unclear whether this perception reflects the overall quality of information available online or if it indicates the difficulties faced by those without any medical background in discriminating between good and bad (or incomplete) information. It is also possible that the information considered important and thus useful by medical providers may not be the same as that considered important by patients.

In the current study, only 33.7% of the patients who used the internet accessed our institution's website, and thus most patients relied on information whose content was not assessed or approved by our providers. Although this low rate of institutional website usage may not be the same at all institutions, institutional websites should be more heavily relied upon, and patient online traffic should be directed to these websites. This online information offers clinicians the advantage of continuing patient education after clinic visits since brief patient encounters have been indirectly and directly encouraged by the current healthcare climate. Since 84.9% of the patients in the current study have internet access, the majority of patients would have access to this physician-controlled information before, during, and after their treatment. When using search engines such as Google, the order of the results is able to be manipulated by paying a fee to have particular results higher on the list. Marketing health information this way provides patients with biased information which may or may not be reliable and may create unreasonable patient expectations. Physicians and institutions have a responsibility to verify the online resources that patients use.

In a 2003 study by Shuyler et al., qualitative content analysis was performed of questions posed by visitors to an orthopedic website [13]. According to their results, the five most frequent reasons visitors searched the website were for information about a condition, treatment of a condition, information about symptoms, advice about symptoms, and advice about treatment. This information may be useful to guide institutional website development to address particular areas in order to answer patients' questions.

27.6% of all patients searched the internet for their surgeon's reputation (and 32.3% of those with internet access), but this number only represents those patients who looked up their physician and then proceeded to come to clinic. Thus, this number likely under-represents the actual percentage of patients who evaluated their physician prior to an appointment. Online reputations will likely continue to play a larger role in patients' selection of a physician and thus an institution, so both parties should have an active role in maintaining and monitoring their online presence [10, 12, 16]. As at least a quarter of patients at our institution used likely anonymous internet reporting to form opinions of

their potential doctor, this online domain will continue to rise in importance in the future due to increasing marketplace competition and internet usage by patients.

The present study demonstrates that a majority of orthopedic patients utilize the internet for general healthcare and orthopedic information. Important differences in usage and perception of internet information exist based on patient age as younger patients are more likely to access this information and find it useful. Additionally, patients often obtain this information from sources which are not controlled by their treating health care professional and thus may rely on inaccurate information when forming opinions and expectations.

Compliance with Ethical Standards

Conflict of Interest: M. Tyrrell Burrus, MD; Brian C. Werner, MD; James S. Starman, MD; Gregory M. Kurkis, MD; Jonathan M. Pierre, BS have declared that they have no conflict of interest. Joseph M. Hart, PhD reports other from Elsevier and Springbok, Inc., and grants from Genzyme, outside the work. David R. Diduch, MD reports grants from Aesculap/B. Braun, Genzyme and Zimmer, personal fees from Depuy-Mitek, other from Smith and Nephew and Springer, outside the work.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

Informed Consent: Informed consent was obtained from all patients for being included in the study.

Required Author Forms: Disclosure forms provided by the authors are available with the online version of this article.

References

- Aslam N, Bowyer D, Wainwright A, Theologis T, Benson M (2005) Evaluation of Internet use by paediatric orthopaedic outpatients and the quality of information available. *J Pediatr Orthop B*. 14(2):129–33.
- Beall MS 3rd, Golladay GJ, Greenfield MI, Hensinger RN, Biermann JS (2002) Use of the Internet by pediatric orthopaedic outpatients. *J Pediatr Orthop* 22(2):261–4.
- Beredjikian PK, Bozentka DJ, Steinberg DR, Bernstein J (2000) Evaluating the source and content of orthopaedic information on the Internet. The case of carpal tunnel syndrome. *J Bone Joint Surg Am* 82-A(11):1540–3.
- Bruce-Brand RA, Baker JF, Byrne DP, Hogan NA, McCarthy T (2013) Assessment of the quality and content of information on anterior cruciate ligament reconstruction on the internet. *Arthroscopy*. 29(6):1095–1100. doi: [10.1016/J.Arthro.2013.02.007](https://doi.org/10.1016/J.Arthro.2013.02.007).
- Duncan IC, Kane PW, Lawson KA, Cohen SB, Ciccotti MG, Dodson CC (2013) Evaluation of information available on the internet regarding anterior cruciate ligament reconstruction. *Arthroscopy*. 29(6):1101–1107 doi: [10.1016/J.Arthro.2013.02.008](https://doi.org/10.1016/J.Arthro.2013.02.008).
- Fraival A, Ming Chong Y, Holdorf D, Plunkett V, Tran P (2012) Internet use by orthopaedic outpatients - current trends and practices. *Australas Med J*. 5(12):633–638 doi: [10.4066/Amj.2012.1530](https://doi.org/10.4066/Amj.2012.1530).
- Gupte CM, Hassan AN, Mcdermott ID, Thomas RD (2002) The internet—friend or foe? A questionnaire study of orthopaedic outpatients. *Ann R Coll Surg Engl*. 84(3):187–92.
- Jariwala AC, Kandasamy, ARJ, Wigderowitz CA (2004) Patients and the internet: a demographic study of a cohort of orthopaedic out-patients. *Surgeon*. 2(2):103–6.
- Mathur S, Shanti N, Brkaric M, Sood V, Kubeck J, Paulino C, Merola AA (2005) Surfing for scoliosis: the quality of information available on the Internet. *Spine (Phila Pa 1976)*. 30(23):2695–700.
- Romano R, Baum N (2014) Reputation management. *J Med Pract Manage*. 29(6):369–372.
- Sambandam SN, Ramasamy V, Priyanka P, Ilango B (2007) Quality analysis of patient information about knee arthroscopy on the World Wide Web. *Arthroscopy*. 23(5):509–513.e2. doi: [10.1016/j.arthro.2006.12.007](https://doi.org/10.1016/j.arthro.2006.12.007).
- Segal J (2012) Managing your online reputation. *J Med Pract Manage*. 27(6):341–3.
- Shuyler KS, Knight KM (2003) What are patients seeking when they turn to the Internet? Qualitative content analysis of questions asked by visitors to an orthopaedics Web site. *J Med Internet Res*. 5(4):e24 doi: [10.2196/Jmir.5.4.E24](https://doi.org/10.2196/Jmir.5.4.E24).
- Source: Internet World Stats (2015) Internet Usage Statistics: The Internet Big Picture. In: Internetworldstats.Com. Accessed September 1 2015.
- Starman JS, Gettys FK, Capo JA, Fleischli JE, Norton HJ, Karunakar MA (2010) Quality and content of Internet-based information for ten common orthopaedic sports medicine diagnoses. *J Bone Joint Surg Am*. 92(7):1612–1618 doi: [10.2106/Jbjs.I.00821](https://doi.org/10.2106/Jbjs.I.00821).
- Verhoef LM, Van De Belt TH, Engelen LJ, Schoonhoven L, Kool RB (2014) Social media and rating sites as tools to understanding quality of care: a scoping review. *J Med Internet Res*. 16(2):e56 doi: [10.2196/Jmir.3024](https://doi.org/10.2196/Jmir.3024).
- Yi PH, Ganta A, Hussein KI, Frank RM, Jawa A (2013) Readability of arthroscopy-related patient education materials from the American Academy Of Orthopaedic Surgeons And Arthroscopy Association Of North America Web sites. *Arthroscopy*. 29(6):1108–1112 doi: [10.1016/J.Arthro.2013.03.003](https://doi.org/10.1016/J.Arthro.2013.03.003).