

Original Paper

# Patient Utilization of Online Information and its Influence on Orthopedic Surgeon Selection: Cross-sectional Survey of Patient Beliefs and Behaviors

Victor Hoang, DO; Amit Parekh, DO; Kevin Sagers, DO; Trevor Call, DO; Shain Howard, DO; Jason Hoffman, DO; Daniel Lee, MD

Valley Hospital Medical Center, Las Vegas, NV, United States

**Corresponding Author:**

Victor Hoang, DO  
Valley Hospital Medical Center  
620 Shadow Lane  
Las Vegas, NV, 89106  
United States  
Phone: 1 7148374577  
Email: [hoangorthopedics@gmail.com](mailto:hoangorthopedics@gmail.com)

## Abstract

**Background:** Patient attitudes and behavior are critical to understand owing to the increasing role of patient choice. There is a paucity of investigation into the perceived credibility of online information and whether such information impacts how patients choose their surgeons.

**Objective:** The purpose of this study was to explore the attitudes and behavior of patients regarding online information and orthopedic surgeon selection. Secondary purposes included gaining insight into the relative importance of provider selection factors, and their association with patient age and education level.

**Methods:** This was a cross-sectional study involving five multispecialty orthopedic surgery groups. A total of 329 patients who sought treatment by six different orthopedic surgeons were asked to anonymously answer a questionnaire consisting of 25 questions. Four questions regarded demographic information, 10 questions asked patients to rate the importance of specific criteria regarding the selection of their orthopedic surgeon (on a 4-point Likert scale), and 6 questions were designed to determine patient attitude and behaviors related to online information.

**Results:** Patient-reported referral sources included the emergency room (29/329, 8.8%), friend (42/329, 12.8%), insurance company (47/329, 14.3%), internet search/website (28/329, 8.5%), primary care physician (148/329, 45.0%), and other (34/329, 10.3%). Among the 329 patients, 130 (39.5%) reported that they searched the internet for information before their first visit. There was a trend of increased belief in online information to be accurate and complete in younger age groups ( $P=.02$ ). There was an increased relative frequency in younger groups to perceive physician rating websites to be unbiased ( $P=.003$ ), provide sufficient patient satisfaction information ( $P=.01$ ), and information about physician education and training ( $P=.03$ ). There was a significant trend for patients that found a surgeon's website to be useful ( $P<.001$ ), with the relative frequency increased in younger age groups.

**Conclusions:** This study shows that insurance network, physician referrals, appointment availability, and office location are important to patients, whereas advertising and internet reviews by other patients were considered to be not as helpful in choosing an orthopedic surgeon. Future studies may seek to identify obstacles to patients in integrating online resources for decision-making and strategies to improve health-seeking behaviors.

(JMIR Form Res 2022;6(1):e22586) doi: [10.2196/22586](https://doi.org/10.2196/22586)

**KEYWORDS**

orthopedics; practice management; physician selection; internet reviews; patient decision; practice; patient online review; social media; physician perception; patient choice; health literacy



## Introduction

Health literacy is a complex concept, defined by both the Institute of Medicine and the World Health Organization as incorporating cognitive and social skill sets that are distilled through patient experiences and are necessary to obtain, understand, and apply information to make appropriate health decisions [1,2]. Health organizations have underscored the importance of health literacy as an essential component of patient-centered care [3,4]. Consequently, a rich body of literature established factors that influence health care choices [4-8] and investigated trends in health care consumerism [9-11].

Online tools and information are postulated to disrupt the traditional patient-physician relationship and traditional metrics of health care assessment with the expanded use of social media and physician rating websites (PRWs) [9,12-15]. Physician websites, social media venues, and online review sites are the most common spaces in which patients can discover information about physicians and their practices [16]. Previous studies sought to investigate online patient behavior and classify the information posted online by patients [11,13,17-19]. The rating scales on PRWs were found to be inaccurate and with significant limitations; as such, concerns regarding misalignment of consumer satisfaction and quality were raised because health care incentives are not aligned as in other consumer industries [17,20,21]. Roughly 59% of US respondents indicated that they believed that the information on PRWs is either somewhat or very important [22], despite the documented disparity between conventional quality metrics and crowd-sourced online reviews [20,21,23,24]. Thus, it remains unclear why patients use these platforms and if this information influences their behavior [4].

The impact of misinformed or uninformed patients is consequential [25-30]. Limited health literacy has been associated with low patient satisfaction, worse patient outcomes, and higher costs [31,32]. In orthopedic surgery, there is a unique form of health literacy and a more sophisticated skill set required for making informed decisions [33-35]. Decision-making has been found to not be strictly rational but is rather a complex and heterogeneous process that is distilled through patient preferences, values, and social influences [5,36]. Improved understanding of these influences on patient decision-making may identify actionable opportunities to practice patient-centered care. To our knowledge, there is a paucity of investigations eliciting how patient attitudes and behaviors related to information online influence provider selection factors. Considering that such information may be of low quality and inaccurate [23,37], it is important to explore if online research alters a patient's decision-making for provider selection.

Accordingly, the aim of this study was to define the internet sources that patients are using to research their orthopedic surgeons and to quantify the importance placed on those findings. In addition, we investigated the demographic variables that may influence the reliance on internet websites, and further aimed to define the importance of other variables involved in choosing an orthopedic surgeon. The purpose of this study was to explore the attitudes and behavior of patients regarding online information and its influence on establishing care with an

orthopedic surgeon. Secondary purposes included a description of the relative importance of provider selection factors, and their association with patient age and education level.

## Methods

We performed a cross-sectional survey of patients at orthopedic offices in Las Vegas, Nevada. The study group included six orthopedic surgeon practices screening patients in their clinics. Subspecialties included were foot and ankle, hand, spine, and sports medicine. The surveys were completed by patients that were seen at the clinics over the course of 3 months. This study was approved by OptiWest institutional review board. Strengthening the Reporting of Observation studies in Epidemiology (STROBE) and Statistical Analyses and Methods in the Published Literature (SAMPL) reporting guidelines were followed during the study design and manuscript preparation to ensure methodologic quality and transparent reporting [38,39].

Consent from each patient was obtained before participation. The survey was confidential and anonymous, with no identifiers linked to individual responses. All participants completed the survey.

The survey consisted of seven questions, which aimed to gauge patient opinion and define patient behavior (see [Multimedia Appendix 1](#)). The survey asked patients to report their demographics, attitudes, and behaviors. Three questions documented patient demographics: patient age, education level, and frequency of internet use. One question prompted patients to rate specific orthopedic surgeon selection criteria [6-8,36] on a 4-point Likert scale ranging from 1 defined as "not important" to 4 defined as "very important." Two questions polled patient opinion regarding internet patient reviews and if patient satisfaction equates to a successful treatment outcome. One question assessed the patient's use of websites prior to their clinic visit. The participants completed their surveys in person and responses were kept anonymous. Notably, the survey is not a validated questionnaire of a measure of a specific outcome but rather represents a survey of questions. This article reports the results of the descriptive analysis of the responses for an exploratory investigation into patient beliefs, behaviors, and trends.

Respondents were grouped into the following age ranges: 18-25, 26-35, 36-45, 46-55, 56-65, and 76-85 years. Respondents were stratified based on their highest level of education: elementary/middle school, high school, some college, bachelor's degree, master's degree, and doctoral degree. A trained medical assistant or research assistant explained each question to the participants while administering the survey.

Basic descriptive statistics were analyzed using MedCalc Software. Ordinal Likert-scale data are reported using median for central tendency and frequencies, and Kendall  $\tau$  was used to analyze associations. Associations are reported as the correlation coefficient with a precision estimate (95% CI) [40]. The Cochran-Armitage test was used for analysis of categorical variables [41,42], which is considered to be more powerful than the  $\chi^2$  test to assess trends in proportions and frequencies. The statistical significance level was set at  $P < .05$ .

## Results

Between July 2017 and August 2017, all 329 patients that were administered the survey completed the survey. Table 1 delineates the distribution of patients that completed the survey according to the subspecialty of the orthopedic surgeon they were

consulting. The majority of patients reported daily baseline internet use (227/329, 69.0%), followed by 2-3 times per week (23/329, 7.0%) and 4-5 times per week (20/329, 6.1%). The histogram of the number of patients that responded according to age group and stratified by the highest education level is shown in Figure 1.

Figure 1. Respondent age and highest education stratification of all participants (N=329).

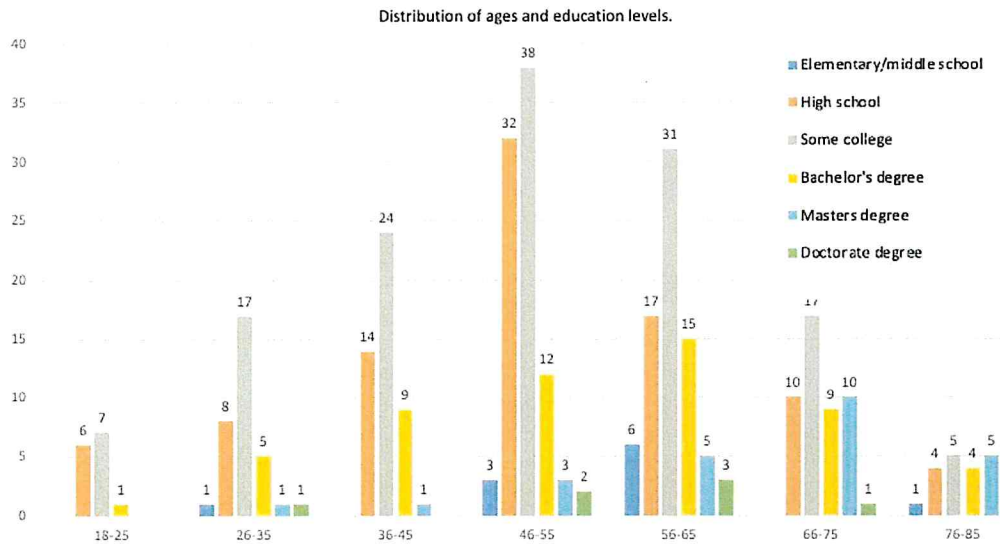


Table 1. Survey participants stratified by orthopedic subspecialty (N=324; subspecialties were not documented by 5 patients).

Subspecialty	Patients, n (%)
Spine	150 (46.3)
Sport	119 (36.7)
Hand	33 (10.2)
Foot and ankle	22 (6.8)

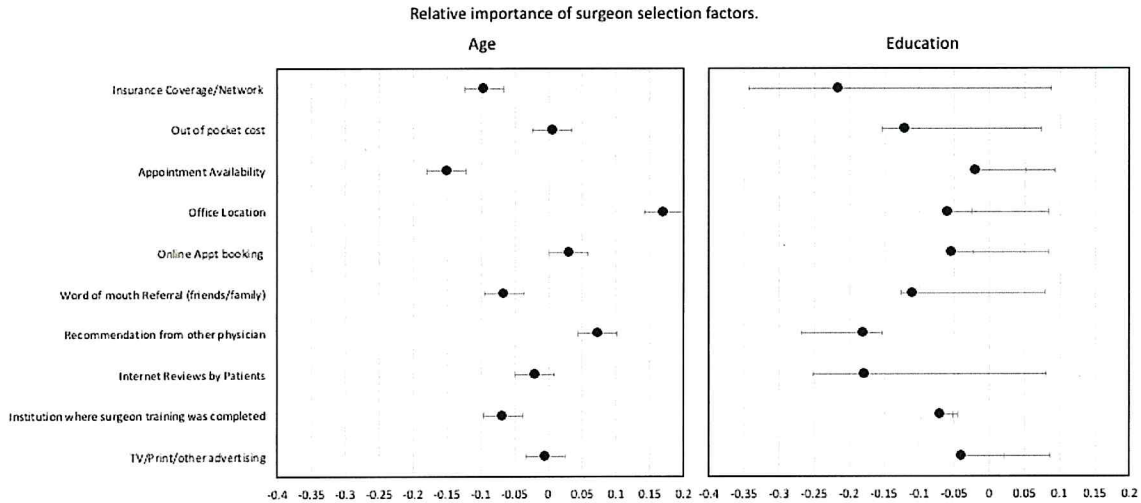
The patient-reported referral source was the emergency room (29/329, 8.8%), friend (42/329, 12.8%), insurance company (47/329, 14.3%), internet search/website (28/329, 8.5%), primary care physician (PCP; 148/329, 45.0%), and other (34/329, 10.3%). Among the 329 patients, 130 (39.5%) reported that they had searched the internet for information about the surgeon before their first visit. The majority of these patients had visited the surgeon’s website (63/130, 48.5%), followed by the website of the office or surgical group (35/130, 26.9%). Other websites visited included webmd.com (34/130, 26.2%), yelp.com (26/130, 20.0%), healthgrades (21/130, 16.2%), ratemd.com (20/130, 15.4%), and the Nevada medical board website (7/130, 5.4%).

The ranking of important factors in selecting the orthopedic surgeon is displayed in Figure 2 as well as the association of these factors with age and level of education. Patient age was

significantly associated with office location ( $P=.05$ ), physician recommendation ( $P<.001$ ), internet reviews ( $P<.001$ ), and advertising sources ( $P=.01$ ). Patient education level was significantly associated with out-of-pocket costs ( $P=.05$ ), availability ( $P<.001$ ), office location ( $P<.001$ ), online appointment booking ( $P=.004$ ), surgeon training ( $P=.002$ ), and advertisement sources ( $P<.001$ ). Patients reported insurance coverage (260/329, 79.0%), out-of-pocket costs (217/329, 66.0%), availability (184/329, 55.9%), and recommendation by another physician as “very important” (score of 4). Surgeon advertising was rated 1 (not important) by 204 (62.0%) of the 329 patients. The frequency at which internet reviews were deemed to be important ranged between 21% and 29% in each category. The institution where the surgeon trained was only deemed to be very important for 82 (24.9%) and as moderately important for 99 (30.1%) of the 329 respondents.



**Figure 2.** Relative importance of orthopedic surgeon selection factors, and their associations with patient age and education level.



The attitudes of patients toward online information are summarized in Table 2. The highest frequency of patients indicated that they found the surgeon’s website to be useful. Among the factors included in the questionnaire, the lowest

number of patients indicated that online information is accurate and complete. There were no significant associations found between patient education groups in regard to their online information or PRW beliefs.

**Table 2.** Attitude toward online information (“is it important?”) (N=329).

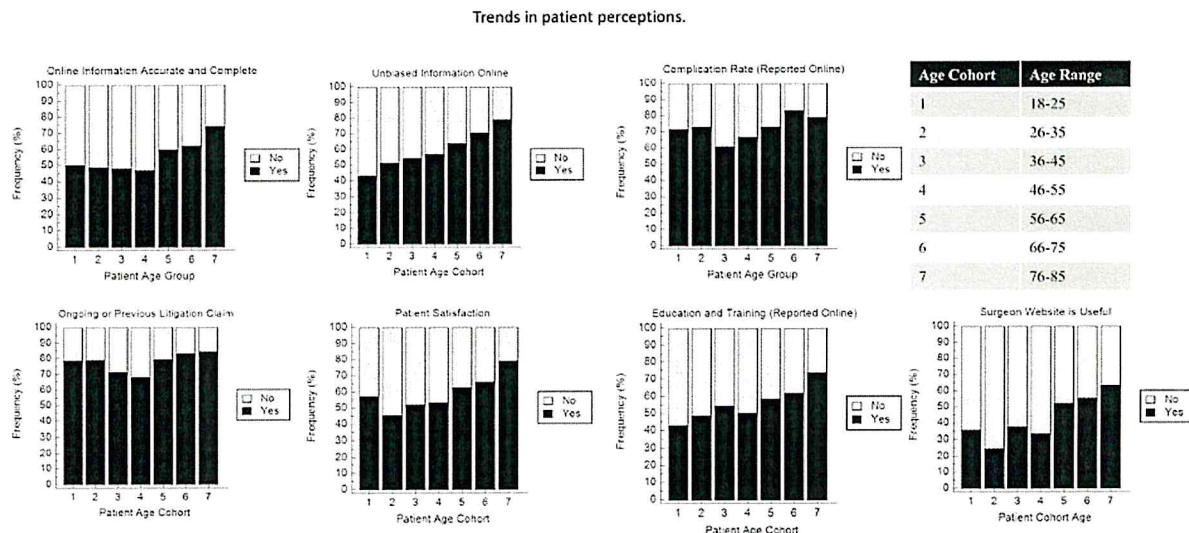
Question	Yes, n (%)	Age P value	Education P value
Online information is accurate and complete	40 (12.2)	.02	.99
PRW <sup>a</sup> is unbiased	131 (39.8)	.003	.32
PRW has complicated rate information	95 (28.9)	.09	.21
Ongoing or previous litigation claims	80 (24.3)	.24	.52
PRW shows patient satisfaction	138 (41.9)	.01	.95
PRW indicates education and training	147 (44.7)	.03	.58
Surgeon website useful	189 (57.4)	<.001	.18

<sup>a</sup>PRW: physician rating website.

Significant trends were found in beliefs regarding online information and PRWs between age groups (Figure 3). There was a trend of increased belief in online information to be accurate and complete in the younger age groups (P=.02). There was an increased relative frequency in younger groups to perceive PRWs to be unbiased (P=.003), provide sufficient

patient satisfaction information (P=.01), and information about physician education and training (P=.03). There was also a significant trend for patients that found the surgeon’s website to be useful (P<.001), with the relative frequency increased in younger age groups.

**Figure 3.** Trends in relative frequency of patient perceptions. Each subgraph, further categorized by age, shows if a specific factor influences the patient’s selection of orthopedic surgeons.



## Discussion

### Principal Findings

Only 28 of the 329 patients (8.5%) that completed the survey selected their orthopedic surgeon using internet search/websites. Notably, 205 (62.3%) patients were referred to their orthopedic surgeon from health care-related sources (emergency room, insurance company, and PCP), with the highest percentage of patients (148/329, 45.0%) referred by their PCP. Correspondingly, the data reflected the generally low importance of patient-oriented advertisements, with 204 patients (62.0%) giving this factor a rating of 1 (not important). Our data indicate that patients are value-oriented, and rated insurance coverage (260/329, 79.0%) and out-of-pocket costs (189/329, 57.4%) as very important factors. Only 130 of the 329 patients (39.5%) conducted an internet search prior to their first visit. Notably, there were significant trends observed for younger patient groups believing online information to be accurate and complete, as well as having more favorable attitudes toward PRWs in providing sufficient and unbiased information (Figure 3).

Despite the rapid expansion of online information available to patients, our data indicate that patients do not use this information to actively engage in their care. This conclusion is in support of previously published findings [43,44]. Patients also did not seek to learn about provider medical knowledge, litigation, or patient satisfaction. Patient satisfaction was purported to be a quality-of-care surrogate metric, considering the complex interplay of social, demographic, cultural, and cognitive factor interactions that influence satisfaction. The multidimensional assessment of quality was lost and deemed inappropriate [21]. Rothenfluh et al [45] suggested that one reason for this may be the perceived inability to assess physician quality even if informed by available information online,

demonstrating that patients differ in decision-making between hotel selection and provider selection due to reduced trust in incorporating online information about physicians. Nevertheless, we found that 40% of patients utilized internet sources for information before their clinic visit compared to only 24% of patients reporting such use among those visiting an outpatient orthopedic clinic surveyed in 2002 [46]. Integration of online information is likely lagging in utilization, and future research should seek to delineate the causal factors or barriers.

Our data imply that surgeons should focus on their relationships with community physician referral sources. This was previously highlighted in a study on referrals to plastic surgeons [47] showing that 82% of patients felt that a recommendation from another physician was very important to moderately important, which was a statistically significant result across all age groups. Important factors influencing the choice of a foot and ankle surgeon were identified as insurance network and recommendations (family, friend, physician) [4]. Our data provide corroboratory support to these factors as important influences on patient decision-making. Further, the external validity of the findings can be compared among studies. In another study, important factors for patient selection of their surgeon and hospital for total joint arthroplasty were ranked on a 5-point Likert scale [6]. All three aforementioned reports [4,46,47] indicated that professional reputation is critical. Similarly, recommendations by other physicians and insurance companies had a significant impact on women selecting their obstetrician/gynecologist [44]. Future studies should evaluate whether there is a difference between how much patients weigh primary care versus urgent/emergent care referrals, other orthopedic surgeons’ opinions, and other medical providers in the community.



The correlation patterns found in this study were surprising and warrant attention. Age and education level have been proposed to influence health literacy, noting that patients with a graduate degree are 130 times more likely to have adequate health literacy ( $P=.01$ ) [48]. Less than college-level education was previously identified as an independent predictor of limited musculoskeletal health literacy with a relative risk of 1.40 [49]. Our data demonstrated different statistically significant associations that had nonconsequential effect sizes. Importantly, this is not the first study to report younger age to be significantly associated with increased use and increased perceived usefulness of online information [50,51].

This survey was not without its limitations. The survey was administered to a convenience sample of limited size. Thus, the sample size of patients is underpowered, although the study was open to all patients at a large private practice setting in an anonymous fashion. Similarly, the selection bias within our sample cannot be ascertained. Another major flaw is the lack of a comparison group, which adds further sample bias. The surveys were also administered over time, with variability in

practice settings, providers, and survey administrators, which could introduce recording and recall bias. Although we were unable to precisely determine the population percentage captured, the survey was administered in multiple locations and to multiple specialties of orthopedics to increase sample diversity. Our survey is not a standardized or validated questionnaire; thus, response bias may have been introduced. Nevertheless, our goal was to describe a macroscopic phenomenon rather than to deduce a causative process.

### Conclusions

This study shows that insurance network, physician referrals, appointment availability, and office location are important to patients, whereas advertising and internet reviews by other patients are not as helpful in choosing an orthopedic surgeon. Our data do not support consensus ideas regarding consumer autonomy and patient agency in health care. Future studies may seek to identify obstacles to patients in integrating online resources for decision-making and strategies to improve health-seeking behaviors.

### Acknowledgments

The authors thank Shanthan Challa, MD, for final drafting of the article, and assistance with manuscript review and submission.

### Conflicts of Interest

None declared.

### Multimedia Appendix 1

Patient survey.

[\[DOCX File , 23 KB-Multimedia Appendix 1\]](#)

### References

1. Institute of Medicine (US) Committee on Health Literacy. In: Nielsen-Bohlman L, Panzer A, Kindig D, editors. Health literacy: a prescription to end confusion. Executive Summary. Washington, DC: National Academies Press; 2004.
2. Liu C, Wang D, Liu C, Jiang J, Wang X, Chen H, et al. What is the meaning of health literacy? A systematic review and qualitative synthesis. *Fam Med Community Health* 2020 May;8(2):e000351 [FREE Full text] [doi: [10.1136/fmch-2020-000351](https://doi.org/10.1136/fmch-2020-000351)] [Medline: [32414834](https://pubmed.ncbi.nlm.nih.gov/32414834/)]
3. Institute of Medicine (US) Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington, DC: National Academies Press; 2001.
4. Manning BT, Bohl DD, Saltzman BM, Cotter EJ, Wang KC, Epley CT, et al. Factors influencing patient selection of an orthopaedic sports medicine physician. *Orthop J Sports Med* 2017 Aug;5(8):2325967117724415 [FREE Full text] [doi: [10.1177/2325967117724415](https://doi.org/10.1177/2325967117724415)] [Medline: [28856170](https://pubmed.ncbi.nlm.nih.gov/28856170/)]
5. Bühn S, Holstiege J, Pieper D. Are patients willing to accept longer travel times to decrease their risk associated with surgical procedures? A systematic review. *BMC Public Health* 2020 Feb 19;20(1):253 [FREE Full text] [doi: [10.1186/s12889-020-8333-5](https://doi.org/10.1186/s12889-020-8333-5)] [Medline: [32075615](https://pubmed.ncbi.nlm.nih.gov/32075615/)]
6. Bozic KJ, Kaufman D, Chan VC, Caminiti S, Lewis C. Factors that influence provider selection for elective total joint arthroplasty. *Clin Orthop Relat Res* 2013 Jun;471(6):1865-1872 [FREE Full text] [doi: [10.1007/s11999-012-2640-9](https://doi.org/10.1007/s11999-012-2640-9)] [Medline: [23065331](https://pubmed.ncbi.nlm.nih.gov/23065331/)]
7. Reuter JM, Hutyra CA, Politzer CS, Calixte CC, Scott DJ, Attarian DE, et al. Characterizing patient preferences surrounding total knee arthroplasty. *JB JS Open Access* 2018 Dec 20;3(4):e0017 [FREE Full text] [doi: [10.2106/JBJS.OA.18.00017](https://doi.org/10.2106/JBJS.OA.18.00017)] [Medline: [30882052](https://pubmed.ncbi.nlm.nih.gov/30882052/)]
8. Yahanda AT, Lafaro KJ, Spolverato G, Pawlik TM. A systematic review of the factors that patients use to choose their surgeon. *World J Surg* 2016 Jan;40(1):45-55. [doi: [10.1007/s00268-015-3246-7](https://doi.org/10.1007/s00268-015-3246-7)] [Medline: [26362880](https://pubmed.ncbi.nlm.nih.gov/26362880/)]
9. Bernstein D, Mesfin A. Physician-review websites in orthopaedic surgery. *JBJS Rev* 2020 Mar;8(3):e0158. [doi: [10.2106/JBJS.RVW.19.00158](https://doi.org/10.2106/JBJS.RVW.19.00158)] [Medline: [32224636](https://pubmed.ncbi.nlm.nih.gov/32224636/)]



10. Emmert M, Sander U, Pisch F. Eight questions about physician-rating websites: a systematic review. *J Med Internet Res* 2013 Feb 01;15(2):e24 [FREE Full text] [doi: [10.2196/jmir.2360](https://doi.org/10.2196/jmir.2360)] [Medline: [23372115](https://pubmed.ncbi.nlm.nih.gov/23372115/)]
11. Velasco BT, Chien B, Kwon JY, Miller CP. Online ratings and reviews of American orthopaedic foot and ankle surgeons. *Foot Ankle Spec* 2020 Feb 22;13(1):43-49. [doi: [10.1177/1938640019832363](https://doi.org/10.1177/1938640019832363)] [Medline: [30795702](https://pubmed.ncbi.nlm.nih.gov/30795702/)]
12. Duymus TM, Karadeniz H, Çağan MA, Kömür B, Demirtaş A, Zehir S, Azboy. Internet and social media usage of orthopaedic patients: a questionnaire-based survey. *World J Orthop* 2017 Feb 18;8(2):178-186 [FREE Full text] [doi: [10.5312/wjo.v8.i2.178](https://doi.org/10.5312/wjo.v8.i2.178)] [Medline: [28251069](https://pubmed.ncbi.nlm.nih.gov/28251069/)]
13. Hong YA, Liang C, Radcliff TA, Wigfall LT, Street RL. What do patients say about doctors online? A systematic review of studies on patient online reviews. *J Med Internet Res* 2019 Apr 8;21(4):e12521. [doi: [10.2196/12521](https://doi.org/10.2196/12521)]
14. Curry E, Li X, Nguyen J, Matzkin E. Prevalence of internet and social media usage in orthopedic surgery. *Orthop Rev (Pavia)* 2014 Aug 08;6(3):5483. [doi: [10.4081/or.2014.5483](https://doi.org/10.4081/or.2014.5483)] [Medline: [25317312](https://pubmed.ncbi.nlm.nih.gov/25317312/)]
15. Schulz PJ, Rothenfluh F. Influence of health literacy on effects of patient rating websites: survey study using a hypothetical situation and fictitious doctors. *J Med Internet Res* 2020 Apr 06;22(4):e14134 [FREE Full text] [doi: [10.2196/14134](https://doi.org/10.2196/14134)] [Medline: [32250275](https://pubmed.ncbi.nlm.nih.gov/32250275/)]
16. Call T, Hillock R. Professionalism, social media, and the orthopaedic surgeon: what do you have on the internet? *Technol Health Care* 2017;25(3):531-539. [doi: [10.3233/THC-171296](https://doi.org/10.3233/THC-171296)] [Medline: [28128772](https://pubmed.ncbi.nlm.nih.gov/28128772/)]
17. Lagu T, Hannon NS, Rothberg MB, Lindenauer PK. Patients' evaluations of health care providers in the era of social networking: an analysis of physician-rating websites. *J Gen Intern Med* 2010 Sep;25(9):942-946 [FREE Full text] [doi: [10.1007/s11606-010-1383-0](https://doi.org/10.1007/s11606-010-1383-0)] [Medline: [20464523](https://pubmed.ncbi.nlm.nih.gov/20464523/)]
18. Arthur JR, Etzioni D, Schwartz AJ. Characterizing extremely negative reviews of total joint arthroplasty practices and surgeons on yelp.com. *Arthroplast Today* 2019 Jun;5(2):216-220 [FREE Full text] [doi: [10.1016/j.artd.2019.02.009](https://doi.org/10.1016/j.artd.2019.02.009)] [Medline: [31286047](https://pubmed.ncbi.nlm.nih.gov/31286047/)]
19. Haeberle HS, Bartschat NI, Navarro SM, Rooney PW, Rosneck J, Westermann RW, et al. Hip arthroscopy: a social media analysis of patient perception. *Orthop J Sports Med* 2019 Jun;7(6):2325967119854188 [FREE Full text] [doi: [10.1177/2325967119854188](https://doi.org/10.1177/2325967119854188)] [Medline: [31245432](https://pubmed.ncbi.nlm.nih.gov/31245432/)]
20. Chang JT, Hays RD, Shekelle PG, MacLean CH, Solomon DH, Reuben DB, et al. Patients' global ratings of their health care are not associated with the technical quality of their care. *Ann Intern Med* 2006 May 02;144(9):665-672. [doi: [10.7326/0003-4819-144-9-200605020-00010](https://doi.org/10.7326/0003-4819-144-9-200605020-00010)] [Medline: [16670136](https://pubmed.ncbi.nlm.nih.gov/16670136/)]
21. Shirley ED, Sanders JO. Measuring quality of care with patient satisfaction scores. *J Bone Joint Surg Am* 2016 Oct 05;98(19):e83. [doi: [10.2106/JBJS.15.01216](https://doi.org/10.2106/JBJS.15.01216)] [Medline: [27707857](https://pubmed.ncbi.nlm.nih.gov/27707857/)]
22. Hanauer DA, Zheng K, Singer DC, Gebremariam A, Davis MM. Public awareness, perception, and use of online physician rating sites. *JAMA* 2014 Feb 19;311(7):734-735. [doi: [10.1001/jama.2013.283194](https://doi.org/10.1001/jama.2013.283194)] [Medline: [24549555](https://pubmed.ncbi.nlm.nih.gov/24549555/)]
23. Burn MB, Lintner DM, Coscolluela PE, Varner KE, Liberman SR, McCulloch PC, et al. Physician rating scales do not accurately rate physicians. *Orthopedics* 2018 Jul 01;41(4):e445-e456. [doi: [10.3928/01477447-20180409-06](https://doi.org/10.3928/01477447-20180409-06)] [Medline: [29658974](https://pubmed.ncbi.nlm.nih.gov/29658974/)]
24. Gao GG, McCullough JS, Agarwal R, Jha AK. A changing landscape of physician quality reporting: analysis of patients' online ratings of their physicians over a 5-year period. *J Med Internet Res* 2012 Feb 24;14(1):e38 [FREE Full text] [doi: [10.2196/jmir.2003](https://doi.org/10.2196/jmir.2003)] [Medline: [22366336](https://pubmed.ncbi.nlm.nih.gov/22366336/)]
25. Gaissmaier W, Gigerenzer G. When misinformed patients try to make informed health decisions. In: Gigerenzer G, Gray JAM, editors. *Better doctors, better patients, better decisions: envisioning health care*. Boston, MA: MIT Press; 2011.
26. Wegwarth O, Gigerenzer G. The barrier to informed choice in cancer screening: statistical illiteracy in physicians and patients. *Recent Results Cancer Res* 2018;210:207-221. [doi: [10.1007/978-3-319-64310-6\\_13](https://doi.org/10.1007/978-3-319-64310-6_13)] [Medline: [28924688](https://pubmed.ncbi.nlm.nih.gov/28924688/)]
27. Bachmann LM, Gutzwiller FS, Puhan MA, Steurer J, Steurer-Stey C, Gigerenzer G. Do citizens have minimum medical knowledge? A survey. *BMC Med* 2007 May 31;5:14 [FREE Full text] [doi: [10.1186/1741-7015-5-14](https://doi.org/10.1186/1741-7015-5-14)] [Medline: [17540024](https://pubmed.ncbi.nlm.nih.gov/17540024/)]
28. Gigerenzer G, Wegwarth O, Feufel M. Misleading communication of risk. *BMJ* 2010 Oct 12;341:c4830. [doi: [10.1136/bmj.c4830](https://doi.org/10.1136/bmj.c4830)] [Medline: [20940219](https://pubmed.ncbi.nlm.nih.gov/20940219/)]
29. Gigerenzer G, Galesic M. Why do single event probabilities confuse patients? *BMJ* 2012 Jan 11;344:e245. [doi: [10.1136/bmj.e245](https://doi.org/10.1136/bmj.e245)] [Medline: [22236599](https://pubmed.ncbi.nlm.nih.gov/22236599/)]
30. Gigerenzer G, Mata J, Frank R. Public knowledge of benefits of breast and prostate cancer screening in Europe. *J Natl Cancer Inst* 2009 Sep 02;101(17):1216-1220 [FREE Full text] [doi: [10.1093/jnci/djp237](https://doi.org/10.1093/jnci/djp237)] [Medline: [19671770](https://pubmed.ncbi.nlm.nih.gov/19671770/)]
31. Stormacq C, Van den Broucke S, Wosinski J. Does health literacy mediate the relationship between socioeconomic status and health disparities? Integrative review. *Health Promot Int* 2019 Oct 01;34(5):e1-e17. [doi: [10.1093/heapro/day062](https://doi.org/10.1093/heapro/day062)] [Medline: [30107564](https://pubmed.ncbi.nlm.nih.gov/30107564/)]
32. Benjamin RM. Improving health by improving health literacy. *Public Health Rep* 2010;125(6):784-785 [FREE Full text] [doi: [10.1177/003335491012500602](https://doi.org/10.1177/003335491012500602)] [Medline: [21121221](https://pubmed.ncbi.nlm.nih.gov/21121221/)]
33. Rosenbaum AJ, Pauze D, Pauze D, Robak N, Zade R, Mulligan M, et al. Health literacy in patients seeking orthopaedic care: results of the Literacy in Musculoskeletal Problems (LIMP) project. *Iowa Orthop J* 2015;35:187-192 [FREE Full text] [Medline: [26361464](https://pubmed.ncbi.nlm.nih.gov/26361464/)]



34. Crepeau AE, McKinney BI, Fox-Ryvicker M, Castelli J, Penna J, Wang ED. Prospective evaluation of patient comprehension of informed consent. *J Bone Joint Surg Am* 2011 Oct 05;93(19):e114. [doi: [10.2106/JBJS.J.01325](https://doi.org/10.2106/JBJS.J.01325)] [Medline: [22005875](https://pubmed.ncbi.nlm.nih.gov/22005875/)]
35. Tsahakis JM, Issar NM, Kadakia RJ, Archer KR, Barzyk T, Mir HR. Health literacy in an orthopaedic trauma patient population: improving patient comprehension with informational intervention. *J Orthop Trauma* 2014 Apr;28(4):e75-e79. [doi: [10.1097/BOT.0b013e3182a66921](https://doi.org/10.1097/BOT.0b013e3182a66921)] [Medline: [23899766](https://pubmed.ncbi.nlm.nih.gov/23899766/)]
36. Victoor A, Delnoij DMJ, Friele RD, Rademakers JJJM. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Serv Res* 2012 Aug 22;12:272 [FREE Full text] [doi: [10.1186/1472-6963-12-272](https://doi.org/10.1186/1472-6963-12-272)] [Medline: [22913549](https://pubmed.ncbi.nlm.nih.gov/22913549/)]
37. Cassidy JT, Baker JF. Orthopaedic patient information on the world wide web: an essential review. *J Bone Joint Surg Am* 2016 Feb 17;98(4):325-338. [doi: [10.2106/JBJS.N.01189](https://doi.org/10.2106/JBJS.N.01189)] [Medline: [26888683](https://pubmed.ncbi.nlm.nih.gov/26888683/)]
38. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet* 2007 Oct 20;370(9596):1453-1457. [doi: [10.1016/S0140-6736\(07\)61602-X](https://doi.org/10.1016/S0140-6736(07)61602-X)] [Medline: [18064739](https://pubmed.ncbi.nlm.nih.gov/18064739/)]
39. Indrayan A. Reporting of basic statistical methods in biomedical journals: improved SAMPL guidelines. *Indian Pediatr* 2020 Jan 28;57(1):43-48. [doi: [10.1007/s13312-020-1702-4](https://doi.org/10.1007/s13312-020-1702-4)]
40. Brasel K, Haider A, Haukoos J. Practical guide to survey research. *JAMA Surg* 2020 Apr 01;155(4):351-352. [doi: [10.1001/jamasurg.2019.4401](https://doi.org/10.1001/jamasurg.2019.4401)] [Medline: [31995149](https://pubmed.ncbi.nlm.nih.gov/31995149/)]
41. Armitage P. Tests for linear trends in proportions and frequencies. *Biometrics* 1955 Sep;11(3):375. [doi: [10.2307/3001775](https://doi.org/10.2307/3001775)]
42. Cochran WG. Some methods for strengthening the common  $\chi^2$  tests. *Biometrics* 1954 Dec;10(4):417. [doi: [10.2307/3001616](https://doi.org/10.2307/3001616)]
43. Menendez ME, van Hoorn BT, Mackert M, Donovan EE, Chen NC, Ring D. Patients with limited health literacy ask fewer questions during office visits with hand surgeons. *Clin Orthop Relat Res* 2017 May;475(5):1291-1297 [FREE Full text] [doi: [10.1007/s11999-016-5140-5](https://doi.org/10.1007/s11999-016-5140-5)] [Medline: [27796802](https://pubmed.ncbi.nlm.nih.gov/27796802/)]
44. Setoodefar M, Tabesh H, Tara F, Eslami S, Heshmati Nabavi F, Valizadeh Zare N, et al. Measurement model of women's preferences in obstetrician and gynecologist selection in the private sector: exploratory and confirmatory factor analysis. *Int J Community Based Nurs Midwifery* 2020 Apr;8(2):150-163 [FREE Full text] [doi: [10.30476/IJCBNM.2020.82278.1049](https://doi.org/10.30476/IJCBNM.2020.82278.1049)] [Medline: [32309456](https://pubmed.ncbi.nlm.nih.gov/32309456/)]
45. Rothenfluh F, Germeni E, Schulz PJ. Consumer decision-making based on review websites: are there differences between choosing a hotel and choosing a physician? *J Med Internet Res* 2016 Jun 16;18(6):e129 [FREE Full text] [doi: [10.2196/jmir.5580](https://doi.org/10.2196/jmir.5580)] [Medline: [27311623](https://pubmed.ncbi.nlm.nih.gov/27311623/)]
46. Beall MS, Beall MS, Greenfield MLVH, Biermann JS. Patient Internet use in a community outpatient orthopaedic practice. *Iowa Orthop J* 2002;22:103-107 [FREE Full text] [Medline: [12180601](https://pubmed.ncbi.nlm.nih.gov/12180601/)]
47. Nowak LI, Washburn JH. Patient sources of information and decision factors in selecting cosmetic surgeons. *Health Mark Q* 1998;15(4):45-54. [doi: [10.1300/J026v15n04\\_03](https://doi.org/10.1300/J026v15n04_03)] [Medline: [10185452](https://pubmed.ncbi.nlm.nih.gov/10185452/)]
48. Yim CK, Shumate L, Barnett SH, Leitman IM. Health literacy assessment and patient satisfaction in surgical practice. *Ann Med Surg (Lond)* 2018 Nov;35:25-28 [FREE Full text] [doi: [10.1016/j.amsu.2018.08.022](https://doi.org/10.1016/j.amsu.2018.08.022)] [Medline: [30263114](https://pubmed.ncbi.nlm.nih.gov/30263114/)]
49. Noback PC, Seetharaman M, Tantigate D, Strauch RJ, Rosenwasser MP, Vosseller JT. Prevalence and risk factors of limited musculoskeletal health literacy in the outpatient setting: a logistic regression model. *J Am Acad Orthop Surg* 2019 May 15;27(10):e491-e498. [doi: [10.5435/JAAOS-D-17-00712](https://doi.org/10.5435/JAAOS-D-17-00712)] [Medline: [30320731](https://pubmed.ncbi.nlm.nih.gov/30320731/)]
50. Burrus MT, Werner BC, Starman JS, Kurkis GM, Pierre JM, Diduch DR, et al. Patient perceptions and current trends in internet use by orthopedic outpatients. *HSS J* 2017 Oct;13(3):271-275 [FREE Full text] [doi: [10.1007/s11420-017-9568-2](https://doi.org/10.1007/s11420-017-9568-2)] [Medline: [28983221](https://pubmed.ncbi.nlm.nih.gov/28983221/)]
51. Koenig S, Nadarajah V, Smuda MP, Meredith S, Packer JD, Henn RF. Patients' use and perception of internet-based orthopaedic sports medicine resources. *Orthop J Sports Med* 2018 Sep;6(9):2325967118796469 [FREE Full text] [doi: [10.1177/2325967118796469](https://doi.org/10.1177/2325967118796469)] [Medline: [30263896](https://pubmed.ncbi.nlm.nih.gov/30263896/)]

## Abbreviations

**PCP:** primary care physician

**PRW:** physician rating website

**SAMPL:** Statistical Analyses and Methods in the Published Literature

**STROBE:** Strengthening the Reporting of Observation studies in Epidemiology



*Edited by G Eysenbach; submitted 17.07.20; peer-reviewed by J Walsh, KP de Castro; comments to author 25.08.20; revised version received 29.01.21; accepted 23.11.21; published 01.01.22*

*Please cite as:*

*Hoang V, Parekh A, Sagers K, Call T, Howard S, Hoffman J, Lee D*

*Patient Utilization of Online Information and its Influence on Orthopedic Surgeon Selection: Cross-sectional Survey of Patient Beliefs and Behaviors*

*JMIR Form Res 2022;6(1):e22586*

*URL: <https://formative.jmir.org/2022/1/e22586/>*

*doi: [10.2196/22586](https://doi.org/10.2196/22586)*

*PMID:*

©Victor Hoang, Amit Parekh, Kevin Sagers, Trevor Call, Shain Howard, Jason Hoffman, Daniel Lee. Originally published in JMIR Formative Research (<https://formative.jmir.org>), 01.01.2022. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in JMIR Formative Research, is properly cited. The complete bibliographic information, a link to the original publication on <https://formative.jmir.org>, as well as this copyright and license information must be included.