Patients' Use and Perception of Internet-Based Orthopaedic Sports Medicine Resources

Scott Koenig,* MD, Vidushan Nadarajah,*† BA, Michael P. Smuda,* MSAT, ATC,
Sean Meredith,* MD, Jonathan D. Packer,* MD, and R. Frank Henn III,*‡ MD
*Investigation performed at the University of Maryland Rehabilitation and Orthopaedic Institute,
Baltimore, Maryland, USA*

Background: Current research is sparse regarding how patients with orthopaedic injuries perceive and use internet-based information resources.

Hypothesis: The majority of patients use the internet to research their orthopaedic condition and are receptive to guidance from their provider.

Study Design: Cross-sectional study.

Methods: A total of 213 patients attending a sports medicine clinic on the East Coast of the United States were asked to complete a questionnaire regarding their use of internet-based information. Data from 185 patients were available for analysis. Bivariate and multivariate statistical analyses were used to determine the significance of identified associations.

Results: Overall, 54% of patients used the internet to find information about their orthopaedic condition prior to their consultation. A higher percentage of internet users were women ($P = .01$), were white ($P = .03$), and had internet access at home ($P = .02$). Multivariable analysis found home internet access to be the only significant independent factor predictive of patients using internet-based information sources ($P < .01$). The majority of patients (61%) were neutral toward orthopaedic information found online, and only 32% of patients trusted the orthopaedic information they found online. The majority of patients (83%) reported they would be receptive to providers' guidance on which internet resources to use.

Conclusion: Only half of patients use the internet to research their orthopaedic condition. Most patients were either neutral toward or did not trust the internet-based information that they found and may forgo internet sources altogether. To help patients avoid misleading information, sports medicine providers should understand how patients are using the internet and guide patients in selecting high-quality, peer-reviewed sources of information. Doing so allows physicians to proactively educate their patients even after the clinic visit.

Keywords: sports medicine; outpatient; internet use

‡Address correspondence to R. Frank Henn III, MD, Department of Orthopaedics, University of Maryland Rehabilitation and Orthopaedic Institute, 2200 Kernan Drive, Baltimore, MD 21207, USA (email: frank_henn@yahoo.com).

*Department of Orthopaedics, University of Maryland School of Medicine, Baltimore, Maryland, USA.

†Department of Orthopaedic Surgery, SUNY Downstate Medical Center, Brooklyn, New York, USA.

According to the Pew Research Center, about half of all adults in the United States were already online in early 2000. Today, roughly 9 in 10 American adults use the internet.[21] In 2002, the first article on internet use in an outpatient orthopaedic patient population reported that 63% of patients had access to the internet.[2] In the same year, the perception of internet use in orthopaedic outpatients was found to be mostly positive: 76% of patients said that using the internet to find an orthopaedic surgeon was useful and informative.[14]

The internet has become an increasingly important source of health information, including information that is used to choose a provider.[11,12,18] However, providing health information over the internet entails issues with respect to effectiveness and access. Literature has shown that providing health-related information, including the comparison of individual providers, is difficult.[22]

Furthermore, from a distributional perspective, not all peo-
ple have the same access and skills in using the inter-
net.[15,20] The literature regarding the extent to which
these internet-based systems are used and how they affect
patient experiences is currently limited,[23,27] even more so
in the orthopaedic community.[2,14,19]

Annually, in the United States, 35 million people look for
a new doctor and 63 million people look for a new special-
ist.[5] The Health Tracking Household Survey conducted in
2007 showed that patients still rely heavily on "word of
mouth" to choose a physician.[5] Specifically, when looking
for a new specialist, 7 of 10 patients relied on physician
referral to find a specialist, and only 15% of patients used
multiple sources of information.[5]

Sports medicine patients tend to be a high-demand and
high-functioning population who may be likely to use the
internet to obtain information. Despite this, no data are
available regarding how patients treated at an orthopaedic
sports medicine practice use and perceive orthopaedic
information on the internet. The aim of this study was to
address the paucity of evidence by assessing the role of
internet-based information for patients seeking an ortho-
paedic sports medicine consultation. Specifically, we stud-
ied the relationship between patients' demographic factors
and internet use, perceptions of internet-based informa-
tion, and receptiveness to recommendations regarding
which internet sources to use.

METHODS

After obtaining institutional review board approval, we
invited 213 patients to participate in our study; the respon-
dents were new patients visiting the urban practice of a
single, sports medicine fellowship–trained orthopaedic sur-
geon on the East Coast of the United States between March
2016 and June 2016. We asked all patients who were older
than 12 years to complete a questionnaire about whether
and how they used the internet to learn about their ortho-
paedic condition and orthopaedic surgeon. Exclusion crite-
ria included non–English speakers and patients younger
than 12 years. Five patients could not complete the survey
due to a language barrier, parents refused participation for
21 patients who were younger than 18, and 1 adult patient
declined participation, which left data from 185 patients
available for analysis.

We built a questionnaire using metrics that had previ-
ously been found to be reliable in another outpatient pedi-
atric orthopaedic sample[3] and that was based on the
experience of the senior surgeon (R.F.H.). The survey con-
sisted of 31, 35, or 41 questions depending on a "skip logic"
function. It was designed to assess participant demograph-
ics, access to and use of the internet, and opinions about the
utility of the internet in obtaining medical information.[3]
Patients were recruited by and provided consent to the
study coordinator and completed the questionnaire prior
to meeting the surgeon. Survey data were collected using
the online software www.surveymonkey.com (SurveyMon-
key Inc) (see the Appendix).

Statistical Analysis

All data obtained from SurveyMonkey were anonymous.
Further analysis was conducted by stratifying and compar-
ing those patients who used internet-based information
systems versus those who did not. Continuous data were
reported as mean and SD, while categorical data were
reported as frequencies and percentages. The Wilcoxon
signed-rank test was used for continuous variables and the
chi-square analysis for categorical variables. We used a
backward-elimination nominal logistic regression model
to determine which predictors were independent factors
of internet use. In cases where the expected count was less
than 5, the Fisher exact test was used. JMP Pro, Version 13
software (SAS Institute Inc) was used for all analyses, with
a P value less than .05 indicating statistical significance.

RESULTS

There were 185 patients who completed the survey, and
most (171, 92.4%) had access to internet. The average
patient age was 37.7 years (range, 15-79 years), and 105
(56.8%) were male. The race and ethnicity distribution was
103 (55.7%) white, 44 (23.8%) black, 10 (5.4%) Asian, 12
(6.4%) Hispanic, and 16 (8.6%) other.

Prevalence of Internet Use
and User Characteristics

Overall, 53.5% (n = 99) of patients used the internet to find
information about their orthopaedic condition prior to their
consultation. Table 1 shows the comparison analysis
between users and nonusers. A higher percentage of inter-
net users were women (53%), whereas nonusers were pre-
dominantly men (68%) (P = .01). More internet users were
white (P = .03) and had internet access at home (P = .02).
We did not observe any significant independent relation-
ships with respect to demographic predictors and use of
rating websites (P > .05).

Use of Physician-Rating Websites
and User Characteristics

Overall, 32.2% (n = 59) of patients used physician-rating
websites prior to their consultation, and Table 2 shows the
comparison analysis between the groups. Users were sig-
nificantly older than nonusers (P = .004) and a higher per-
centage of them had a household income over $70,000 ($P$ =
.05). Users also accessed the internet significantly more
frequently for any medical information (P < .01). We did
not observe a difference between users and nonusers with
respect to sex, education, or insurance status (P > .05).

Patient Perspectives of the Internet

Figure 1 shows patients' reasons for using the internet.
Most commonly, patients identified "no specific reason."
Almost half the remaining patients used the internet to
gather information about their doctor, with the most

TABLE 1
Demographic Details of Patients Who Use Internet-Based
Information Systems Versus Nonusers[a]

Demographic Factor	Users	Nonusers	P
Patients	99 (54)	82 (44)	
Age, y, mean ± SD	38.4 ± 14.3	36.9 ± 16.1	.53[b]
Sex			.01[c]
Female	52 (53)	26 (32)	
Male	47 (47)	56 (68)	
Race/ethnicity			.03[c]
White	59 (60)	43 (52)	
Black	22 (22)	22 (27)	
Asian	7 (7)	3 (4)	
Hispanic	3 (3)	9 (11)	
Other	2 (2)	2 (2)	
Not reported	6 (6)	3 (4)	
Highest level of education			.48
Grade 1-8	4 (4)	7 (9)	
Some high school	2 (2)	4 (5)	
High school graduate or GED	13 (13)	21 (26)	
Some college, no degree	9 (9)	8 (10)	
Associate's degree	3 (3)	2 (2)	
Bachelor's degree	35 (35)	27 (33)	
Graduate degree	32 (32)	12 (15)	
Not reported	1 (1)	1 (1)	
Annual household income			.21
Less than $70,000	54 (55)	37 (45)	
More than $70,000	32 (32)	34 (42)	
Not reported	13 (13)	11 (13)	
Health insurance			.36
State insurance	44 (44)	36 (44)	
Private insurance	52 (53)	44 (54)	
No insurance	3 (3)	2 (2)	
Internet access			.02[c]
Yes	97 (98)	70 (85)	
No	0 (0)	5 (6)	
Not reported	2 (2)	7 (9)	
Frequency of internet use for any medical information			.12
Rarely	21 (21)	30 (39)	
Daily	18 (18)	10 (13)	
Weekly	20 (20)	12 (15)	
Monthly	39 (40)	26 (33)	

[a]Values are expressed as n (%) except for age. Data missing for 4 survey respondents.

[b]P value determined by use of the Wilcoxon rank-sum test; all other P values were determined by use of the Fisher exact test.

[c]Significant difference between groups (P < .05).

TABLE 2
Demographic Details of Patients Who Use
Physician-Rating Websites Versus Nonusers[a]

| Demographic Factor	Users	Nonusers	P
Patients	59 (32.2)	124 (67.8)	
Age, y, mean ± SD	42.4 ± 14.7	35.6 ± 14.7	.0039[b,c]
Sex			.43
Female	28 (47)	52 (41)	
Male	31 (53)	74 (59)	
Race/ethnicity			.13
White	28 (47)	75 (60)	
Black	18 (31)	27 (21)	
Asian	6 (10)	4 (3)	
Hispanic	3 (5)	9 (7)	
Other	1 (2)	3 (2)	
Not reported	3 (5)	8 (6)	
Highest level of education			.30
Grade 1-8	2 (3)	9 (7)	
Some high school	2 (3)	4 (3)	
High school graduate or GED	7 (12)	28 (22)	
Some college, no degree	5 (8)	12 (10)	
Associates degree	2 (3)	3 (2)	
Bachelor's degree	19 (32)	45 (36)	
Graduate degree	21 (36)	24 (19)	
Not reported	1 (2)	1 (1)	
Annual household income			.05[c]
Less than $70,000	15 (25)	52 (41)	
More than $70,000	37 (63)	55 (44)	
Not reported	7 (12)	19 (15)	
Health insurance			.17
State insurance	20 (34)	61 (48)	
Private insurance	37 (63)	61 (48)	
No insurance	2 (3)	4 (3)	
Internet access			.68
Yes	56 (95)	115 (91)	
No	1 (2)	4 (3)	
Not reported	2 (3)	7 (6)	
Frequency of internet use for any medical information			.0009[c]
Rarely	6 (10)	45 (37)	
Daily	8 (14)	20 (16)	
Weekly	16 (28)	17 (14)	
Monthly	28 (48)	40 (33)	

[a]Values expressed as n (%) except for age. Data missing for 2 survey respondents.

[b]P value determined by use of the Wilcoxon rank-sum test; all other P values were determined by use of the Fisher exact test.

[c]Significant difference between groups (P < .05).

specific reason being to gather information on the physician's experience. Figure 2 shows the reasons why those patients who did not use the internet chose not to do so. Aside from "no specific reason," the 2 most common reasons were reluctance to trust information found on the internet and being unaware of internet options.

Figure 3 shows the frequency of the different physician-rating websites used by the 59 patients who used such websites. By a wide margin, the most frequently used physician-rating website was *HealthGrades.com*, followed by *RateMDs.com, Vitals.com*, and *Zoc Doc*. Table 3 shows the quantified importance of factors associated with

physician-rating websites for those patients who used them. Factors were graded on a scale of 1 to 5, with 1 being "strongly disagree" and 5 being "strongly agree." The most important factor was a previous patient's written comments about the doctor (4.29 ± 0.74). The least important factor was the number of written comments about the doctor (3.78 ± 1.01).

Figure 4 represents the information patients stated would be useful to have prior to visiting their orthopaedic surgeon. The 2 most important pieces of information were the surgeon's number of years of surgical experience and the insurance plans accepted by the surgeon. The least important information was the surgeon's sex and age.
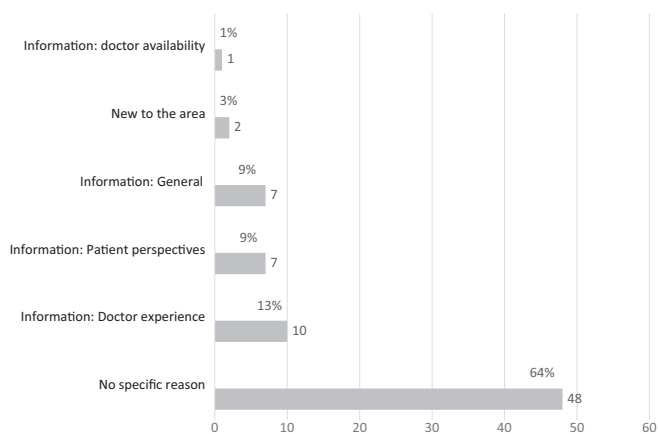
Figure 1. Reasons for using the internet prior to orthopaedic appointment.
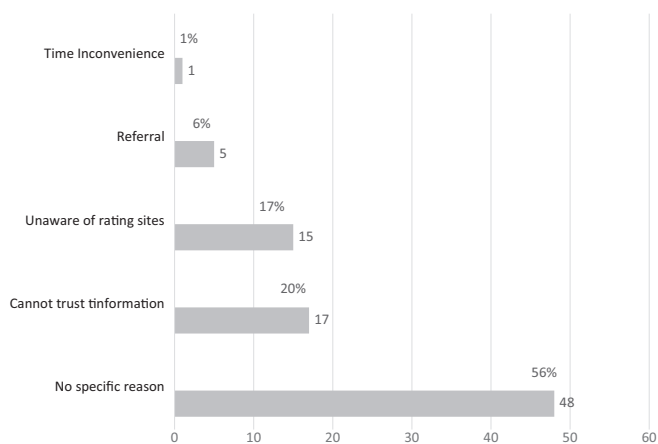
Figure 2. Reasons for not using the internet prior to orthopaedic appointment.
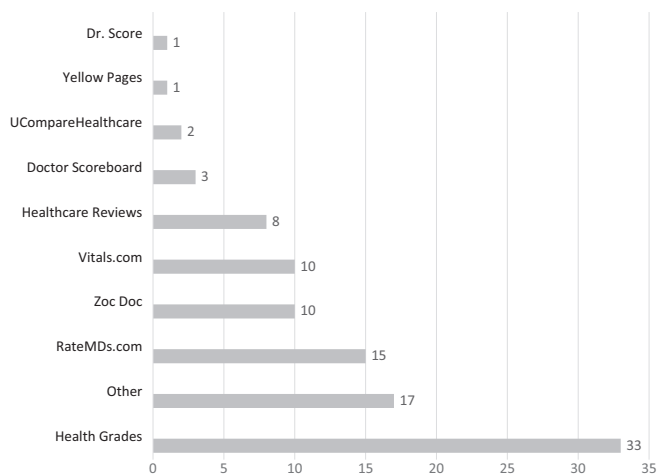
Figure 3. Physician-rating websites used.

Figure 5 shows patients' responses about the likelihood they would use the internet to learn about their orthopaedic condition if encouraged to do so by their physician. The overwhelming majority of patients reported positively, with 154 patients (83%) indicating they would be "very likely" or "likely" to use internet-based information if recommended by their physician. Figure 6 shows that the majority of patients (n = 113, 61%) were neutral toward orthopaedic information online, and only 60 patients (32%) trusted the orthopaedic information they found online.

DISCUSSION

In this sample of patients treated by an orthopaedic sports medicine physician, only 54% of patients used the internet to find information about their condition, and only 32% accessed physician-rating websites. The finding that relatively few sports medicine patients appear to use the internet when seeking information about their care is important and in accordance with studies in other patient populations.[3,13,14,26] When assessing outpatients' use and perceptions of the internet, Burrus et al[4] found that 64.7% of patients with access to the internet used it to research orthopaedic information prior to their office visit. Furthermore, those investigators found that younger male patients were more likely to reference internet-based sources of orthopaedic information.[4]

Our study found that internet use is associated with several demographic characteristics. While use of the internet to find information about one's condition was greater among patients who were female, were white, and had access to the internet at home, accessing physician-rating sites was greater among older patients and patients with an income over $70,000. We did not observe any associations with education and insurance status. This study suggests that there are differences in internet use among different patient populations.

An important finding of this study is the ambivalence of patients toward online medical information but also their willingness to use the internet if encouraged to do so by their physician. Although a patient's perception of health care is likely to depend on many factors other than the particular source of information, the effect of internet use on various health care perceptions is important, especially in the wake of raised expectations among policy makers of how this source of information is being used.[9] While it seems optimal to develop internet-based information systems to help individuals choose their provider and educate patients, this process risks excluding those with no or limited access to the internet, those with limited skills in using such internet-based information systems, and those who simply refrain from using such systems for other reasons.

Understanding how the process of seeking information affects a patient's overall health care consumption is important. It may be that people are displeased with the internet as a source of information because the information available to compare providers is not always what patients are looking for.[11] In our sample, the most sought-after

TABLE 3
Quantified Importance of Physician Review Factors[a]

Physician Review Factor (Importance of…)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Score, Mean ± SD
1. Doctor's "star" rating	1 (2.0)	0 (0.0)	7 (12.0)	29 (49.0)	22 (37)	4.20 ± 0.79
2. Hospital's "star" rating	0 (0.0)	0 (0.0)	15 (25.4)	21 (35.6)	23 (39.0)	4.16 ± 0.79
3. Patients' written comments about the doctor	1 (2.0)	0 (0.0)	4 (7.0)	30 (51.0)	24 (41.0)	4.29 ± 0.74
4. Number of written comments	2 (3.0)	2 (3.0)	20 (34.0)	18 (31.0)	17 (29.0)	3.78 ± 1.01

[a]Factors were graded on a scale of 1 to 5 points: 1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree. Patient responses for each factor are expressed as n (%). The percentages are based on 59 patients who used physician-rating websites.
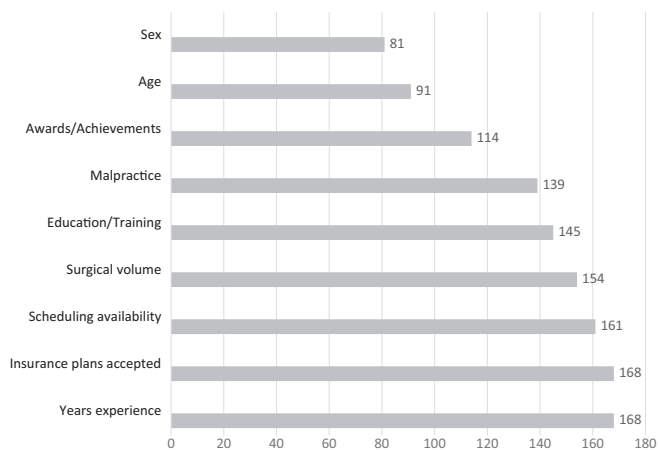

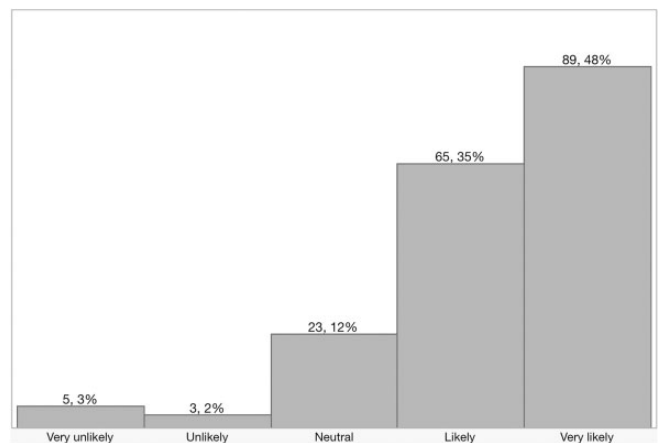**Figure 4.** Desired information about the physician.

Figure 5. Would physician encouragement promote use of internet-based information?

Figure 6. Can you trust orthopaedic information found online?

information about orthopaedic surgeons was their experience and the types of insurance plans accepted by the practice. We found that a previous patient's written comments about the orthopaedic surgeon tends to be the most important factor when reviewing physician-rating websites.

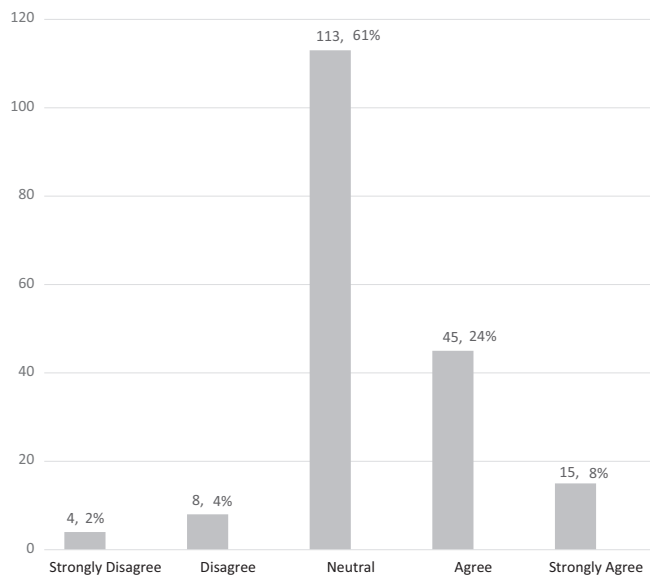In our study, most patients who did not access the internet did not provide a specific reason for this. In the literature surrounding health status and information-seeking behavior, it is reported that having a preexisting health problem can interfere with the information-seeking process.[10,16] Some patients may view the process of searching and interpreting information to be such a tedious task that they decline to invest the effort. Similarly, it is possible that "choice fatigue" is an underlying reason why patients do not use the internet. Some patients may have an inherent negative attitude toward the internet and, by extension, medical information on the internet.[6]

One often-overlooked factor regarding the impact of health information is that being more informed may change the expectations that a patient has about the health care experience.[7,8] Further studies are warranted to explore the role that pretreatment consultation plays in modifying the subsequent treatment experience. Recent studies suggest that this involves a complex interaction between information, its source, and the patient-provider interaction.[1] Understanding patients' expectations for treatment is important because expectations have been shown to relate to outcomes after orthopaedic surgery.[17,24,25] It is highly likely that providers will be

increasingly challenged to provide context for the information that patients obtain from the internet.

This study is subject to the limitations of a survey study. The cross-sectional design prohibited a causal analysis of the relationships observed. The data depend on the specific questions asked, which may limit comparison with other studies that use different means of measuring how patients use the internet. Even though the racial and socioeconomic diversity of this urban population is a strength, the findings in this population may not be generalizable to other orthopaedic practices, especially those in a rural setting or outside the United States. Another limitation relates to the sampling of participants. Considering the frequency of adolescent sports injuries, we believed that inclusion of adolescents was important and made the study more generalizable. Although all but 1 adult participated, many adolescents did not, which inherently introduces self-selection bias.

CONCLUSION

This study showed that only half of patients used the internet to find information about their orthopaedic condition, and only a third viewed physician-rating websites. Some demographic characteristics were associated with internet use. Most patients either were neutral toward or did not trust internet-based information, and many may forgo internet sources altogether. Most important, patients in this study were receptive to physician guidance regarding information to review online. To help patients avoid misinformation, sports medicine providers should understand how patients are using the internet and guide patients in selecting high-quality, peer-reviewed sources of information.

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APPENDIX

Sports Medicine Internet Utilization Survey

Background information

3. Age:

4. Gender

5. Race/Ethnicity

6. Highest Level of Education:

7. Annual Household Income (approximate):

8. Insurance Provider:

9. Reason for Today's Visit:

10. Visit location

11. Respondent's relationship (if applicable):

Choosing your doctor

12. Do you have internet access in your home?

13. How often do you use the internet to look up ANY SORT OF medical information (symptoms, treatment, surgery, drugs, physician searches, etc).

Rarely	Monthly	Weekly	Daily
○	○	○	○

14. What is/are your reasons for choosing University of MD Orthopaedics?

☐ Peer Recommendation

☐ Insurance reasons

☐ Specialty care

☐ Prior experience

☐ Online search

☐ Convenience (location, scheduling, etc.)

☐ Doctor referral

Other (please specify)

15. How did you find out about your orthopaedic surgeon?

☐ Internet

☐ Family/Friends

☐ Physician Referral

☐ Advertisement

☐ List of approved doctors through your insurance company

Other:

16. Do you use physician rating websites for reviewing orthopaedic surgeons?

Physician Review Websites

17. Mark which of these physician rating websites you have used.

☐ Vitals.com

☐ Health Grades

☐ RateMDs.com

☐ Doctor Scoreboard

☐ Healthcare Reviews

☐ Zoc Doc

☐ UCompareHealthcare

☐ Dr. Score

☐ Yellow Pages

☐ Do not remember

Other (please specify)

[   ]

18. Check the box based on how important the listed factor is to you when choosing a doctor:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Physician's "star" rating	○	○	○	○	○
Hospital's "star" rating	○	○	○	○	○
Patient's written comments about the doctor	○	○	○	○	○
Number of written comments on the doctor	○	○	○	○	○

Other (please specify)

[   ]

19. Have you ever posted a review or comment on one of these websites?

[   ]

20. Which would you most like to have prior to choosing your doctor?

○ Written comments by previous patients.

○ Average scores given to your doctor by previous patients

○ Hospital, federal or state-made statistics generated about your doctor

○ Other (please specify)

21. Why did you choose to use or not to use these physician rating websites?

22. Answer this question for each of the following factors:
Did you have this information on the potential doctors from whom you were choosing?

	Yes	No
Age	○	○
Sex (male or female)	○	○
Years experience	○	○
# surgeries performed	○	○
Medical school and residency training	○	○
Awards received	○	○
# malpractice lawsuits	○	○
Scheduling availability	○	○
Insurance plans accepted	○	○

Comments

23. Answer this question for each of the following factors:

Is it or would it be helpful having this information on a doctor when choosing a doctor?

	Yes	No
Age	○	○
Sex (male or female)	○	○
Years experience	○	○
# surgeries performed	○	○
Medical school and residency training	○	○
Awards received	○	○
# malpractice lawsuits	○	○
Scheduling availability	○	○
Insurance plans accepted	○	○

Internet use before and after your appointment

24. Which of the following did you use to get information on your symptoms/condition? (Click all that apply)

☐ Medical pamphlets

☐ Friends and Family

☐ Facebook/Twitter

☐ Forums with people who have had the same problem

☐ Youtube

☐ WebMD

☐ Mayo Clinic website

☐ National Library of Medicine.gov

☐ MedicineNet

☐ Wikipedia

☐ Institutional website or website made by your doctor

☐ Word of mouth from doctor only

☐ Other websites I do not remember from a general google search

Other (please specify)

[   ]

25. Which do you use most frequently to get information on other conditions?

[   ]

[   ]

26. When you have new orthopaedic related symptoms, do you consult the internet BEFORE seeing a doctor?

[   ]

27. You feel more prepared for your orthopaedic visit with the doctor because of online searching

Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
○	○	○	○	○

28. Do you search the internet for information on your orthopaedic condition AFTER you see the doctor?

29. Briefly, why or why don't you consult the internet regarding your symptoms?
(please respond for both before AND after your appointment)

30. You trust the orthopaedic medical information online

Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
○	○	○	○	○

31. Does anyone access the internet regarding medical care on your behalf?

If yes, please specify who

32. If you were given a list of medical websites by your orthopaedic surgeon, would you be more likely to use the internet to look up information on your orthopaedic condition?

○ Yes

○ No

33. If you were encouraged by your physician to read information relating to your condition on recommended websites, what is the likelihood you would do it?

Very unlikely	Unlikely	Neutral	Likely	Very likely
○	○	○	○	○

Travel considerations

34. Visit # to current facility: (put 1 if this is your first time to this facility)

_____

35. What is/are your reasons for choosing this facility?

☐ Location

☐ Scheduling convenience

☐ First available appointment you could get

☐ I've been treated here by another physician

☐ Physician's request

☐ Family/friend suggestion

Other (please specify)

_____

36. Travel distance to clinic (miles):

_____

37. Travel time to clinic (minutes):

_____

38. Regarding your job, you had to:

_____

39. Presumed lost wages from visit to doctor (dollar value)

_____

Additional Comments

Thank you for your input. We appreciate your taking time to complete our survey. Please feel free to make any additional comments you have below

40. Hypothetically, you would be most likely to write a review on your doctor if it was:

- ○ On paper in the doctor's office
- ○ On paper at home (you would then mail it in)
- ○ Online in the office (for example, on an ipad)
- ○ Online at home
- ○ In doctor's office guided by an employee (other than the doctor himself)

41. Comments: