



# How Reliable is Dr. Google?

## A systematic review of internet search engine accuracy for common orthopedic sports medicine phraseology

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### Introduction

The internet is a superhighway of streamlined, though unfortunately, sometimes biased information. Patients have immediate access to powerful search engines and often use the internet to get inexpensive, quick medical advice. Previous studies have evaluated the reliability of public-access websites and have reported that many lack high-quality, accurate, information.

A unique subset of patients that has yet to be investigated in this context is the orthopedic athlete. Surgical interventions often have recovery periods that impact quality of life (QOL)—especially in an active population where an injury results in a significant decrease in daily activity. It is common for the surgeon to encourage limited use of an injured area or even complete immobilization to promote healing. Many active individuals facing such down-time turn to the internet since it is a wealth of information that is easy to access.

### Purpose

To conduct a systematic review of studies evaluating the quality and content of internet-based information available for some of the most common orthopedic sports medicine diagnoses

### Methods

A search of PubMed, Embase, and Cochrane databases following PRISMA guidelines was performed. All English-language literature published from 2010-2020 discussing information quality pertaining to orthopedic sports medicine terms are included. Outcomes included the search engines used, number and type of websites evaluated, platform, and quality scoring metrics. Descriptive statistics are presented

**Table 1:** Search engines evaluated by included studies. Percentages denote number of studies out of twenty-one total. The most popular search engine as Google followed by Yahoo and Bing.

Study	Ask™	Bing™	Google™	Yahoo!®	YouTube™	Other
Akinleye et al, 2018			X			
Akpolat et al, 2020					X	
Bruce-Brand et al, 2013	X	X	X	X		
Cassidy et al, 2018					X	
Celik et al, 2020					X	
Dalton et al, 2015	X	X	X	X		AOL
DeFroda et al, 2019		X	X			
DeFroda et al, 2018		X	X	X		
Devitt et al, 2017		X	X	X		AOL, Lycos
Duncan et al, 2013	X	X	X	X		
Dy et al, 2012		X	X	X		
Garcia et al, 2014		X	X	X		
Goldenberg et al, 2019		X	X	X		
Gosselin et al, 2013		X	X	X		
Houck et al, 2019		X	X	X		
Nwachukwu et al, 2018		X	X	X		
O'Neill et al, 2014		X	X	X		
Somerson et al, 2018		X	X	X		
Starman et al, 2010			X	X		
Wang et al, 2017		X	X	X		
Zhang et al, 2016		X	X	X		
<b>Total:</b>	<b>3</b>	<b>16</b>	<b>18</b>	<b>16</b>	<b>3</b>	<b>3</b>
<b>Percentage:</b>	<b>14%</b>	<b>76%</b>	<b>86%</b>	<b>76%</b>	<b>14%</b>	<b>14%</b>

**Table 2:** Type of data analyzed in each study and category of information assessed. The most common website affiliation was *Physician*.

Study	No. Websites	Physician	Academic	Public Education, Not Physician	Blog	News Or other	Industry Commercial
Akinleye et al, 2018	50	8	15	19		8	
Akpolat et al, 2020	48 videos	-	-	-	-	-	-
Bruce-Brand et al, 2013	60	6	4		6	-	29
Cassidy et al, 2018	39	1		22			16
Celik et al 2020	67 videos	32	0	9	16	0	10
Dalton et al, 2015	59	26	-	-	-	31	2
DeFroda et al, 2019	300 images	-	-	-	-	-	-
DeFroda, et al, 2018	300 images	-	-	-	-	-	-
Devitt et al, 2017	81	34	20	-	-	23	4
Duncan, et al, 2013	200	36	23	20	12	104	5
Dy et al, 2012	75	36	4		45	-	40
Garcia et al, 2014	82	32	13	12	14	-	11
Goldenberg et al, 2019	47			Not specified			
Gosselin et al 2013	35	3	7	2	13	8	2
Houck et al 2019	90	32	38	7	1	11	1
Nwachukwu et al, 2018	96	57	9	5	6	14	5
O'Neill et al, 2014	225			Not specified			
Somerson et al, 2018	49	16	12	5	-	-	16
Starman et al, 2010	154	22	32	7	3	16	74
Wang et al, 2017	53	33	-	-	-	5	15
Zhang et al, 2016	91			Not specified			
<b>Total:</b>	<b>1486</b>	<b>374</b>	<b>199</b>	<b>86</b>	<b>116</b>	<b>220</b>	<b>230</b>
<b>Percentage:</b>		<b>25%</b>	<b>13%</b>	<b>6%</b>	<b>8%</b>	<b>15%</b>	<b>15%</b>
<b>Average: 87.51 ± 55.17</b>							

### Study Scoring Systems

#### DISCERN

Seven studies reported on the DISCERN Instrument. The average content specific DISCERN score was 5.24 whereas the average non-content specific DISCERN score was 40.55. The average FK Grade level was 10.24 with scores ranging from 7.9 to 13.4. The average FK Readability score was 52.94 ("fairly difficult, high school"). The average JAMA Benchmark score was 2.00. The average percentage of websites with HON certifications was 17.79%. Akpolat et al (2.35± 0.91) and Cassidy et al (2.30± 0.9) reported YouTube content specific DISCERN scores. Celik et al reported an average DISCERN score of 30.5 ± 13.9 on YouTube. Dalton et al reported DISCERN scores on Ask, Bing, Google, Yahoo, and AOL averaging 39.47 ± 11.39. Devitt et al reported overall and content specific DISCERN scores across Bing, Google, Yahoo, AOL, and Lycos (ALLR 37.3 ± 3.4, ACLR 54.4 ± 4.6, p < 0.0001; specific content score 5.3 ± 1.3, 11.0 ± 1.5; p < 0.0001). Houck et al reported an average specific content DISCERN score across Bing, Google, and Yahoo (3.4 ± 0.59).

#### Flesch-Kincaid (FK) Readability Test Tool

Nine studies reported on Flesch-Kincaid (FK) Readability Test Tool. Akinleye et al, Dalton et al, Dy et al, Garcia et al, Gosselin et al, Nwachukwu et al, O'Neill et al, Wang et al, and Zhang et al reported on grade level. Scored ranged from 7.9 to 13.4 with an average of 10.24.

Akinleye et al, Dalton et al, Gosselin et al, and O'Neill et al reported on FK Readability. Scores ranged from 47.40 to 54.60 with an average of 52.94 ("fairly difficult, high school").

#### Health On the Net (HON)

Seven studies reported on the HON Foundational Principals. The average percentage of websites with HON certifications was 17.79%. Two studies searched Ask. Seven searched both Google and Bing. Three searched Yahoo. Two searched AOL. One searched Lycos. None searched YouTube (Table A1).

#### JAMA Benchmark Score

Seven studies reported on the JAMA Benchmark score. The average JAMA Benchmark score was 2.00. The average percentage of websites with HON certifications was 17.79%.

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### Results

This review includes 21 studies. Of them, three evaluated both the upper and lower extremity. Twelve focused on the upper and lower extremity, most commonly rotator cuff tears (3/12) and/or ACL pathologies (7/12). The most common engines were Google (18/21), Bing (16/21), Yahoo (16/21), YouTube (3/21), Ask (3/21), and AOL (2/21). The average number of media files assessed per study was 87±55. Website quality was assessed with DISCERN (7/21), Flesch-Kincaid (9/21), Health On The Net (HON) (7/21), and/or JAMA Benchmark (7/21) scores. YouTube was evaluated with JAMA Benchmark Scores (1.74±1.00). Image quality was reported in two studies and varied with search terminology.

### Discussion and Conclusion

The results of this systematic review suggest that physicians should improve the quality of online information and encourage patients to access credible sources when doing their own research. Doctors can and should play an active role in closing the gap between the level of health literacy of their patients and that of most common online resources.



### HOW TO TELL IF MEDICAL INFORMATION ONLINE IS CREDIBLE

- A Health On the Net Seal
- Peer-Reviewed References
- .org or .edu affiliations

! Websites with sponsorships, that ask for your personal information, offer 'Quick Fix' claims, and/or with products for sale.

IF YOU'RE UNSURE, DON'T D.I.Y STOP CALL YOUR DOCTOR

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