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Original Research

## Patient-Directed Online Education for Carpal Tunnel Syndrome and Release: Analysis of What Patients Ask and Quality of Resources



Shelby R. Smith, MD,\* Alexander Hodakowski, BS,\* Johnathon R. McCormick, MD,\*  
Jonathan Spaan, BS,\* John Streepy, BS,\* Colton Mowers, BS,\* Xavier Simcock, MD\*

\* Department of Orthopaedic Surgery, Rush University Medical Center, Chicago, IL

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**Purpose:** This study classifies common questions searched by patients from the Google search engine and categorizes the types and quality of online education resources used by patients regarding carpal tunnel syndrome (CTS) and carpal tunnel release (CTR).

**Methods:** Google's results were extracted and compiled using the "People also ask" function for frequent questions and associated web pages for CTS and CTR. Questions were categorized using Rothwell's classification with further topic subcategorization. Web pages were evaluated by using Journal of the American Medical Association Benchmark Criteria for source quality.

**Results:** Of the 600 questions evaluated, "How do I know if I have carpal tunnel or tendonitis?" and "What causes carpal tunnel to flare up?" were the most commonly investigated questions for CTS. For CTR, frequent questions investigated included "How long after hand surgery can I drive" and "How do you wipe after carpal tunnel surgery." The most common questions for CTS by Rothwell classification were policy (51%), fact (41%), and value (8%) with the highest subcategories being indications/management (46%) and technical details (27%). For CTR, the most common questions entailed fact (54%), policy (34%), and value (11%) with the highest subcategories as technical details (31%) and indications/management (26%). The most common web pages were academic and medical practice. The mean Journal of the American Medical Association score for all 600 web pages was 1.43, with journals (mean = 3.91) having the highest score and legal (mean = 0.52) and single surgeon practice websites (mean = 0.28) having the lowest scores.

**Conclusions:** Patients frequently inquire online about etiology, precipitating factors, diagnostic criteria, and activity restrictions regarding CTS/CTR. Overall, the quality of online resources for this topic was poor, especially from single surgeon practices and legal websites.

**Clinical relevance:** Understanding the type and quality of information patients are accessing assists physicians in tailoring counseling to patient concerns and facilitates informed decision-making regarding CTS/CTR as well as guiding patients to high-quality online searches.

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The internet is readily accessible, and search engines such as Google, Yahoo, and Bing are powerful tools used by many people to gain information on any topic. Although the modern era of technology has led to a wealth of information, cautious inter-

pretation is required because resources can be of poor quality, misleading, anecdotal, and even false. More than half of the patients will access the internet for health-related information.<sup>1,2</sup> Furthermore, one of every three patients will bring questions to their surgeons regarding their internet investigations; only half of which will coincide with the surgeon's recommendations.<sup>2</sup> Because most patients access the internet before appointments, office visits can be monopolized by dispelling preconceived notions regarding diagnosis and treatment options.<sup>2</sup>

The validity of online orthopedic resources is questionable. Many have demonstrated that the information accessed by patients for or-

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**Corresponding author:** Shelby R. Smith, MD, Department of Orthopaedic Surgery, Rush University Medical Center, 1611 W. Harrison Street, Chicago, IL 60612.

E-mail address: [shelby\\_smith@rush.edu](mailto:shelby_smith@rush.edu) (S.R. Smith).

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thopedic conditions is of poor quality, leading to patient confusion and physician frustration.<sup>3</sup> Even if accurate information is available to the patient, health literacy is a barrier to interpreting the information found online as only 12% of adults in the United States demonstrate proficient health literacy.<sup>4</sup> Controlling the information placed on the internet is impractical; therefore, in-office counseling becomes essential in providing proper education and creating an informative, trusting relationship between the patient and physician.

Carpal tunnel syndrome (CTS) is the most common compressive neuropathy, with a prevalence of 4.9% in the general population.<sup>5</sup> The syndrome is particularly alarming to patients because night-time symptoms interfere with sleep, disrupt activities of daily living, and may diminish work capacity. CTS is recognized as a work-related disability and is commonly involved in worker's compensation claims.<sup>6</sup> Surgical treatment in the form of carpal tunnel release (CTR) is one of the most common procedures performed by hand surgeons, with more than a 30% increase in the number performed in the outpatient setting over a 10-year period.<sup>7</sup> Despite its high prevalence in the general population, the syndrome and procedure are poorly understood by patients, who often turn to the internet for education.

The purpose of this study is to summarize and categorize the commonly asked questions using Google's "People Also Ask" function and categorize the types and quality of websites patients use regarding CTS and CTR. Although others have categorized commonly asked patient questions regarding this topic, summarizing overarching topics patients are asking and rating the quality of websites used are lacking.<sup>8</sup>

## Methods

The methods of our study were adapted from a previous study by Shen et al.<sup>9</sup> Search queries were performed by one of the authors using coding language via the Google Web Search on April 4, 2023. The author used three different search terms for both "carpal tunnel diagnosis" and "carpal tunnel surgery," which were meant to emulate how a patient may search on Google for information. For the topic of "carpal tunnel diagnosis," the terms "carpal tunnel," "carpal tunnel syndrome," and "carpal tunnel disease" were searched. For the topic of "carpal tunnel surgery," the terms "carpal tunnel release," "carpal tunnel surgery," and "carpal tunnel release surgery" were searched. To avoid bias of personalized results influenced by previous search history, searches were prospectively conducted on a newly installed Google Chrome application (Google, Inc.) with no previous queries. Any previously installed Google Chrome application was uninstalled, and the hard drive was subsequently searched for any remaining files containing Google Chrome data, which were deleted if encountered.

For each search query, the "People also ask" tab was automatically expanded until 300 unique suggested searches appeared on the page. Each "People also ask" question was paired with a single hyperlink to a webpage. The suggested questions and associated webpage hyperlinks were automatically collected into a data sheet using the automated Google Chrome extension SEO Minion, version 3.6 (Google, Inc.). Each "People also ask" question was also counted for the number of times it populated the page because some appeared more than one time.

Each resultant question was categorized using the Rothwell classification into one of the following three themes: fact, policy, or value.<sup>10,11</sup> For this study, the questions were subcategorized based on the content into one of the following categories: specific activities, timeline of recovery, restrictions, technical details, cost, indications/management, risks/complications, pain, longevity, and evaluation of surgery. Further descriptions and examples of Rothwell classification can be found in Table 1.

Each website hyperlink was visited, and the website source was subsequently categorized as academic, commercial, government,

**Table 1**

Description and Examples of Each Type of Rothwell Classification Category and Subcategory for Carpal Tunnel Syndrome

Rothwell's Classification:	
Fact	Ask whether something is true and to what extent For example, how do they test for carpal tunnel?
Specific activities	What is the best position to sleep in with carpal tunnel syndrome?
Timeline of recovery	How long should I keep my hand covered after carpal tunnel surgery?
Technical details	Why is carpal tunnel worse at night?
Restrictions	What foods should I avoid if I have carpal tunnel?
Cost	Is carpal tunnel treatment expensive?
Policy	Ask whether a certain course of action should be taken to solve a problem For example, what is the fastest way to get rid of carpal tunnel?
Indications/management	How do you stop carpal tunnel from getting worse?
Risks/complications	What happens if you do not fix carpal tunnel?
Value	Ask for evaluation of an idea, object, or event For example, how painful is carpal tunnel surgery?
Pain	What is the most effective pain relief for carpal tunnel?
Longevity	Does surgery permanently fix carpal tunnel?
Evaluation of surgery	When is carpal tunnel bad enough for surgery?

journal, legal, medical information site, medical practice, nonmedical media site, or single surgeon personal. A description and example of each website classification can be found in Table 2.

Each website was scored for information quality on a 4-point scale according to the Journal of the American Medical Association (JAMA) Benchmark Criteria, which include points for authorship, attribution, currency, and disclosure. A description of the requirements to receive a point for each criterion can be found in Table 3. The question classification, website classification, and JAMA Benchmark score were compiled independently by two authors after an agreement was established for categorical definitions. Discrepancies were reviewed by a third author as a tiebreaker to decide the final categorization.

Cohen's kappa coefficient was used to evaluate the interobserver reliability of question classification and website classification.

## Results

In total, 600 questions were extracted between the two search strings: (1) 300 questions from "carpal tunnel diagnosis" and (2) 300 questions from "carpal tunnel surgery." Rothwell's classification of questions for "carpal tunnel syndrome" included 51% involving policy, followed by 41% fact and 8% value. "Carpal tunnel diagnosis" questions were categorized as fact (54%), policy (34%), and value (11%). For "carpal tunnel diagnosis," the most common question subcategories were indications/management (46%) and technical details (27%). For "carpal tunnel surgery," the most common question subcategories were technical details (31%) and indications/management (26%; Table 4). A large difference was observed in the nature of the search queries as 95% of "carpal tunnel diagnosis" questions were categorized as nonsurgical, decision-making, or diagnostic, whereas 52% of "carpal tunnel

**Table 2**  
Description and Examples of Each Type of Website Classification

Website Categorization	
Academic	Webpage hosted by an academic institution or organization For example, <a href="http://hopkinsmedicine.org">hopkinsmedicine.org</a> , <a href="http://orthoinfo.aaos.org">orthoinfo.aaos.org</a>
Commercial	Webpage hosted by a for-profit company For example, <a href="http://foothillstherapy.com">foothillstherapy.com</a> , <a href="http://optivusphysicaltherapy.com">optivusphysicaltherapy.com</a>
Journal	Academic journal publication, may be hosted by third party site For example, <a href="http://pubmed.com">pubmed.com</a> , <a href="http://sciencedirect.com">sciencedirect.com</a>
Government	Governmental hosted webpage For example, <a href="http://myhealth.alberta.ca">myhealth.alberta.ca</a> , <a href="http://medlineplus.gov">medlineplus.gov</a>
Legal	Single attorney, law firm, or legal advice webpage For example, <a href="http://rosenfeldinjurylawyers.com">rosenfeldinjurylawyers.com</a> , <a href="http://rossfellercasey.com">rossfellercasey.com</a>
Medical information site	Company or organization for the purpose of medical information reviewed by medical professionals For example, <a href="http://WebMD.com">WebMD.com</a> , <a href="http://healthline.com">healthline.com</a>
Medical practice	Medical or surgical practice of physicians For example, <a href="http://austinshouldersurgery.com">austinshouldersurgery.com</a> , <a href="http://orthobethesda.com">orthobethesda.com</a>
Nonmedical media site	Web pages not specializing in medical information such as general news and social media sites For example, <a href="http://wikipedia.com">wikipedia.com</a> , <a href="http://abcnews.com">abcnews.com</a>
Single surgeon practice	Single surgeon practice or personal webpage For example, <a href="http://gomeramd.com">gomeramd.com</a> , <a href="http://hyderabadshoulderclinic.com">hyderabadshoulderclinic.com</a>

**Table 3**  
Description of JAMA Benchmark Criteria Scoring System

JAMA Benchmark Criteria	(Each Criteria Received One Point for a Maximum of Four Points)
Authorship	Clearly identifiable author and contributors with affiliations and relevant credentials present
Attribution	References and sources clearly listed with any copyright information disclosed
Currency	Clearly identifiable posting date of any content as well as date of any revisions
Disclosure	Website ownership clearly disclosed along with any sponsorship, advertising, underwriting, and financial support

surgery” questions were categorized as such. Therefore, 48% of the “carpal tunnel surgery” questions involved surgical or post-operative details, compared with 5% of “carpal tunnel diagnosis” questions. Summary of the top five most common questions asked for both diagnosis and surgery are summarized in Table 5.

For “carpal tunnel diagnosis,” the most common web pages were academic (30%), medical practice (23%), and commercial (12%). For “carpal tunnel surgery,” the most common web pages were medical practice (32%), academic (26%), and commercial (9%; Table 6). The mean JAMA score for all 600 websites was 1.43. The websites with the highest mean JAMA scores were journal websites (mean = 3.91). The websites with the lowest mean JAMA scores were legal (mean = 0.52) and single surgeon practice websites (mean = 0.28). The mean values for the remaining categories were as follows: medical information 2.65, commercial 1.56, academic 1.47, government 1.43, nonmedical media 1.00, and medical practice 0.59.

## Discussion

This study highlights the following: (1) Classification of the general topics that patients investigate online regarding CTS and

**Table 4**  
Rothwell Classification Category and Subcategory for Carpal Tunnel Syndrome and Release

Category	Syndrome	Release
Fact	n = 122	n = 163
Technical details	81	94
Timeline of recovery	16	29
Specific activities	11	15
Restrictions	8	21
Cost	6	5
Policy	n = 154	n = 103
Indications/management	138	79
Risks/complications	16	24
Value	n = 24	n = 33
Pain	15	26
Evaluation of surgery	7	7
Longevity	2	0

**Table 5**  
Top Questions Searched by Patients for Carpal Tunnel Syndrome and Release

CTS	CTR
<ul style="list-style-type: none"> <li>How do I know if I have carpal tunnel or tendonitis?</li> <li>What causes carpal tunnel to flare up?</li> <li>How painful is carpal tunnel surgery?</li> <li>What is the fastest way to get rid of carpal tunnel?</li> <li>Does squeezing a ball help carpal tunnel?</li> </ul>	<ul style="list-style-type: none"> <li>How long after hand surgery can I drive?</li> <li>How to use restroom after carpal tunnel syndrome?</li> <li>Can I drive myself home after carpal tunnel surgery?</li> <li>How long can I expect to be off work after wrist surgery?</li> <li>Can I go back to work 2 weeks after carpal tunnel surgery?</li> </ul>

**Table 6**  
Website Classification for Carpal Tunnel Syndrome and Release

Website Classification	Syndrome	Release
Academic	89	79
Medical practice	68	96
Commercial	36	28
Medical info site	27	28
Journal	25	19
Government	21	26
Legal	15	12
Single surgeon personal	15	10
Nonmedical media site	4	2

CTR, (2) The overall online resources used for CTS/CTR education are of poor quality, and (3) Frequently visited websites are from academic sources and medical practices. These findings assist with in-office counseling and demonstrate the importance of providing vetted, high-quality resources to patients. It is essential for physicians to educate patients on the cautious interpretation of online resources. Furthermore, we identify the questions patients are most interested in learning about regarding this topic, and addressing these in the office may lead to a more fulfilling visit.

Based on Rothwell’s classification, the most frequently asked questions fall into fact and policy categories. Fact questions are defined by asking whether something is true and to what extent. The most common subcategory of “fact” questions asked involved technical details. Patients seem most interested in understanding the etiology, demographic groups affected, pathophysiology, treatment, preventative measures, and surgical

details. Questions regarding the disability associated with CTS were asked in various ways, suggesting that work-related difficulties are at the forefront of patient's minds. Policy questions are defined by a certain course of action taken to solve a problem and are subcategorized by indications/management and risks/complications. Patients are interested in learning more about nonsurgical treatment modalities and at what point surgery would be recommended. These findings counter the higher percentage of value-based categorized questions found in recent investigations by Foster et al.<sup>8</sup> This discrepancy can be explained by the limited number of questions evaluated in that study and their focus on "symptom-related" questions.

Classifying the overall topics regarding CTS revolved around the diagnostic criteria and precipitating activities. Provided this, in-office counseling should involve validating the patient's symptoms that contribute to the clinical diagnosis of CTS. It also may be beneficial to explain that median nerve compression can be exacerbated by certain positions and repetitive activities. Regarding carpal tunnel surgery, patients seek information about how and when they are able to perform activities such as the activities of daily living and driving after surgery. Therefore, proper preoperative counseling should include detailing activity restrictions and release to specific activities. Determining answers to these questions online is unreliable because they are often based on the surgeon's preference. As mentioned above, patients inquire frequently about the disability of CTS and is important to address this in work-related cases. It should be made clear that the clinical and legal definition of "disability" differs and can be an area of patient confusion. Finding and deciphering this information online can be challenging, as it requires the interpretation of medical-legal jargon and differs depending on the state of residence.

About half of the websites that patients use for both CTS and surgery originated from academic and medical practice websites, in contrary to Foster et al.,<sup>8</sup> where commercial websites were most frequent. Quality of websites is based on the JAMA Benchmark criteria involving identifiable authorship, attribution, currency, and disclosures. Although the scoring system does not fact-check the information provided, it does provide insights into how current and credible the information is and the presence of bias. All websites included, on average, scored 1.43 of 4, indicating overall poor-quality resources. Unsurprisingly, the highest quality resources originated from journals. However, the readability of literature from journals is a barrier to using them as a patient-education resource.<sup>12</sup> Surgeons should counsel patients on limiting the use of single surgeon practice and legal websites because these demonstrate the poorest quality sources. Unfortunately, one of the highest frequented sources (medical practice websites) is of the lowest quality based on the JAMA Benchmark scoring system (0.59).

Evaluating online education performed by patients has been demonstrated across many specialties, including orthopedics, and within subspecialties such as the hand and elbow.<sup>13,14</sup> The educational value of YouTube videos for CTS has demonstrated overall poor quality.<sup>14–17</sup> Content quality did not correlate with video popularity, perpetuating misconceptions about diagnosis and treatment for CTS.<sup>15</sup> Furthermore, educational handouts designed for patients included questionable information, with up to 70% of the educational materials containing moderate or highly misleading information.<sup>18</sup> Even if educational handouts are accurate, the readability of these is often at a much higher education level than what is recommended for the general population.<sup>18,19</sup>

A similar investigation of CTS-related education was performed using Google and the "People Also Ask" function; however, it was limited in the number of questions and did not evaluate website

quality.<sup>8</sup> This study confirms poor-quality resources are used by patients when researching topics such as CTS and CTR. Additionally, the study delineates major topics that should be included in educational materials or in-office counseling based on the frequency of the questions generated by the "People Also Ask" function. Physicians should educate patients on indicators of online information accuracy which include high Google toolbar ratings, numerous in-links to the main page, and unbiased discussion of treatment options.<sup>20</sup>

Provided the internet is updated with data on a daily basis, the limitations to this study include an outdated list of the most common questions patients ask and resources used. However, the study included the top 300 questions for both diagnosis and surgical treatment, for a total of 600 questions, to capture the most exhaustive list, regardless of the updates. Selection bias may be present toward a population with internet access and technological knowledge to perform internet searches, limiting generalization. Other limitations of the study include the use of only one search engine, Google. Commonly asked questions and website quality may differ when using Bing or Yahoo. However, because of the large number of websites included in the study, we presume that this would capture nearly all websites provided by other search engines.

In conclusion, information on the internet used by patients is of poor quality. Patients frequently ask about the pathophysiology of CTS, preventative and treatment options, and when patients can be released to certain activities after CTR. Patients also question the degree of disability CTS imposes in work-related environments. These topics should be addressed during visits, in addition to, providing vetted, high-quality resources to patients in an effort to build an educational relationship between the patient and physician.

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