

Evaluation of Onychomycosis Information on the Internet

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ABSTRACT

Onychomycosis is a common and significant nail condition causing both physical and social impairment. Since patients often search for health information online, the accuracy of this information has become important. In this study, we sought to assess the reliability and comprehensibility of accessible internet information for patients searching for onychomycosis. We identified the top search engine hits, evaluating websites on several categories: Accountability, Quality of Medical Information, Readability, Display, Support Features, and Transparency/Disclosures. Utilizing a pro forma based on established internet codes of conduct, website readability scores, and peer-reviewed papers, we objectively analyzed and scored the most commonly-listed websites on onychomycosis. Fifty-one total websites were reviewed with a maximum possible overall score of 43. The mean overall score for all websites was 20 and 1/43 (range, 4-35) with varied Accountability (mean, 4.9/10; range, 0-10) and Quality (mean, 6.4/13; range, 1-12/13). Readability was poor overall with only 1/3 of sites meeting the acceptable 7th grade reading level for patients. In addition, while sites such as the American Academy of Dermatology website were well-organized and highly readable (Readability score, 5/5), this may compromise the quality of medical information presented (Quality score, 6/13). Because online education materials set the expectations and concerns of patients with onychomycosis, the variability in website reliability necessitates more efficient and regulated methods of presenting health information.

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INTRODUCTION

Onychomycosis is a fungal nail infection accounting for half of all nail conditions seen in clinical practice. It causes both physical and social impairment in patients worldwide,^{1,2} prompting the search for additional health information. Since the internet has become an increasingly accessible resource for self-directed investigation by patients, the reliability of online material is now an important consideration. This study assesses the most frequently listed websites regarding onychomycosis available to the general public.

Using five widely-used search engines (Google, Yahoo, Bing, AOL, and Ask), the terms onychomycosis and nail fungus were respectively queried on each. From these results, the first 20 websites for each term were selected for a total of 200 URLs. Within these, 142 were repeated, 5 required subscription, and 2 were unrelated/nonspecific, yielding a total of 51 analyzable websites.

For each site, a predetermined pro forma (Figure 1) was utilized to score reliability based upon several categories: Accountability, Quality of Medical Information, Readability, Display, Support Features, and Transparency/Disclosures. Parameters within Accountability were constructed upon the Health on the Net Code of Conduct³ and Journal of the American Medical

Association standard.⁴ Quality of Information was verified through peer-reviewed papers,^{1,2} and Readability was scored by Flesch Reading Ease Scores and Flesch-Kincaid Levels.

The mean overall score was 20.1/43 (range 4-35). Accountability was variable (range, 0-10/10) with a mean of 4.9—approximately half (53%) listed any references/sources, and only 22% were authored by board-certified dermatologists or podiatrists. Additionally, only 25% were updated within the last year, a potential explanation for incorrect information reported by a few sites, including that “treatment may be initiated on clinical suspicion.”^{1,2} Other incorrect statements asserted “nail polish as an onychomycosis remedy.” Furthermore, Quality was varied (range, 1-12/13; mean, 6.4), and overall Readability was poor, with only 33% meeting the acceptable 7th grade reading level for health information.

While the majority provided relevant images for supplementation, Support Features were lacking (mean, 2.0/8), indicating that outlets for sharing personal experiences or coping strategies were deficient. Table 1 displays the top-scoring websites by overall score and pro forma categories.

Surprisingly, the American Academy of Dermatology website did not make the list of top 10 overall highest-scoring websites,

FIGURE 1. Website scoring pro forma for “Onychomycosis” + “Nail Fungus” (Maximum 43 points).

Name of Website:

URL of Webpage:

Accountability (maximum 10 points):

Identifiable author (2 points)

Any affiliations of website (1 point)

Credentials of the author (1 point for any listing; 2 points for MD, MD/PhD, PhD, DPM, DO; 3 points for Dermatology or Podiatry specialty)

Listed source or references (1 point for any source, 2 points for references listed on PubMed)

Date of last update (1 point for any date, 2 points for update within last 12 months)

Quality of medical information (maximum 13 points):

Caused by fungi: dermatophytes, non-dermatophytes, and yeast (1 point)

Risk factors including trauma, older age, immunosuppression, diabetes, or psoriasis (1 point)

Tinea pedis, or athlete's foot, precedes onychomycosis (1 point)

Most commonly involves toenails (1 point)

Can affect multiple nails (1 point)

Different subtypes based on presenting clinical features (1 point)

May involve paresthesias, pain, or discomfort (1 point)

Confirmatory testing should precede treatment (1 point)

Diagnosis may involve microscopy, culture, PCR, histopathology, or a combination (1 point)

Medical treatments are the main option for treating onychomycosis (1 point)

Medical treatment usually involves systemic medication (1 point)

Expected duration of any mentioned treatments (1 point)

Mention of likelihood of recurrence (1 point)

Any incorrect information on subungual melanoma (-1 points)

Readability (maximum 5 points):

Flesch Reading Ease Score (FRES)		Flesch-Kincaid Level (FKL)	Score
60+	AND	8 th grade or lower	5
60+	OR	8 th grade or lower	4
30-59	AND	9 th to 12 th grade	3
30-59	OR	9 th to 12 th grade	2
0-29	OR	Beyond 12 th grade	1
0-29	AND	Beyond 12 th grade	0

Display (maximum 3 points):

Relevant images included (1 point)

Relevant audio content included (1 point)

Relevant video content included (1 point)

Support features (maximum 8 points):

Publications or newsletters (1 point)

Personal experiences (1 point)

Chat sites (1 point)

Message boards or forums (1 point)

Mention of clinical trials (1 point)

Link to other relevant websites (1 point)

Information regarding coping strategies (1 point)

Contact information of webmaster (1 point)

Transparency and Disclosures (maximum 4 points):

Clear statement of purpose (2 point)

Identifiable ownership, donors, or sponsors (1 point)

No external advertisements (1 point)

Pro forma to evaluate websites on reliability regarding onychomycosis. Based upon website evaluation form by Shah et al.⁵

TABLE 1.**Top-scoring Websites by Overall Score, Accountability, Quality, Readability, Display, and Support**

Website	Accountability (max 10)	Quality (max 13)	Readability (max 5)	Display (max 3)	Support (max 8)	Transparency (max 4)	Overall score (max 43)
TOP 5 OVERALL							
Medicine Net ^a	9	12	4	1	6	3	35
Medscape ^b	10	12	3	1	2	4	32
AAFP ^c	8	10	3	1	6	4	32
Dermatology Advisor ^d	8	11	5	1	1	4	30
Emedicine Health ^e	8	10	3	1	4	3	29
TOP 5 BY ACCOUNTABILITY							
Medscape	10	12	3	1	2	4	32
Podiatry Today ^f	10	6	3	1	3	3	26
Aesthetics ^g	10	10	1	1	1	2	25
Medicine Net	9	12	4	1	6	3	35
Medline Plus ^h	9	8	5	1	1	4	28
TOP 5 BY QUALITY							
Medicine Net	9	12	4	1	6	3	35
Medscape	10	12	3	1	2	4	32
Dermatology Advisor	8	11	5	1	1	4	30
Merck Manual ⁱ	9	11	3	1	2	3	29
Other*	--	10	--	--	--	--	--
TOP 5 BY READABILITY							
Dermatology Advisor	8	11	5	1	1	4	30
Top 10 Home Remedies ^j	2	2	5	1	2	1	13
Everyday Roots ^k	2	4	5	0	3	3	17
AAD ^l	3	6	5	2	4	4	24
WikiHow ^m	3	5	5	1	5	3	22
TOP 5 BY DISPLAY							
AAD	3	6	5	2	4	4	24
My Foot Shop ⁿ	8	3	2	2	3	4	22
Men's Health ^o	5	3	5	2	3	2	20
Canadian Nail Fungus Resource ^p	1	5	5	2	2	1	16
Other*	--	--	--	1	--	--	--
TOP 5 BY SUPPORT FEATURES							
Medicine Net	9	12	4	1	6	3	35
AAFP	8	10	3	1	6	4	32
WikiHow	3	5	5	1	5	3	22
Emedicine Health	8	10	3	1	4	3	29
Other*	--	--	--	--	3	--	--

^a<http://www.medicinenet.com>; ^b<http://emedicine.medscape.com>; ^c<https://www.aafp.org>;^d<http://www.dermatologyadvisor.com>; ^e<http://www.edmedicinehealth.com>; ^f<http://www.podiatrytoday.com>;^g<http://aestheticsjournal.com>; ^h<http://medlineplus.gov>; ⁱ<http://www.merckmanuals.com>;^j<http://www.top10homeremedies.com>; ^k<http://everydayroots.com>; ^l<http://www.aad.org>; ^m<http://www.wikihow.com>;ⁿ<http://www.myfootshop.com>; ^o<http://www.menshealth.com>; ^p<http://nailfungus.ca>; *multiple websites with same score values; Transparency/Disclosures were not included as multiple websites shared the same score for this category.

although it was a top scorer in Readability and Display. This may potentially be explained by a tradeoff between Quality of Information (in terms of amount/technicality) and need for patient comprehensibility. For example, the site appears as a top hit with the search term “nail fungus” but not with the medical term “onychomycosis.” While the AAD website is well-organized with tabs separating informational material, a separate tab with additional information for advanced health-literate patients may be a way to boost Quality without compromising Readability.

Overall, the pool of evaluated websites included varied backgrounds (academic, non-profit, commercial, etc.). This study shows that for a disease that may cause significant physical and social discomfort, the presentation of onychomycosis on the web causes concern for the regulation and reliability of health information, with variability in quality and in readability.

DISCLOSURE

The authors have no relevant disclosures.

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