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Research Article

Evaluation of Readability, Quality, and Comprehensiveness of Online Patient Materials on Dysplastic Nevi

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Abstract

Online articles on Dysplastic Nevi (DN) are a major source of information for patients. The information provided should be readable, high quality, and comprehensive. Our objective was to evaluate the landscape of published online educational materials on DN based on standard criteria of readability, quality, and comprehensiveness. A Google search was conducted utilizing terms "dysplastic nevi," "atypical mole," and "abnormal mole." The first 40 search results of each term were analyzed. Readability, quality, and comprehensiveness were analyzed using standard research tools. Correlation and comparison statistics were used to analyze relationships between characteristics noted. We identified 40 patient articles among 120 results. Average reading grade level was 10.6 (range 6.3 to 14.1). The average DISCERN instrument score was 39.5 (range 20.5 to 57.5.), indicating fair quality. Average comprehensiveness, calculated using 23 evaluative-based measures, was 13.1 (range 2 to 21). Comprehensiveness directly correlated with quality (r=0.7163). Physician authors produced articles more comprehensive and of higher quality than those authored by non-physicians, while dermatologist-authored articles were noted to be less readable. We conclude that authors of online patient articles on DN should prioritize their readability, quality, and comprehensiveness.

Keywords: Abnormal mole; Atypical mole; Comprehensiveness; Dysplastic nevi; Online health resources; Patient education; Quality; Readability

Introduction

Dysplastic Nevi (DN), also referred to as abnormal or atypical moles, are benign melanocytic lesions of the skin with a clinical appearance that may be concerning for melanoma [1]. DN are common with a lifetime prevalence in the region of 10% in Caucasian populations. They frequently share morphological features with melanoma such as the ABCDEs (asymmetry, border irregularity, color variability, diameter greater than 5mm, and evolving appearance) and thus require dermatologist evaluation to stratify risk [2]. While DN rarely transform to melanoma, their presence is the most important risk factor for developing melanoma, increasing the relative risk to approximately 6.36 for individuals with 5 or more DN compared to those with none [3].

As online patient health educational resources have increased, so, too, has patient access to healthcare information. Such changes have led to greater patient engagement in personal health care and greater personal knowledge of health disorders [4].With increasing utilization of the internet, a majority of patients in the United States are using the internet to obtain health information [5]. However, inconsistencies in their quality, comprehensiveness, and readability remain a concern. Patient articles lacking in any of these qualities can potentially confuse, misinform, or inadequately inform patients about DN, leading to mismanagement [6]. With the increase in utilization of online patient health resources, there remains a paucity in data evaluating the quality of websites on DN. In this study, we seek to evaluate the quality, readability, and

comprehensiveness of online patient resources on DN.

Methods

An incognito Google search was conducted in January 2023 with terms "Dysplastic nevi", "Atypical mole", and "Abnormal mole". The first 40 results from each search term were evaluated (Figure 1). Duplicate results, advertisements, scientific articles, resources intended for professionals, and non-relevant websites were excluded. Text from each website was run through six well-established and validated readability scales (Flesch Reading Ease, Flesch-Kincaid Grade Level, Gunning-Fog Score, SMOG Index, Coleman-Liau Index, Automated Readability Index). Quality was determined using the JAMA Benchmark criteria and the modified DISCERN instrument. The JAMA benchmark utilizes 4 criteria to evaluate website quality— authorship, attribution (e.g. references), disclosure (e.g. mention of potential conflicts of interest), and currency (e.g. whether website is dated). The modified DISCERN instrument (15 items) analyzes reliability and overall quality of written health information through 15 objective measures [7]. A DISCERN instrument review of each website was independently performed by two reviewers (DRD and KA), with a plan in place to average discrepancies of two or fewer points and debate to consensus discrepancies in quality perception of greater than 2 points. No inter-reviewer discrepancies were noted. Comprehensiveness was evaluated using 23 standard criteria, screening for inclusion of etiology, diagnosis, treatment, and incorporation of images and video material. Correlation between comprehensiveness and quality score was evaluated using Pearson's r test. Comprehensiveness of repeat websites was evaluated using the ANOVA test. Comparison of comprehensiveness, quality, and readability between articles written by physicians versus non-physicians and dermatologists versus non-dermatologists was performed using the student's t-test. Differences with P value of <.05 were considered statistically significant. All data analyses were performed using GraphPad Prism v9.5.0.

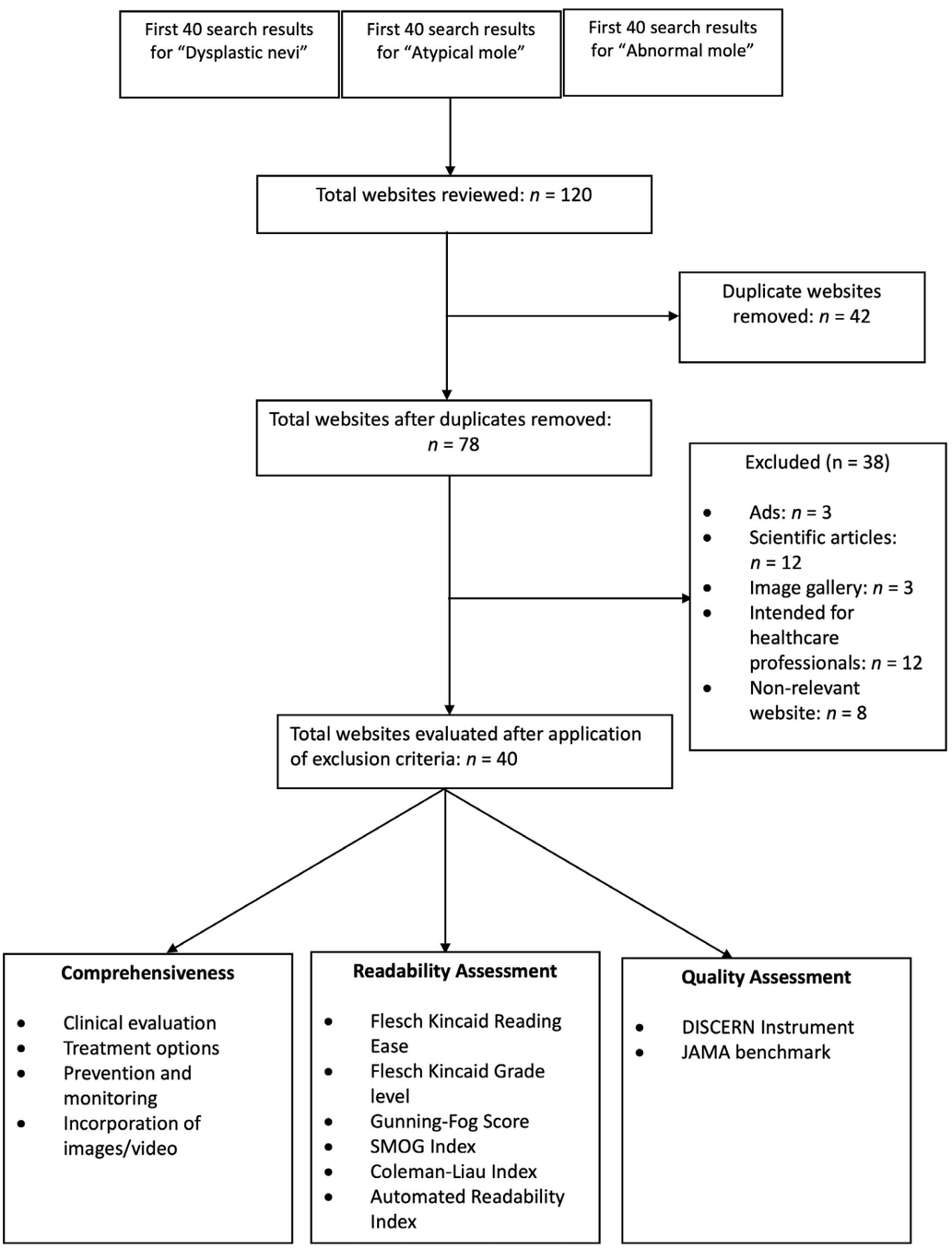

Figure 1: Schematic depicting selection and assessment of top searched patient education websites on dysplastic nevi from Google.com

Results

A total of 120 websites were evaluated, with 40 of those reviewed meeting the criteria for inclusion. (Table 1) Two websites, WebMD and Drugs.com, met the American Medical Association's (AMA) recommendation for 6th-grade reading level [8]. The average readability across all websites was 10.6 (range 6.3 to 14.1). Five websites (Wikipedia, Gainesville Dermatology, Mii Skin, OC Skin Institute and Tri Cities Skin and Cancer) required university-level reading comprehension ability (≳13). Average comprehensiveness was 13.1 (range 2 to 21) using the 23 items tested. The average DISCERN instrument score was 39.5, characterized as fair, ranging from 20.5 to 57.5. There were no websites scored as excellent in quality. Websites with the highest quality based on their DISCERN instrument scores were UCF Health, NIH, and British Association of Dermatologists. The average JAMA benchmark score was 0.8 (range 0 to 3), with no website achieving a full 4-point score.

Website Name	Average Readability Grade Level
WebMD	6.3
Drugs.com	6.8
Richmond Dermatology	7.2
AAD	7.4
Healthline	7.5
Aurora Health Care	8.0
Cleveland Clinic	8.1
Mayo Clinic	8.1
Dedicated Dermatology	8.4
MD Anderson Cancer Center	8.8
NIH	8.9
UPMC Cancer Center	9.1
National Health Service (UK)	9.5
East Valley Dermatology Center	9.8
JAMA Network	9.9
Water's Edge Dermatology	10.0
Dermatology Physicians of Connecticut	10.4
Raleigh Dermatology	10.5
Dermatology Associates of Plymouth Meeting	10.5
Premier Dermatology and Mohs Surgery of Atlanta	10.6
South East Skin Clinic	10.9
British Association of Dermatologists	10.9
Skin Cancer Foundation	11.0
US Dermatology Partners	11.3
Hutton Klein Dermatology	11.6
Skinsight	11.7
Columbus Skin Surgery Center	11.8
Vujevich Dermatology Associates, PC	11.9
UCF Health	12.0
Twin Ports Dermtology	12.2
Dr. Michele Green, MD Cosmetic Dermatologist	12.2
Bondi Junction Skin Cancer Clinic	12.3

Cancer Treatment Centers of America	12.4
Sanova Dermatology	12.8
Derm Net NZ	12.9
Wikipedia	13.3
Gainesville Dermatology	13.4
Mii Skin	13.6
OC Skin Institute	14.1
Tri Cities Skin and Cancer	14.1
Website Characteristics	**No. (%)**
Author name provided	9 (23%)
Author degree (n=9): MD or equivalent	7 (78%)
Author is a dermatologist (n=9)	4 (44%)
Mentions year written/modified	15 (38%)
Written/modified in 2021 or later (n=15)	10 (66%)
Websites with references	8 (20%)
Websites with disclosures	1 (2.5%)
Clinical Evaluation	
Mention of benign nature	31 (78%)
Mention of clinical history	34 (85%)
Mention of spectrum of atypia	12 (30%)
Mention of melanocytes	12 (30%)
Mention of physical exam	35 (88%)
Mention of dermoscopy	9 (23%)
Treatment Options	
Mention of biopsy	34 (85%)
Mention of different methods of biopsy	10 (25%)
Mention monitoring as a treatment option	30 (75%)
Prevention and Monitoring	
Mention general risk factors for developing DN	30 (70%)
Mention of family history as a risk factor	25 (63%)
Mention of risk factors for transformation into a melanoma	30 (75%)
Mention of ABCDE of melanoma	22 (55%)
Mention of sun protection	26 (65%)
Mention of self-examination	33 (83%)
Mention of taking photographs	14 (35%)
Mention of skin checks by a dermatologist	35 (88%)
Media Education	
Multimedia included	14 (35%)
Video included	2 (5%)
Pictures of atypical nevi included	17 (43%)
Website available in other languages	6 (15%)
Overall Website Readability	**Mean ± SD (range)**

Flesch Kincaid Reading Ease^	52.7 ± 12.9 (29.9 to 81.2)
Flesch Kincaid Grade Level	10.4 ± 2.6 (5.4 to 14.8)
Gunning Fog Score	13 ± 2.5 (8.0 to 17.8)
SMOG Index	9.8 ± 1.9 (5.7 to 13.1)
Coleman-Liau Index	9.9 ± 1.5 (7 to 13)
Automated Readability Index	9.6 ± 2.5 (5.2 to 14.8)
Average Readability Grade Level*	10.6 ± 1.2 (6.3 to 14.1)
Overall Website Quality Score	**Mean ± SD (range)**
JAMA benchmark	0.8 ± 1.0 (0 to 3)
DISCERN instrument, Modified	39.5 ± 9.3 (20.5 to 57.5)
	# of websites:
Excellent (63-75)	0
Good (51-62)	4
Fair (39-50)	17
Poor (27-38)	14
Very Poor (15-26)	5

Table 1: Most searched dysplastic nevi educational website characteristics. *Average readability grade level was calculated by averaging Flesch Kincaid Grade Level, Gunning Fog Score, SMOG Index, Coleman-Liau Index, and Automated Readability Index scores. ^Flesch Kincaid Reading Ease is scored between 0 and 100 for a given passage, with a higher score indicating that the article is easier to read. The other readability scales calculate an educational grade level likely required to comprehend the text passage.

Authorship was disclosed in 9 of 40 (23%) websites, references disclosed in 8 of 40 (20%) websites, conflicts of interest readily visible on 1 of 40 (2.5%) websites, and date of publication/review specified on 15 of 40 (38%) websites. Authorship was provided for only 20% (8 of 40) of websites, with 67% (6 of 9) of authors noted to have medical degrees. Dermatologists accounted for 44% of the online authors, noted in four of nine publications. Evaluation of website characteristics revealed that 85% (34/40) of websites mentioned clinical history, 30% (12/40) mentioned spectrum of atypia, 88% (35/40) mentioned physical examination, 85% (34/40) mentioned biopsy, 25% (10/40) mentioned multiple biopsy methods, and 75% (30/40) mentioned observation and monitoring as a treatment option. With regard to prevention and monitoring, risk factors associated with transformation to melanoma were noted in 75% (30/40) of websites, 55% of websites (22/40) mentioned the ABCDE's of melanoma, 65% (26/40) mentioned sun protection, 83% (33/40) mentioned self-skin examination, 35% (14/40) mentioned lesion photography, and 88% (35/40) mentioned skin-screening evaluations by a dermatologist. 43% (17/40) of websites addressing DN included images and videos.

A significant positive correlation was noted between the DISCERN instrument score and comprehensiveness of websites ($r= 0.72$, $p <0.0001$). There was no correlation found between DISCERN instrument score and readability or comprehensiveness and readability (Figure 2). There were no significant differences in comprehensiveness, DISCERN instrument score or JAMA benchmark scores for dermatologists versus non-dermatologists. Comprehensiveness trended towards significance. Dermatologist-authored articles were significantly less readable on the Flesch Reading Ease (44.6 vs 66.5, p=0.0307), Flesch Kincaid (12.05 vs 7.96, p=0.038), and SMOG (10.9 vs 8.0, p=0.0409) scales. Websites authored by a physician compared with those not authored by a physician were found to be significantly more comprehensive (16.0 vs 11.3, p=0.0470) and of higher quality by DISCERN instrument scoring (3.1 vs 2.4, p=0.0264). There were no significant differences noted in readability or JAMA benchmark scores between these two groups (Figure 3). Websites included as

repeats under each search term were significantly more comprehensive than those identified as a unique result of each search term ($p<0.05$). The readability of articles identified under the search-term "abnormal mole" was significantly higher compared with other search terms (Figure 4).

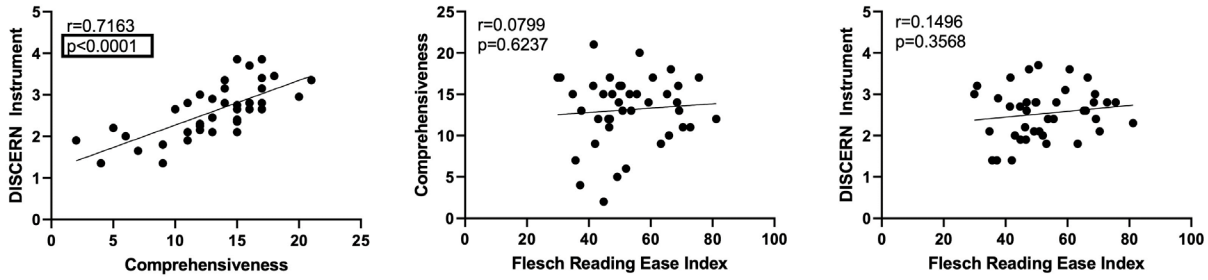

Figure 2: Correlations between DISCERN instrument and comprehensiveness scores (8th grade reading level or below are denoted in red), Flesch Reading Ease Index and comprehensiveness scores, and Flesch Reading Ease Index and DISCERN instrument scores.

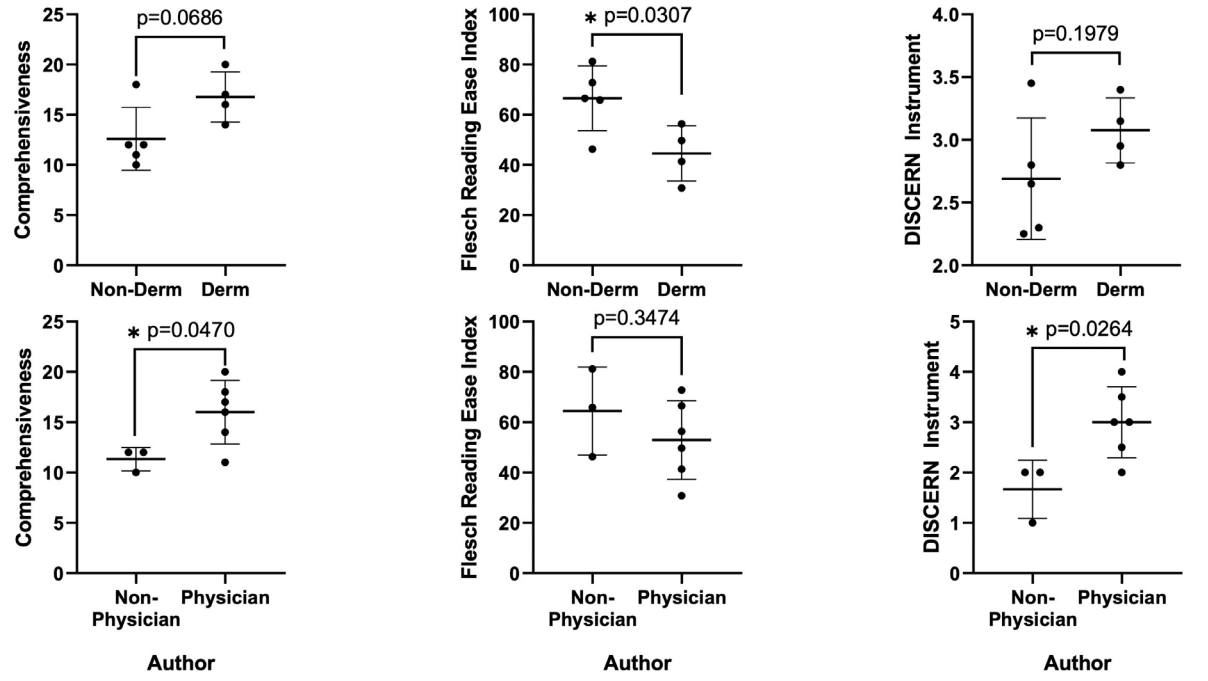

Figure 3: Comprehensiveness, Flesch Reading Ease Index, and DISCERN instrument scores among articles authored by non-dermatologists or dermatologists. Comprehensiveness, Flesch Reading Ease Index, and DISCERN instrument scores among articles authored by MD physician authors and non-MD authors. Data are presented as mean +/- SD. *p value<0.05.

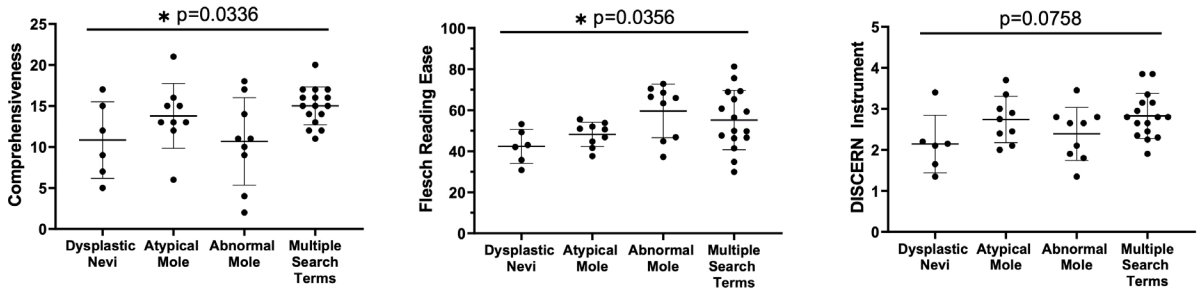

Figure 4: Patient articles under the search terms "dysplastic nevi," "atypical mole," and "abnormal mole" and articles appearing under multiple search terms analyzed for their Comprehensiveness, Flesch Reading Ease Index, and DISCERN instrument scores. Data are presented as mean +/- SD. *p value<0.05.

Discussion

Our results highlight the high grade-level readability as well as variability in quality and comprehensiveness of online patient materials for dysplastic nevi. There were only 2 websites found meeting the recommended 6th grade readability level for patients, using search terms dysplastic nevi, atypical moles, or abnormal moles, with an average readability level found to be at the 11th grade level. Regarding quality, most websites were characterized by their DISCERN instrument scoring as "very poor" to "fair" and no websites met all criteria necessary to achieve the full 4 points of the JAMA benchmark. Websites with the highest DISCERN instrument scores had readability levels greater than 8th grade, underscoring that although some websites contain high quality information, this information may not be comprehended by their target audiences.

The current standard of care for dysplastic nevi includes a combination of measures that are both non-invasive, such as standard dermatologic evaluations, self-monitoring for changes, and use of sun protection, and invasive, such as excisional biopsy [9]. Due to the risk associated with dysplastic nevi and subtle morphological differences between dysplastic nevi and melanoma, patients must be well informed of their condition, the treatment options available, and the importance of self-monitoring [2]. Further, because optimal medical management of dysplastic nevi frequently requires patient recognition, monitoring, and compliance, comprehensive patient education is imperative [10]. Our results demonstrated that there was variable inclusion of factors associated with quality online comprehensive patient education. As an example, discussion of photographic documentation was noted in only 35% of websites, while discussion of cutaneous examination by a dermatologist was noted in 88% of websites. Increase in comprehensiveness of websites to include information on prevention and monitoring may help to increase personal patient participation in dysplastic nevus management, potentially leading to better outcomes.

It is encouraging that physician-written articles were found to be significantly more comprehensive and of higher quality than non-physician-written articles. This supports the belief that physicians should continue to take the lead in curating online health materials for patients. Dermatologist-authored articles were found to be less readable, however, calling attention to a potential area for improvement. In summary, our results support previous findings from examination of online patient materials, highlighting the broad need for increase in quality of patient materials available to patients [11,12].

Conclusion

Our study demonstrates a need for improvement in readability, quality, and comprehensiveness of online materials available to patients seeking information on abnormal nevi, atypical nevi, and dysplastic nevi. As online health resources become increasingly utilized as a standard supplement to patient care, there is a unique opportunity for dermatologists to lead in resource creation. Ultimately, the utilization of strong online health resources will positively enhance patient care and potentially increase successful treatment outcomes.

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