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Best practices on patient education materials in hip surgery based on learnings from major hip centers and societies

Ali Parsa[1,2], Omkar N. Prabhavalkar[1], Sheema Saeed[1], Julio Nerys-Figueroa[1], Andrew Carbone[1] and Benjamin G. Domb [1,3*]

[1]American Hip Institute Research Foundation, Chicago, IL 60018, USA, [2]Orthopedic Research Center, Department of Orthopedic Surgery, Mashhad University of Medical sciences, Mashhad, Iran and [3]American Hip Institute, Chicago, IL 60018, USA

This study was performed at the American Hip Institute Research Foundation.
*Correspondence to: B. G. Domb. E-mail: DrDomb@americanhipinstitute.org

ABSTRACT

Patient education is important as it gives patients a better understanding of the risks and benefits of medical and surgical interventions. Developing communication technologies have completely changed and enhanced patient access to medical information. The aim of this study was to evaluate available patient education materials (PEMs) regarding hip surgery on the websites of major hip societies and centers. The PEM from 11 selected leading hip centers and societies were evaluated with the following assessment tools: Flesch–Kincaid (FK) readability test, Flesch Reading Ease formula, Literature-Intelligence-Data-Analysis (LIDA) instrument and Discernibility Interpretability Sources Comprehensive Evidence Relevance Noticeable (DISCERN) tool. Videos were assessed using Patient Educational Video Assessment Tool (PEVAT). A total of 69 educational items, including 52 text articles (75.4%) and 17 videos (24.6%) were retrieved and evaluated. The median Interquartile Range (IQR) FK level of 52 text articles was 10.8 (2.2). The median (IQR) LIDA score of text articles by center was 45. According to the LIDA score, 60% of all website articles demonstrated high accessibility (LIDA score > 44). The median DISCERN score of text articles by center was 69. Overall, 52 (100%) of the text articles were deemed to be at 'good' quality rating or higher, and 23.2% (16 out of 69) of the articles had excellent quality. The mean PEVAT score for the 17 videos was 25 ± 1.9. Analysis of text and video articles from the 11 leading orthopedic surgery centers and societies demonstrated that by selecting a reliable source of information from main scientific societies and major centers in hip surgery, patients can find more accurate information regarding their hip conditions.

INTRODUCTION

Patient education is an important part of patient care. It gives patients a better understanding of the risks, benefits and sequence of medical and surgical interventions.

The Internet has become the most widely used source of data for patients seeking additional information about their conditions over the past decade. Developing communication technologies have completely changed and enhanced patient access to medical information.

While this provides a tremendous opportunity for equity in patient care, the quality of the available patient education materials (PEMs) is unclear [1].

Furthermore, health literacy is defined as 'the degree to which individuals can obtain, process, and understand basic health information and services needed to make appropriate health decisions'. High-quality PEM increases patient adherence to treatment plans and promotes healthy lifestyle behaviors [2].

The approximate level of education needed to understand a PEM is an important factor called readability. The American Medical Association (AMA) suggests that PEMs are better understood by US audiences if they are written at a sixth grade reading level [3]. Evidence demonstrates that when searching health topics patients rarely look beyond the first 25 pages. Participants typically opted for one of the initial search results presented by the search engine (97.2% were on links positioned within the first 10 search results) [4].

Despite this widespread access to the Internet, it has been shown that the quality of orthopedic-related data available for patients is highly variable [5]. Additionally, varying website designs offer different levels of accessibility for patients, making it a significant variable in patient engagement.

The aim of this study was to evaluate available PEMs regarding hip surgery on websites of the major hip societies and centers.

Table I. *Distribution of assessment scores from the included orthopaedic academic centers*

Academic center rank	Text articles	Videos	FK level [Median (IQR)]	FRE score (MEAN ± SD)	LIDA score [Median (IQR)]	DISCERN score [Median (IQR)]	PEVAT score (MEAN ± SD)
1 AAOS	10	4	9.9 (1.3)	51.3 ± 4.8	45	70.5 (4)	22.6 ± 0.75
2 AAHKS	10	4	11.5 (2.2)	46.1 ± 7.5	43	67 (4.8)	27 ± 0.4
3 AHI	9	5	11.4 (2.5)	38 ± 10	49	68 (5.5)	24.2 ± 0.45
4 HSS	9	1	10.7 (1.8)	48.2 ± 5.3	45	70 (4)	26.5 ± NA
5 BCH	6	0	9.2 (0.4)	58.3 ± 2.2	42	71 (3.3)	–
6 DUKE	4	1	11.7 (1.3)	41.1 ± 4.5	46	69.5 (2.5)	24.5 ± NA
7 AANA	3	1	11.2 (2.9)	45.6 ± 11	47	68 (7)	26 ± NA
8 AAOSM	0	1	–	–	43	–	26.5 ± NA
9 ISHA	1	0	–	27.6 ± NA	42	–	–
10 EHS	0	0	–	–	45	–	–
11 HPS	0	0	–	–	X	–	–
Total	52	17	10.8 (2.2)	46.5 ± 9.1	45 (3.75)	69 (4)	25 ± 1.9

METHODS

In February 2023, the 11 main hip and orthopedic institutes were searched for PEMs on hip issues from their websites (Table I). The rationale for the selection of top institutions and societies was that they would provide a reliable source of PEMs.

These centers' websites were searched by two independent orthopedic surgeons (A.P. and A.C.) for hip surgery-related PEMs including text, articles, slides and videos. There were two ways to find the hip-related data. First, some websites specialized in hip surgery or had a subsection on their website for hip surgery, and secondly, the entire website was reviewed and searched for all the site's contents for PEMs.

Evaluation of the readability

The Flesch–Kincaid (FK) grade and Flesch Reading Ease (FRE) formula, which have been widely used to determine the objective and numerical reading level of the text documents, were used in our study to evaluate readability level [6–8]. This formula is commonly used for determining grades and level of readability and has been incorporated into various softwares including Microsoft Word [9, 10]. Every piece of informational text was copied into a Microsoft Office Word 365 document (Microsoft, Redmond, WA, USA). The text was then edited to eliminate HTML tags, unrelated text and superfluous punctuation. Finally, Microsoft Word was used to check the articles for spelling and grammar mistakes. After preparation of the document, Microsoft Word can automatically calculate and generate both FK score and FRE grade. The FK grade-level approximately indicates the US grade-level equivalent for a person to read and understand the content of an article.

Quality assessment of the educational materials

To evaluate the completeness, correctness, accessibility, and transparency of information provided to patients on the websites of selected hip centers, the DISCERN instrument was used. This tool was initially described by Charnock *et al.* [11].

The DISCERN instrument was selected because it is the first standardized quality assessment tool of consumer health knowledge that can be used as a critical appraisal index to assess health knowledge among patients, healthcare professionals and the public. The DISCERN questionnaire process consists of three sections with 15 questions and an overall quality rating. Questions 1 through 8 in the first section address reliability; questions 9 through 15 concentrates on the website's treatment information; and question 16 asks about the website's overall quality score. A score of >70 is categorized as 'excellent', while a score of >50 is regarded as 'good'. The maximum score is 80.

Accessibility of the educational contents

The accessibility of the examined websites included hip content was assessed using the LIDA instrument (Minervation Ltd, Oxford, UK) [12]. LIDA is a standard tool that consists of three main parts of accessibility, usability and reliability. We have used the accessibility section of LIDA to evaluate how easy access PEMs are on selected websites.

Evaluation of videos

We used the PEVAT (Patient Educational Video Assessment Tool) to evaluate the hip-related videos were extracted from websites in this study. PEVAT was introduced by the first author previously [1]. It consists of three subscale sets of binary and ternary questions with maximum scores of 30. A higher score indicated higher reliability, higher accessibility and higher overall quality of the provided educational video. The maximum achievable score for the videos is 30.

RESULTS
Study characteristics

A total of 69 educational items, including 52 text articles (75.3%) and 17 videos (24.6%) were retrieved and evaluated by two authors (XX, YY). There were no significant observer differences noted in the number of articles selected or the scores calculated from text or video evaluation (intraclass correlation coefficient = 0.814). The median (IQR) quantity of educational items (text articles and videos) per center was 5.5. The quantity of items per center spanned a range of 0 (EHS & The Hip society) to 14 (AAOS, AAHKS, AHI). Figure 1 reflects the quantity of items per centers and shows distribution of content.
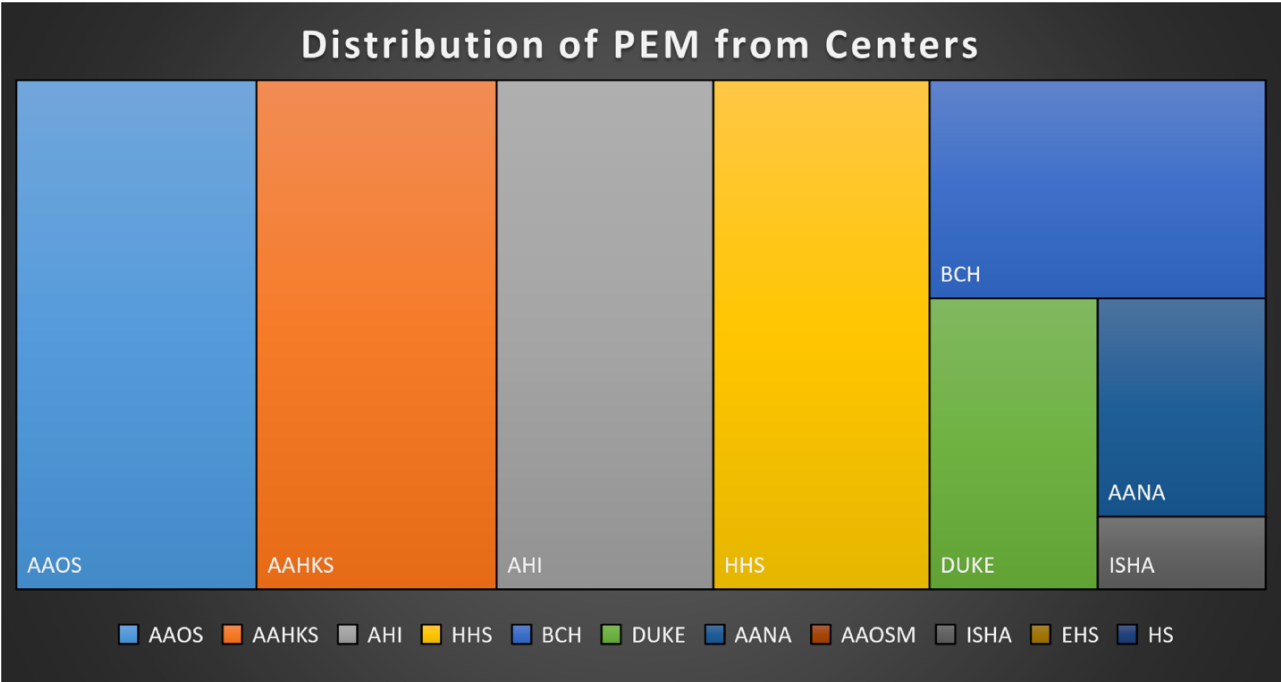
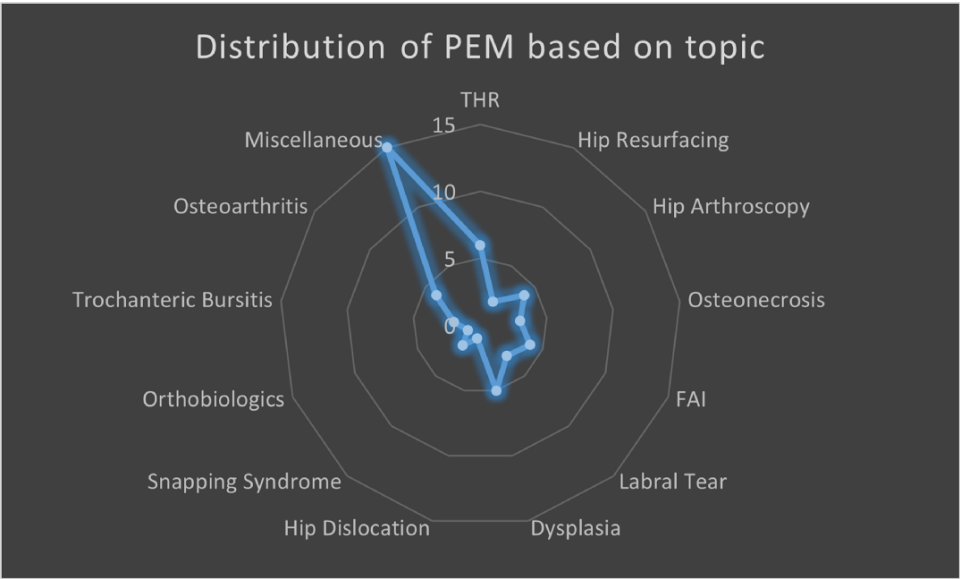**Fig. 1.** PEMs per centers.

Fig. 2. Distribution of hip preservation-related PEMs based on topics and content.

Distribution of text articles based on their topics, explained in Fig. 2.

EVALUATION OF TEXT MATERIALS
Readability FK and FRE assessments

The median (IQR) FK level of 52 text articles was 10.8 (2.2). The range consisted of articles from the 5th ranked academic center, which was the easiest to read at an FK level = 9.2 and the article of the 6th ranked academic center was the most difficult to read at an FK level = 11.7 (Figs 3 and 4). No articles were at or below an eight-grade reading level, which is

the average reading level in the United States. The mean FRE score of text articles by center was 46.5 ± 9.1. The range consisted of articles from the 5th ranked center being the easiest to read with an FRE score of 58.3 and the 3rd ranked center's article, which was the most difficult to read with an FRE score of 38.

Accessibility LIDA score

The median (IQR) LIDA score of text articles by the center's was 45 (3.75). The score range varied between the 3rd ranked center's
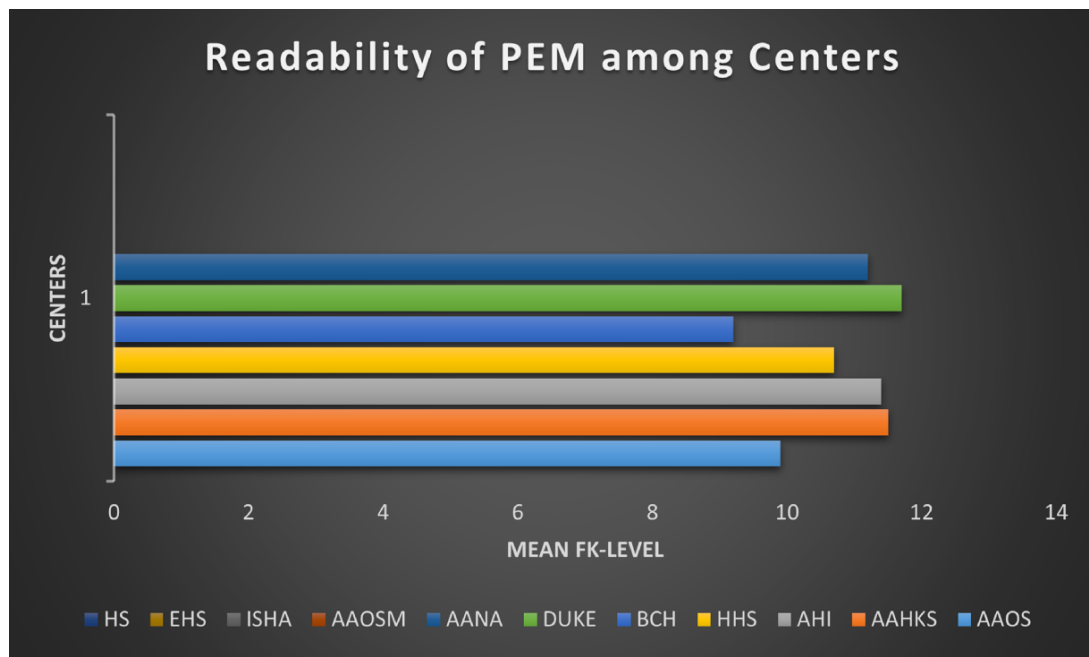
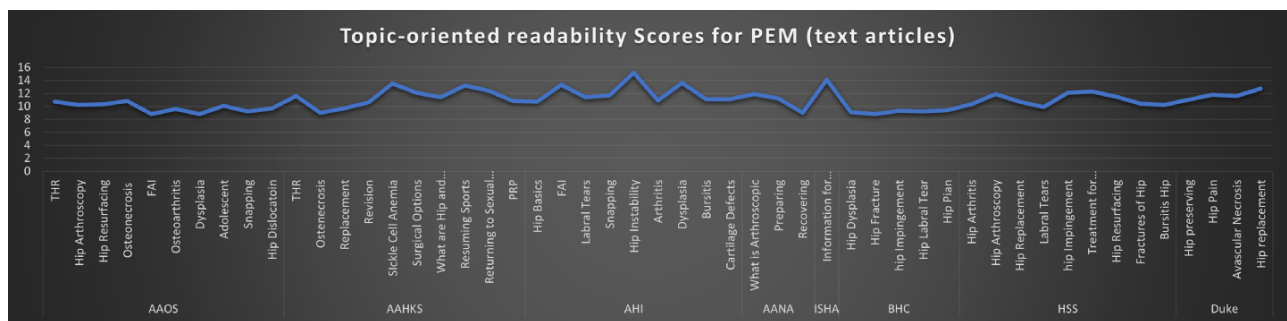**Fig. 3.** Mean FK level of text materials by centers.

Fig. 4. Topic-oriented readability scores for PEMs (text articles).

website articles and those of the 5th. The 3rd ranked center displayed the greatest usability with a LIDA score of 49, while the 5th ranked center showed the lowest score of 42.

Quality DISCERN assessment

The median (IQR) DISCERN score of text articles by center was 69 [4] or 69%. The scores ranged between those of the 5th ranked center's articles which displayed the highest quality DISCERN score with a DISCERN score of 71 or higher percent and the 9th ranked center's articles displayed the lowest quality with a DISCERN score of 60 or 60%. Overall, 52 (100%) of the text articles were deemed to be at 'good' quality rating or higher (DISCERN score of >50) and 23.2% (16 out of 69) of the articles had excellent quality based on DISCERN.

EVALUATION OF VIDEO MATERIALS
PEVAT

The mean PEVAT score for the 17 videos was 25 ± 1.9 with a range of 22.6–27. Seven (70%) of the top 10 academic centers

had video content available regarding hip surgery patient education. For this assessment, the preliminarily defined threshold of a high-quality video was >20. Among the educational videos, 17 (100%) were deemed to be high quality (Table II).

DISCUSSION

The most significant findings of this study were that PEMs regarding hip surgeries (both text articles and videos) provided by the major specialized hip centers and societies are highly accessible and reliable with a high quality. All PEMs including articles and videos scored well with high scores according to the DISCERN and PEVAT tools. The overwhelming majority of websites scored relatively poor in terms of readability, which means that the provided information is harder to read and understand by median reading level of US population.

Poor readability level is a common issue in most available PEMs in almost all specialties in medicine. It has been shown that considering several tricks while preparing PEMs could be effective in improving readability. These include avoiding

Table II. *Distribution of educational materials and text assessment scores by topic*

Topic	Text articles	Videos	FK level (mean)	FRE score (mean)
THR (Total Hip Replacement)	6	6	11.1	49.5
Hip resurfacing	2	1	10.9	47.2
Hip arthroscopy	4	2	11.3	43.3
Osteonecrosis	3	0	10.5	47.9
FAI (Femoroacetabu-larImpingment)	4	0	10.9	45.7
Labral tear	3	1	10.2	53.3
Dysplasia	5	1	10.8	47.5
Hip dislocation	1	1	9.7	52.1
Snapping syndrome	2	0	10.5	50.3
Orthobiologics	1	0	10.8	46.7
Trochanteric bursitis	2	0	10.7	48.3
Osteoarthritis	4	1	10.8	46.8
Miscellaneous	15	4		

technical jargon, complex medical terminology and acronyms. Instead, using clear and concise language that patients can easily understand could help. Second, breaking down complex concepts into simple terms and providing explanations or definitions where necessary could alleviate confusion. Third, adopting a conversational writing style to make the content more engaging and relatable could improve readability. Fourth, using an active voice and addressing the reader directly helps to create a connection and fosters better comprehension. Fifth, short sentences and paragraphs are preferred because long sentences can be difficult for the audience to follow. Sixth, each paragraph should be limited to one main idea or concept [13–15].

In a recent study, Hanish *et al.* [16] showed that reducing the use of complex words and sentence length to less than 15 words have better readability of patient education materials for knee and sports injuries. The mean reading level in their study was the mean reading level for original PEMs was 9.77, which is very similar to our study (10.2). One concern for readability evaluation is the fact that computerized tools such as FK and FRE has limitations compared to hand-scoring tools. Computer programs utilize different methods for counting words, sentences and syllables, which is a source of possible discrepancies [17].

In order to help patients make informed decisions, reduce anxiety and actively participate in their recovery process following hip surgery, high-quality patient education is crucial. There are many resources for patient education available on the Internet and social media platforms. However, due to a lack of regulation and oversight, these materials' dependability and accuracy are in doubt [18]. It has been shown in a recent study on online patient education for hip arthroplasty that <30% of websites were classified as 'good' sources of information when using the DISCERN score [19], which is in contrast with the quality of PEMs from leading centers and societies in this study.

Of the centers included in this study, 63.6% (7 out of 11) provided video contents on their website regarding hip surgeries for patients. This is encouraging because videos can be widely used

and may be preferred to text materials regardless of literacy or reading ability [20, 21].

CONCLUSION

Analysis of text and video articles from the 11 leading orthopedic surgery centers and societies in this study demonstrated that by selecting a reliable source of information from main scientific societies and major centers in hip surgery, patients can find more accurate information regarding their hip conditions.

DATA AVAILABILITY

The data analyzed during the current study will be shared by the corresponding author upon reasonable request.

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CONFLICT OF INTEREST STATEMENT

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REFERENCES

1. Parsa A, Nazal M, Molenaars RJ *et al.* Evaluation of hip preservation-related patient education materials from leading orthopaedic academic centers in the United States and description of a novel video assessment tool. *J Am Acad Orthop Surg Glob Res Rev* 2020; **4**: 1–10.
2. Peterson PN, Shetterly SM, Clarke CL *et al.* Health literacy and outcomes among patients with heart failure. *JAMA* 2011; **305**: 1695–701.
3. Kripalani S, and Weiss BD. Teaching about health literacy and clear communication. *J Gen Intern Med* 2006; **21**: 888–90.
4. Eysenbach G, Köhler C. How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *BMJ* 2002; **324**: 573–7.

5. McCormick JR, Kerzner B, Tuthill TA *et al*. Patients with femoroacetabular impingement obtain information from low-quality sources online and are most interested in conservative treatment and expected recovery. *Arthrosc Sports Med Rehabil* 2023; **5**: e21–7.

6. Akinleye SD, Krochak R, Richardson N *et al*. Readability of the most commonly accessed arthroscopy-related online patient education materials. *Arthroscopy* 2018; **34**: 1272–9.

7. Feghhi DP, Komlos D, Agarwal N *et al*. Quality of online pediatric orthopedic materials. *J Bone Joint Surg Am* 2014; **96**: e194.

8. Badarudeen S, Sabharwal S. Readability of patient education materials from the American Academy of Orthopaedic Surgeons and Pediatric Orthopaedic Society of North America Web sites. *J Bone Joint Surg Am* 2008; **90**: 199–204.

9. Cooley ME, Moriarty H, Berger MS *et al*. Patient literacy and the readability of written cancer educational materials. *Oncol Nurs Forum* 1995; **22**: 1345–51.

10. Albright J, De Guzman C, Acebo P *et al*. Readability of patient education materials: implications for clinical practice. *Appl Nurs Res* 1996; **9**: 139–43.

11. Charnock D, Shepperd S, Needham G *et al*. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health* 1999; **53**: 105–11.

12. Minervation. *The LIDA Instrument*. 2018. Available at: http://www.minervation.com/wp-content/uploads/2011/04/Minervation-LIDAinstrument-v1-2.pdf. Accessed: 10 May 2018.

13. Heppard ED, Hyde Z, Florence MN *et al*. Improving the readability of online foot and ankle patient education materials. *Foot Ankle Int* 2014; **35**: 1282–6.

14. Badarudeen S, Sabharwal S. Assessing readability of patient education materials: current role in orthopaedics. *Clin Orthop Relat Res* 2010; **468**: 2572–80.

15. Meghan MY, Paul HY, Hussein KI *et al*. Readability of patient education materials from the web sites of orthopedic implant manufacturers. *J Arthroplasty* 2017; **32**: 3568–72.

16. Hanish SJ, Cherian N, Baumann J *et al*. Reducing the use of complex words and reducing sentence length to <15 words improves readability of patient education materials regarding sports medicine knee injuries. *Arthrosc Sports Med Rehabil* 2023; **5**: e1–9.

17. Grabeel KL, Russomanno J, Oelschlegel S *et al*. Computerized versus hand-scored health literacy tools: a comparison of Simple Measure of Gobbledygook (SMOG) and Flesch-Kincaid in printed patient education materials. *J Med Libr Assoc* 2018; **106**: 38.

18. Suarez-Lledo V, Alvarez-Galvez J. Prevalence of health misinformation on social media: systematic review. *J Med Internet Res* 2021; **23**: e17187.

19. Sheridan GA, O'Brien C, Masri BA *et al*. Revision total hip arthroplasty: an analysis of the quality and readability of information on the internet. *World J Orthop* 2020; **11**: 82.

20. Park JS, Kim MS, Kim H *et al*. A randomized controlled trial of an educational video to improve quality of bowel preparation for colonoscopy. *BMC Gastroenterol* 2016; **16**: 64.

21. Abu Abed M, Himmel W, Vormfelde S *et al*. Video-assisted patient education to modify behavior: a systematic review. *Patient Educ Couns* 2014; **97**: 16–22.