YouTube Videos on Voice Disorders: What can a Layperson Learn?

Les vidéos portant sur les troubles de la voix disponibles sur YouTube : ce que le grand public peut en retirer

Dhanshree R. Gunjawate
Rohit Ravi
Monica L. Bellon-Harn
Abigail J. Dueppen
Vinaya Manchaiah

KEYWORDS

YOUTUBE

VOICE DISORDERS

VOICE PROBLEMS

Dhanshree R. Gunjawate,[1] Rohit Ravi,[1] Monica L. Bellon-Harn,[2] Abigail J. Dueppen,[2] and Vinaya Manchaiah[2]

[1]Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, INDIA

[2]Department of Speech and Hearing Sciences, Lamar University, Beaumont, TX, USA

Abstract

The primary aim of the current study was to examine the source, content, understandability, and actionability of information related to voice disorders in the most widely viewed YouTube videos. The secondary aim was to compare the difference in content, understandability, and actionability across the video sources. The terms "voice problem" and "voice therapy" were used to search and identify videos with top views on YouTube. Content of the top 50 most viewed and relevant videos was coded. Each video was rated for understandability and actionability using the Patient Education Materials Assessment Tool for Audiovisual Materials (Agency for Healthcare Research and Quality, 2013). The total number of views for the included videos was 5,474,432 and the total length of the videos was 4 hours 48 minutes. There was no significant difference in metadata including number of views, video length, thumbs up, and thumbs down across video sources. The video content mainly focused on signs and symptoms, causes, and vocal hygiene/home remedy. The understandability and actionability were found to be poor, which indicates that these videos may be of little value to consumers in managing their voice disorders. There is a need for developing videos with appropriate and evidence-based content as well as making them more understandable and actionable for self-management of voice disorders.

Editor:
Bonnie Martin-Harris

Editor-in-Chief:
David H. McFarland

Abrégé

L'objectif principal de la présente étude était d'examiner la source, le contenu, la compréhensibilité et l'application des informations portant sur les troubles de la voix disponibles dans les vidéos les plus visionnées sur YouTube. L'objectif secondaire était de comparer le contenu, la compréhensibilité et l'application des informations entre les différentes sources de vidéo. Les termes anglais « voice problem » et « voice therapy » ont été utilisés pour chercher et identifier des vidéos les plus regardées sur YouTube. Le contenu des 50 vidéos les plus pertinentes et ayant le plus de visionnements a été codé. La compréhension et l'application des informations ont été évaluées à l'aide de l'outil *Patient Education Materials Assessment Tool for Audiovisual Materials* (Agency for Healthcare Research and Quality, 2013). Les vidéos de notre échantillon ont été visionnées un total de 5 474 432 fois et la durée cumulée de ces vidéos est de 4 heures et 48 minutes. Il n'y avait aucune différence significative entre les vidéos concernant les métadonnées, ce qui incluait le nombre de visionnements, la durée des vidéos, le nombre de mentions « J'aime ce contenu » (pouce en l'air) et le nombre de mentions « Je n'aime pas ce contenu » (pouce vers le bas). Le contenu des vidéos portait principalement sur les signes et symptômes, les causes, l'hygiène vocale et les remèdes maison. Les scores de compréhensibilité et d'application se sont révélés faibles, ce qui suggère que ces vidéos seraient peu utiles aux individus qui cherchent à traiter leur trouble de la voix. La réalisation de vidéos abordant la prise en charge des troubles de la voix de façon autonome, dont le contenu est approprié, fondé sur des données probantes et plus compréhensible et applicable, répondrait à un besoin.

Voice disorders are frequent conditions with a prevalence of more than 15% of individuals diagnosed in the general population (Lyberg-Åhlander et al., 2019). Despite this prevalence, only a small proportion (i.e., 1–2%) report that symptoms occur to a great extent, whereas most respondents report symptoms to a small extent (Lyberg-Åhlander et al., 2019). It is likely that people with mild voice problems delay seeking professional services and rely on self-management. In a survey of occupational voice users, while most experienced voice symptoms, they rarely knew about professional services for vocal health (Lee, 2015). Professionals who use and depend on their voice, especially singers and teachers, commonly report voice problems (Byeon, 2019; Pestana et al., 2017). Like other health conditions, people with voice disorders are likely to use internet-based health information for various reasons including self-assessment of their condition, understanding treatment options, and self-management of the condition. However, variability in the accuracy and reliability of internet health information is noted (Sbaffi & Rowley, 2017).

Patient education materials can be evaluated across multiple dimensions including understandability, actionability, readability, suitability, and quality. Materials are understandable when users across diverse backgrounds and different levels of health literacy are able to process and decribe the key messages. Materials are actionable when users across diverse backgrounds and different levels of health literacy can identify the action that can be taken based on the information (Agency for Healthcare Research and Quality, 2013). Readability refers to an objective measure of the reading skills needed to understand any reading material (Albright et al., 1996). Suitability refers to readability and understandability of content, graphics, and layout as well as whether the material stimulates learning, motivates action, and addresses diverse cultures (Doak et al., 1996). Quality refers to how well the information adequately informs the reader.

Dueppen et al. (2019) evaluated the readability and quality of internet-based information on vocal health, vocal hygiene, and prevention of voice disorders in English across 85 websites using the DISCERN tool, a tool designed to help consumers judge the quality of written material for treatment choices (Charnock et al., 1999). The information on these websites was found to be acceptable in terms of readability and quality. Also, Dueppen et al. (2020) studied the suitability of 77 websites and found them to have overall suitability based on results from the Suitability Assessment of Materials tool. The Suitability Assessment of Materials tool includes 22 items that measure readability and comprehension of content, literacy demand, graphics, typography and layout, learning stimulation and motivation, and cultural appropriateness (Doak et al., 1996). On the contrary, an evaluation of 25 websites with information on treatment of vocal nodules reported very low quality, readability, and understandability based on results from the Patient Education Materials Assessment Tool (PEMAT; Agency for Healthcare Research and Quality, 2013) and DISCERN (Doruk et al., 2020). The PEMAT is a tool to systematically evaluate understandability and actionability of patient education material (Agency for Healthcare Research and Quality, 2013). An analysis of the 50 top websites of patient education materials on vocal fold paralysis for readability and understandability revealed a high level of readability but poor to adequate levels of understandability on the PEMAT (Balakrishnan et al., 2016). Taken together, these studies highlight the need for involving health care professionals in evaluating the content, understandability, and actionability of online material. Examining this information would help to disseminate and promote appropriate online information.

In recent years, there has been an increase in the use of social media for health information (Zhao & Zhang, 2017). Social media can be classified in multiple ways to reflect the diversity of platforms such as content communities (e.g., YouTube), collaborative projects (e.g., Wikipedia), social networking websites (e.g., Facebook), and virtual games (Kaplan & Haenlein, 2010). Consumers increasingly use social media as a means for gathering information, especially for health care concerns. Social media is rapidly changing the nature and speed of health care practices and interaction among individuals and health care providers. It is being increasingly used by the public, patients, and health care providers (Giustini, 2006; Moorhead et al., 2013). Surveys have revealed that eight out of 10 internet users accessed health related information (Atkinson et al., 2009; Rutten et al., 2006).

YouTube is a video sharing platform that allows users to view, upload, share, store, and comment on videos. Madathil et al. (2015) reviewed literature addressing health care information available on YouTube. They noted that YouTube is increasingly used as a platform for disseminating information on health. There is a high probability that a layperson may consider this information highly relevant. However, this information could be misleading and contradict reference standards. In a recent study, Bellon-Harn et al. (2020) examined the understandability and actionability of YouTube videos related to vocal health using the PEMAT. A review of 166 YouTube videos suggested adequate understandability and actionability scores. The study also showed that the videos consumers uploaded were superior to professional sources in actionability, but no difference was noted between video sources for understandability. These results are surprising because

it was expected that videos by professionals would be of higher quality than the other videos. The authors suggested that individuals with milder voice problems may be more likely to look for information pertaining to vocal hygiene and vocal health to prevent voice disorders. On the other hand, people with significant voice problems may seek health information on treatment and management of voice disorders.

The Bellon-Harn et al. (2020) study was limited to vocal hygiene. As such, information about videos related to voice disorder is needed. Based on the studies conducted so far, it is hypothesized that the YouTube videos on voice disorders would have appropriate content, understandability, and actionability for laypersons. The primary aim of the current study was to examine the source, content, understandability, and actionability of information related to voice disorders in the most widely viewed YouTube videos. The secondary aim was to compare the difference in content, understandability, and actionability across the video sources.

Method

The study used a cross-sectional design. No ethical approval was required because we did not collect any human participant data.

Video Selection and Metadata Extraction

We used the terms "voice problem" and "voice therapy" to search and identify videos with top views on YouTube. We selected these two search terms based on the Google trends—these search terms were more common than "voice disorders" and were more likely to have been used by lay users. The videos were categorized based on the most viewed videos using the above-mentioned search terms. We used a cutoff criterion of the top 50 most viewed and relevant videos because a viewer rarely views internet content beyond the initial few search results. After applying the inclusion criteria, 113 videos were not suitable for inclusion. Videos based on voice problems, vocal conditions, and voice therapy were included. We excluded videos for several reasons: audio/playback problems in online games (n = 20), speech and language therapy other than voice (n = 55), videos in languages other than English (n = 15), compilation videos (n = 7), and music/rhymes (n = 16). The top 50 most viewed and relevant videos were considered for the study. A predesigned Excel spreadsheet was used to extract basic data about the videos such as title, uniform resource locator link (URL link), upload date, video duration, number of views, numbers of likes (thumbs up) and dislikes (thumbs down), and video location.

Video Source and Content

Next, we identified and coded information and content in every video. The source from where the video was uploaded on YouTube was coded based on the following categories (a) television or internet channels (e.g., news channels, webpages, blogs), (b) organization (any professional body/organization), and (c) professional (e.g., singing teacher, singing/voice coach, therapist). The video content categories were determined based on the factsheet on *Hoarseness* (National Institute of Deafness and other Communication Disorders, 2011) and *Taking Care of Your Voice* (National Institute of Deafness and other Communication Disorders, 2017).

The categories for content coding included

1. Signs and symptoms: This included the signs and symptoms associated with voice problem or voice changes.
2. Causes: This included medical, non-medical, behavioural, phonotraumatic, neurological, or other causes of voice problems.
3. Risk factors: This included risk factors that could lead to voice problems.
4. Diagnosis: This included the diagnosis given for a voice disorder based on objective or subjective procedures.
5. Voice hygiene/home remedies: This included voice hygiene programs or home remedies for voice problems. Home remedies included any medication or agent with unproven effectiveness usually used without any professional prescription.
6. Medical/surgical management: This included any medical or surgical line of treatment for voice disorders. Names of any specific management options were noted.
7. Voice therapy: This included information on voice therapy techniques for voice disorders. Names of specific voice therapy techniques were noted.
8. Research/evidence-based practices: This included research or evidence-based practice related to voice disorders.

Evaluation of Understandability and Actionability

We rated each YouTube video for understandability and actionability using the PEMAT (Agency for Healthcare Research and Quality, 2013), which is comprised of 17 items.

Out of the 17 items, 13 are related to understandability and four are related to actionability. Within the understandability subsection, Items 12 and 19 were not included. Item 12 (i.e., the material uses visual cues such as arrows, boxes, bullets, bold, larger font, and highlighting) was not included because it is not applicable for video. Item 19 (i.e., the material uses simple tables with short and clear rows and column headings) was not included because no tables are included in videos. Within the actionability subsection, Item 25 (i.e., the material explains how to use the charts, graphs, tables, or diagrams to take actions) was not included because charts, graphs, tables, or diagrams are not present in videos. Each included item was to be scored 1 (*agree*), 0 (*disagree*), and NA (*no score as not applicable*).

To calculate percentages of understandability and actionability subscale scores, we divided the number of items which scored 1 (i.e., agree) by the number of items rated. Items that were identified as not applicable were not included in the calculation. For example, for a specific video, if 10 out of 13 items in the understandability subscale were rated and three were not applicable, the calculation would include 10 total items rated. Of the 10, if five items were rated as *agree*, the understandability score would be 50% (i.e., score of 5 from 10 items rated, 5/10 = 50). The higher the percentage, the higher the understandability and actionability rating. Scores under 70% indicate that the information has poor understandability or actionability (Shoemaker et al., 2014). The primary author carried out the data coding and PEMAT rating. We randomly selected 20% of the videos (n = 10) and coded them to ascertain the inter-rater reliability.

Data Analysis

Statistical analysis was conducted using the IBM SPSS Software Version 22. The descriptive statistics were examined. Normality tests were performed on the videos' metadata (i.e., number of views, length of videos, thumbs up, and thumbs down) and Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-A/V) understandability and actionability subscales. The visual examination of Q-Q normality plots and the Shapiro Wilk test suggested that all these variables violated the assumption of normality. Hence, non-parametric tests were used for further analysis.

The video content was coded using multiple binary variables (1 if the content was present and 0 if the content was not present). Interclass Correlation Coefficient was performed to examine the inter-rater reliability for PEMAT-A/V subscale ratings. The Kruskal-Wallis test was used to examine whether the metadata (i.e., number of views, length of videos, thumbs up, and thumbs down) and PEMAT-A/V understandability and actionability subscales varied across the video source. Further, the Bonferroni post hoc test was used for pairwise analysis where significant differences between video source was found. Spearman's correlation was performed to examine the correlation between videos' metadata. A significance level of .05 was used for interpretation of results.

Results

We identified the top 50 most viewed videos on YouTube based on the predefined inclusion and exclusion criteria. Of these 50 videos, 22 were uploaded by different organizations (i.e., professional bodies/groups, hospitals, clinics, and singing studios), 17 were by professionals (laryngologists, voice therapists, and singers/singing coach), and 11 were from television or internet. **Table 1** provides descriptive statistics of the metadata. The total number of views was 5,474,432. The total length of all the videos together was 269.23 minutes (i.e., 4 hours 48 minutes). The duration of the shortest video was 54 seconds while the longest was 22 minutes 43 seconds. The total thumbs up/likes were 63,415, while thumbs down/dislikes were 2,771.

The Kruskal Wallis test was used to examine the metadata across video sources. There was no significant difference in metadata including number of views (χ^2 = 0.56, p = .75), video length (χ^2 = 3.55, p = .17), thumbs up (χ^2 = 1.32, p = .52), and thumbs down (χ^2 = 0.88, p = .64) across videos sources. The correlation between the different metadata measures was determined using Spearman's rank correlation coefficient. The number of views had a strong positive correlation with likes (r_s = .72, p < .01) and dislikes (r_s = .84, p < .01).

Video Content

The video content was identified and coded based on eight pre-determined themes. **Table 2** depicts the percentage of videos with respect to the content and chi-square analysis for the association between video source and content. Based on **Table 2**, 66% of videos included content related to signs and symptoms of voice disorders and 68% included content related to therapy. Only 10% of videos included content related to research or evidence-based practices. The organization-based videos included the greatest diversity of content across the different domains, compared to other sources.

Among the videos that included content related to voice therapy, 11 videos included information related to specific voice therapy techniques. These included Lee Silverman Voice Treatment (n = 2); resonant voice therapy (n = 2); and

Table 1

Descriptive Statistics of Metadata in the 50 Most Viewed YouTube Videos on Voice Disorders by Their Source

Source	*M*	Median	Min to Max	*SD*	*SE*	95% CI	Total
Number of views							
Television or internet	113,437	38,730	20,595 to 409,442	145,295	43,808	[15,827, 211,048]	5,474,432
Organization	99,933	39,533	19,610 to 468,357	107,798	22,982	[52,138, 147,728]	
Professional	119,298	60,183	21,682 to 431,738	117,532	28,505	[58,868, 179,728]	
All	109,488	117,801	76,009 to 142,967	117,801	16,659	[76,009, 142,967]	
Video length (mm:ss)							
Television or internet	7:36	6:56	1:44 to 22:43	5:97	1:80	[3:35, 11:38]	269:23
Organization	4:05	3:49	0:54 to 8:10	2:12	0:45	[3:11, 5:39]	
Professional	6:22	4:22	2:08 to 17:03	4:32	1:35	[4:20, 8:25]	
All	5:38	4:24	0:54 to 22:43	4:00	0:56	[4:24, 6:52]	
Thumbs up							
Television or internet	3,137	677	30 to 2,500	7,384	2,226	[-1,823, 8,098]	63,415
Organization	703	299	84 to 3,600	889	189	[308, 1,097]	
Professional	790	408	0 to 4,800	1,238	300	[153, 1,426]	
All	1,268	377	0 to 2,500	3,602	509	[244, 2,292]	
Thumbs down							
Television or internet	91	13	6 to 563	167	50.59	[-20, 204]	2,771
Organization	38	12	3 to 194	49	10	[16, 60]	
Professional	54	26	0 to 205	61	14	[22, 85]	
All	55	16	0 to 563	92	13	[29, 81]	

Note. CI = confidence interval.

one each on breathing exercises, vocal function exercises, laryngeal massage, redirected phonation, transgender voice therapy, vocal fold adductory exercises, and vocal warm-up.

Understandability and Actionability

The PEMAT-A/V scale was used to assess the understandability and actionability of the videos. The Interclass Correlation Coefficient for understandability and actionability was .83 and .80 respectively, suggesting good inter-rater reliability. As noted in **Table 3**, in the understandability subscale, 94% of videos made the purpose evident and clear (Item 1) and 84% used common language that is easy to understand (Item 3). In addition, 84% of the videos did not provide a summary at the end (Item 11). Under the actionability subscale, 88% of the videos provided the listener with at least one action that could be

Table 2

Percentage of Videos Presenting Specific Theme Content in 50 Most Viewed YouTube Videos on Voice Disorders

Content	All	Television or internet	Organization	Professional	χ^2	*p*
Signs & symptoms	66	72.7	68.2	58.8	0.65	.72
Causes	46	63.6	50.0	29.4	3.40	.18
Risk factors	30	45.5	18.2	35.3	2.94	.23
Diagnosis	56	54.5	63.6	47.1	1.08	.58
Vocal hygiene/Home remedy	22	63.6	4.5	17.6	15.21	<.001
Medical surgical	22	36.4	18.2	17.6	1.69	.43
Therapy	68	54.5	81.8	58.8	3.50	.17
Research (Evidence-based practice)	10	0	13.6	11.8	1.60	.45

taken (Item 20). However, 72% of videos did not break down the action into manageable steps (Item 22).

Table 4 depicts the total scores for understandability and actionability subscales across the different video sources. The mean score for the understandability and actionability subscale was 59 and 54, respectively. These scores are indicative of poor understandability and actionability from the videos (Shoemaker et al., 2014). The Kruskal Wallis test revealed no significant difference in the understandability scores ($\chi^2 = 5.45$, $p = .07$) or the actionability scores ($\chi^2 = 5.36$, $p = .07$) between the different video sources.

Discussion

Social media is being used increasingly in health care both by professionals and laypeople (Smailhodzic et al., 2016; Ventola, 2014; Zhao & Zhang, 2017). Health care professionals may use social media for networking and to share health information. On the other hand, those with health conditions may use social media to seek health information. Recently, work examining YouTube information related to vocal health has been conducted (i.e., Bellon-Harn et al., 2020). The current study examined YouTube videos related to voice disorders, contributing to existing work evaluating online voice materials.

Easy access to the internet allows people to use the internet for quick searches about their health condition. YouTube videos are presented to users based on the search term used as well as their personal profile of previous search history. Although algorithms used to rank search results are constantly changing, examination of metadata about YouTube videos provides useful insights about popularity and viewership engagement (Drozd et al., 2018; Gabarron et al., 2013). In the present study, organizations and professionals uploaded most of the videos (i.e., 78%). This was expected because consumers are likely to develop videos about vocal hygiene, as shown in the recent study, rather than voice disorders (Bellon-Harn et al., 2020). There was no difference in metadata between video sources. However, videos with a high number of views had high correlations with thumbs up and thumbs down as expected, because users will report the likability of videos only after watching them.

When examining the content of the videos, the current study revealed that most videos were based on signs and symptoms of voice disorders and therapy for voice disorders, followed by diagnosis. However, YouTube videos related to vocal hygiene, as noted in the recent study, were primarily educational and most of the content focused on tips and techniques for professional voice users (Bellon-Harn et al., 2020). Differences were expected since the nature of the videos was diverse and different consumers utilize the videos for varied reasons. These observations suggest that video content seems to be appropriate for the purpose for which the videos were created. Further, a high availability of content related to signs and symptoms of voice problems and therapy in the present study was noted.

Although the video content may be appropriate, the more important question is whether the content is accurate, the information is easy to understand, and if

Table 3

Descriptive Statistics of the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-A/V) Items

PEMAT-A/V Factors and Items			Frequency *n* (%)		
Factor	Item number	Item	Disagree	Agree	Not applicable
Understandability					
Content	1	The material makes its purpose completely evident.	3 (6)	47 (94)	0
Word choice & style	3	The material uses common, everyday language.	8 (16)	42 (84)	0
	4	Medical terms are used only to familiarize audience with the terms. When used, medical terms are defined.	39 (78)	11 (22)	0
	5	The material uses the active voice.	11 (22)	39 (78)	0
Organization	8	The material breaks or "chunks" information into short sections.	35 (70)	14 (28)	1 (2)
	9	The material's sections have informative headers.	28 (56)	21 (42)	1 (2)
	10	The material presents information in a logical sequence.	14 (28)	36 (72)	0
	11	The material provides a summary.	42 (84)	7 (14)	1 (2)
Layout & design	13	Text on screen is easy to read.	2 (4)	18 (36)	30 (60)
Use of visual aids	14	The material allows the user to hear the words clearly (e.g., not too fast, not garbled).	10 (20)	37 (74)	3 (6)
	18	The material uses illustrations and photographs that are clear and uncluttered.	2 (4)	11 (22)	37 (74)
Actionability					
	20	The material clearly identifies at least one action the user can take.	6 (12)	44 (88)	0
	21	The material addresses the user directly when describing actions.	25 (50)	25 (50)	0
	22	The material breaks down any action into manageable, explicit steps.	36 (72)	14 (28)	0

Note. The Understandability subscale included 13 items, but Items 12 and 19 were not considered, while the Actionability subscale included four items, but Item 25 was not used. Items 2, 6, and 7 are for other subscales of the PEMAT-A/V.

engaging in these videos stimulate users to take action. The current study did not examine the accuracy of the video content, although it examined the understandability and actionability of YouTube videos using a standardized rating scale. The current study showed that the sampled videos were not adequate in terms of understandability and actionability and there was no difference based on video source. Regarding understandability, the videos made their purpose evident. Although the videos used accessible language, medical terms were not defined. Items on the PEMAT-A/V related to organization indicated that the material was presented in a logical sequence. However, much of the video material was neither presented in short sections nor included summaries. Regarding actionability, some strengths were identified. Most videos did identify one action step; however, the videos did not break down

Table 4

Patient Education Materials Assessment Tool for Audiovisual Materials Scores Across Video Source Categories

Source	*M*	Median	Min to Max	*SD*	*SE*	95% CI
Understandability						
Television or internet	58.00	56	20 to 90	20.20	6.69	[43.08, 72.92]
Organization	67.18	67	44 to 100	17.20	3.66	[59.56, 74.81]
Professional	50.59	56	22 to 80	19.92	4.83	[40.35, 60.83]
All	59.52	56	20 to 100	20.28	2.86	[53.75, 65.29]
Actionability						
Television or internet	48.36	33	0 to 100	31.28	9.43	[27.35, 69.38]
Organization	65.18	67	33 to 100	26.32	5.61	[53.51, 76.85]
Professional	45.00	33	0 to 100	28.87	7.00	[30.16, 59.84]
All	54.62	50	0 to 100	29.23	4.15	[46.29, 62.95]

Note. CI = confidence interval.

actions into manageable steps. Overall, these results are not consistent with Bellon-Harn et al. (2020) who reported adequate understandability and actionability. Additionally, Bellon-Harn et al. found that consumer-developed and uploaded videos had significantly higher actionability when compared to professional videos.

Study Implications, Limitations, and Further Research

The findings of the present study provide valuable information to both consumers as well as professionals about the limits and benefits of available information on YouTube. It may also enable clinicians to understand the type of information a consumer has seen prior to visiting the voice therapist. The study was focused on the metadata, source, type of informational content, understandability, and actionability of YouTube videos related to voice disorders. However, it has some limitations. First, a major drawback is that the targeted context, purpose, and population in the videos was not considered. Second, some of these videos may have misinformation related to voice disorders. However, this was not considered in the current study and reliability was not obtained on type of informational content. Future studies can examine and quantify misinformation by mapping the content to the evidence base in the academic literature. Third, the PEMAT-AV was designed to be used by the general population and health professionals alike. The small number of raters in this study were faculty and graduate students with a background in communication disorders. Consequently, they rated the videos with background knowledge. Future studies should include non-clinical individuals and professional voice users. Further, while the PEMAT-AV is a credible tool for rating the video content, the binary nature (yes, no) of the rating scale may not have captured the degree to which each element of understandability and actionability was met.

Conclusion

The current study examined the source, content, understandability, and actionability of information related to voice disorders in the most widely viewed YouTube videos. There was no significant difference in metadata including number of views, video length, thumbs up, and thumbs down across video sources. The video content was mainly comprised of signs and symptoms, causes, and vocal hygiene/home remedy with over 60% of videos including these elements. The understandability and actionability were found to be poor, indicating that these videos will be of little value to consumers in managing their voice disorders. There is a need for developing videos with appropriate and evidence-based content that are more understandable and aimed at promoting self-management of voice disorders.

References

Agency for Healthcare Research and Quality. (2013). *The Patient Education Materials Assessment Tool (PEMAT) and user's guide: PEMAT tool for audiovisual materials (PEMATA/V).* Publication No. 14-0002-EF. Retrieved from https://

www.ahrq.gov/sites/default/files/publications2/files/pemat_guide_0.pdf

Albright, J., de Guzman, C., Acebo, P., Paiva, D., Faulkner, M., & Swanson, J. (1996). Readability of patient education materials: Implications for clinical practice. *Applied Nursing Research, 9*(3), 139–143. https://doi.org/10.1016/S0897-1897(96)80254-0

Atkinson, N. L., Saperstein, S. L., & Pleis, J. (2009). Using the internet for health-related activities: Findings from a national probability sample. *Journal of Medical Internet Research, 11*(1), Article e4. https://doi.org/10.2196/jmir.1035

Balakrishnan, V., Chandy, Z., Hseih, A., Bui, T.-L., & Verma, S. P. (2016). Readability and understandability of online vocal cord paralysis materials. *Otolaryngology—Head and Neck Surgery, 154*(3), 460–464. https://doi.org/10.1177/0194599815626146

Bellon-Harn, M. L., Ulep, A. J., Dueppen, A., Manchaiah, V., Ravi, R., & Gunjawate, D. R. (2020). A cross-sectional study of the portrayal of vocal health in YouTube videos. *Perspectives of the ASHA Special Interest Groups, 5*(4), 867–875. https://doi.org/10.1044/2020_PERSP-20-00058

Byeon, H. (2019). The risk factors related to voice disorder in teachers: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health, 16*(19), Article 3675. https://doi.org/10.3390/ijerph16193675

Charnock, D., Shepperd, S., Needham, G., & Gann, R. (1999). DISCERN: An instrument for judging the quality of written consumer health information on treatment choices. *Journal of Epidemiology & Community Health, 53*(2), 105–111. https://doi.org/10.1136/jech.53.2.105

Doak, C., Doak, L. G., & Root, J. H. (1996). *Teaching patients with low literacy skills* (2nd ed.). J. B. Lippincott.

Doruk, C., Enver, N., Çaytemel, B., Azezli, E., & Başaran, B. (2020). Readibility, understandability, and quality of online education materials for vocal fold nodules. *Journal of Voice, 34*(2), 302.e15–302.e20. https://doi.org/10.1016/j.jvoice.2018.08.015

Drozd, B., Couvillon, E., & Suarez, A. (2018). Medical YouTube videos and methods of evaluation: Literature review. *Journal of Medical Internet Research, 4*(1), Article e3. https://doi.org/10.2196/mededu.8527

Dueppen, A. J., Bellon-Harn, M. L., & Manchaiah, V. (2020). Suitability of English language internet-based information for voice disorders. *Journal of Voice, 34*(6), 962.e1–962.e7. https://doi.org/10.1016/j.jvoice.2019.06.011

Dueppen, A. J., Bellon-Harn, M. L., Radhakrishnan, N., & Manchaiah, V. (2019). Quality and readability of English-language internet information for voice disorders. *Journal of Voice, 33*(3), 290–296. https://doi.org/10.1016/j.jvoice.2017.11.002

Gabarron, E., Fernandez-Luque, L., Armayones, M., & Lau, A. Y. S. (2013). Identifying measures used for assessing quality of YouTube videos with patient health information: A review of current literature. *Journal of Medical Internet Research, 2*(1), Article e6. https://doi.org/10.2196/ijmr.2465

Giustini, D. (2006). How Web 2.0 is changing medicine. *British Medical Journal, 333,* 1283–1284. https://doi.org/10.1136/bmj.39062.555405.80

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons, 53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Lee, E.-J. (2015). A survey on the voice symptoms and vocal-health service related experience of occupational voice users. *Journal of Digital Convergence, 13*(1), 397–405. https://doi.org/10.14400/JDC.2015.13.1.397

Lyberg-Åhlander, V., Rydell, R., Fredlund, P., Magnusson, C., & Wilén, S. (2019). Prevalence of voice disorders in the general population, based on the Stockholm public health cohort. *Journal of Voice, 33*(6), 900–905. https://doi.org/10.1016/j.jvoice.2018.07.007

Madathil, K. C., Rivera-Rodriguez, A. J., Greenstein, J. S., & Gramopadhye, A. K. (2015). Healthcare information on YouTube: A systematic review. *Health Informatics Journal, 21*(3), 173–194. https://doi.org/10.1177/1460458213512220

Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A new dimension of health care: Systematic review of the uses, benefits, and limitations of social media for health communication. *Journal of Medical Internet Research, 15*(4), Article e85. https://doi.org/10.2196/jmir.1933

National Institute of Deafness and other Communication Disorders. (2011, October). *NIDCD fact sheet: Hoarseness.* https://www.nidcd.nih.gov/sites/default/files/Documents/health/voice/NIDCD-Hoarseness.pdf

National Institute of Deafness and other Communication Disorders. (2017, March 6). *Taking care of your voice.* https://www.nidcd.nih.gov/health/taking-care-your-voice

Pestana, P. M., Vaz-Freitas, S., & Manso, M. C. (2017). Prevalence of voice disorders in singers: Systematic review and meta-analysis. *Journal of Voice, 31*(6), 722–727. https://doi.org/10.1016/j.jvoice.2017.02.010

Rutten, L. J. F., Squiers, L., & Hesse, B. (2006). Cancer-related information seeking: Hints from the 2003 Health Information National Trends Survey (HINTS). *Journal of Health Communication, 11*(sup 1), 147–156. https://doi.org/10.1080/10810730600637574

Sbaffi, L., & Rowley, J. (2017). Trust and credibility in web-based health information: A review and agenda for future research. *Journal of Medical Internet Research, 19*(6), Article e218. https://doi.org/10.2196/jmir.7579

Shoemaker, S. J., Wolf, M. S., & Brach, C. (2014). Development of the Patient Education Materials Assessment Tool (PEMAT): A new measure of understandability and actionability for print and audiovisual patient information. *Patient Education and Counseling, 96*(3), 395–403. https://doi.org/10.1016/j.pec.2014.05.027

Smailhodzic, E., Hooijsma, W., Boonstra, A., & Langley, D. J. (2016). Social media use in healthcare: A systematic review of effects on patients and on their relationship with healthcare professionals. *BMC Health Services Research, 16*(1), Article 442. https://doi.org/10.1186/s12913-016-1691-0

Ventola, C. L. (2014). Social media and health care professionals: Benefits, risks, and best practices. *Pharmacy and Therapeutics, 39*(7), 491–499, 520.

Zhao, Y., & Zhang, J. (2017). Consumer health information seeking in social media: A literature review. *Health Information and Libraries Journal, 34*(4), 268–283. https://doi.org/10.1111/hir.12192

Authors' Note

Correspondence concerning this article should be addressed to Rohit Ravi, Department of Audiology and Speech Language Pathology, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India, 575001. Email: **rohitravi94@gmail.com.**

Disclosures

No conflicts of interest, financial or otherwise, are declared by the authors.