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YouTube As a Source of Information on Awake Brain Surgery and Language: Quality, Reliability, And Professional Involvement

Uyanık Beyin Cerrahisi ve Dil Konusunda Bilgi Kaynağı olarak YouTube: İçerik Kalitesi, Güvenilirliği ve Profesyonel Katılım

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ABSTRACT

Objectives: Digital platforms have become a major source of medical information worldwide. Among them, YouTube is one of the most frequently used for educational purposes, yet it often lacks formal content regulation. Consequently, the accuracy, reliability, and educational value of health-related videos remain uncertain, especially for complex procedures such as awake brain surgery involving language mapping. This study aimed to evaluate the quality, reliability, transparency, and popularity of YouTube videos on awake brain surgery and language. The analysis focused on the language domains assessed, the involvement of speech and language therapists (SLTs) in assessments, and the relationships among evaluation parameters.

Materials and Methods: Thirty-one English-language videos were analyzed using the modified DISCERN (m-DISCERN), Global Quality Scale (GQS), and Journal of the American Medical Association (JAMA) benchmarks. Video popularity was measured using the Video Power Index (VPI). Video duration, number of language domains assessed, and SLT participation were also recorded.

Results: m-DISCERN scores correlated positively with GQS and JAMA scores (for all; p=0.001). JAMA scores correlated negatively with VPI and positively with video duration (for all; p<0.001). VPI correlated negatively with duration and positively with likes and comments (for all; p<0.005). Videos that assessed multiple language domains had higher m-DISCERN, GQS, and JAMA scores and longer durations, whereas single-domain videos assessed had higher VPI scores. SLT participation was limited, and domains such as writing and speech characteristics were rarely addressed.

Conclusion: These findings highlight a misalignment between online content and evidence-based clinical practice, suggesting a need for greater professional contribution and improved content standards.

Keywords: Awake brain surgery, language assessment, YouTube, video analysis, speech and language therapist

ÖZET

Amaç: Dijital platformlar, dünya çapında tıbbi bilginin önemli bir kaynağı haline gelmiştir. Bunlar arasında YouTube, eğitim amaçlı en sık kullanılan platformlardan biridir, ancak genellikle resmi içerik düzenlemesi bulunmamaktadır. Bu nedenle, sağlıkla ilgili videoların doğruluğu, güvenilirliği ve eğitim değeri, özellikle dil haritalaması içeren uyanık beyin cerrahisi gibi karmaşık prosedürler için belirsizliğini korumaktadır. Bu çalışma, uyanık beyin cerrahisi ve dil ile ilgili YouTube videolarının kalitesini, güvenilirliğini, şeffaflığını ve popülerliğini değerlendirmeyi amaçlamıştır. Analiz, değerlendirilen dil alanlarına, değerlendirmeye dil ve konuşma terapistlerinin (DKT) katılımına ve değerlendirme parametreleri arasındaki ilişkilere odaklanmıştır.

Gereç ve yöntem: Otuz bir İngilizce video, modifiye DISCERN (m-DISCERN), Global Kalite Ölçeği (GQS) ve Amerikan Tıp Derneği Dergisi (JAMA) kriterleri kullanılarak analiz edilmiştir. Videoların popülerliği, Video Güç Endeksi (VPI) kullanılarak ölçülmüştür. Videoların süresi, değerlendirilen dil alanlarının sayısı ve DKT katılımı da kaydedilmiştir.

Bulgular: m-DISCERN puanı, GQS ve JAMA puanları ile pozitif korelasyon göstermiştir (tümü için; p=0,001). JAMA puanı VPI ile negatif, video süresi ile pozitif korelasyon göstermiştir (tümü için; p<0,001). VPI, video süresi ile negatif, beğeni ve yorumlar ile pozitif korelasyon göstermiştir (tümü için; p<0,005). Birden fazla dil alanını değerlendiren videolar daha yüksek m-DISCERN, GQS ve JAMA puanları ve daha uzun süreye sahipken, tek bir alanı değerlendiren videolar daha yüksek VPI değerleri göstermiştir. DKT katılımı sınırlı bulunmuş ve yazma ve konuşma özellikleri gibi alanlara nadiren yer verildiği belirlenmiştir.

Sonuç: Bu bulgular, çevrimiçi içerik ile kanıta dayalı klinik uygulamalar arasında bir uyumsuzluk olduğunu ortaya koymakta, daha fazla profesyonel katkıya ve içerik standartlarının iyileştirilmesine ihtiyaç olduğunu göstermektedir.

Anahtar kelimeler: Uyanık beyin cerrahisi, dil değerlendirmesi, YouTube, video analizi, dil ve konuşma terapisti

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Introduction

The rapid growth of medical information on digital platforms has made them central to the global information network. YouTube is a major source of health-related content for professionals and the public. Over a billion hours of video are viewed daily, with approximately 30 million hours focused on health topics (1). However, the lack of systematic regulation for user-generated content on YouTube raises concerns about the accuracy, reliability, and educational value of this information (2). Systematic reviews have found significant inconsistency in the quality of YouTube's health-related videos. Many contain misleading or biased information (2-4). This is especially critical for complex procedures such as awake brain surgery.

Awake brain surgery, especially for lesions in language-eloquent regions, requires real-time mapping of language functions while the patient is conscious. The primary objective is to preserve cognitive and linguistic abilities while maximizing lesion removal (5). Language performance is monitored throughout the operation using brief, stimulus-based tasks and electrical cortical stimulation. These tasks range from simple counting to more complex ones such as naming, reading aloud, repetition, fluency, verb generation, semantic associations, and comprehension. Speech and language therapists (SLTs) are essential in this process, designing and guiding language tasks and monitoring performance during stimulation (6-8). Their expertise is also crucial before and after surgery, during baseline assessments, and postoperative follow-up (8). Although research on SLT involvement in awake brain surgery is limited, existing studies highlight their significant contribution to intraoperative decision-making and patient outcomes (5). Providing accurate, accessible information about these procedures supports patient education and increases awareness of the SLT's role in multidisciplinary teams. However, it is unclear whether YouTube videos accurately reflect the clinical complexity of awake brain surgery, the role of SLTs, or meet educational and scientific standards. To address this gap, the present study aimed to (1) assess the quality and reliability of YouTube videos on awake brain surgery and language, (2) examine their relationship with viewer engagement metrics, (3) determine whether videos that address multiple language domains have higher quality than those that focus on a single domain, and (4) identify the extent to which SLTs conduct the assessments presented in these videos.

Materials and Methods

Video selection

For this retrospective study, on March 1, 2025, the terms 'awake brain surgery and language' and 'awake craniotomy and language' were used to search for relevant YouTube videos. The analysis was performed using Google Chrome.

To minimize search result variations, a new YouTube account was created, and all search history and cookies were cleared. Following established methods (9-11), all videos from the first two pages of results for each search term (40 videos per term) were included. Although most users do not go beyond the first page (12-13), the second page was included to broaden the sample. The filter was set to 'relevance.' In total, 80 videos uploaded between June 20, 2024, and November 20, 2024, were reviewed. Exclusion criteria were non-English language (3 videos), duplicates (16), irrelevant content (28), and videos longer than 60 minutes (2). After exclusions, 31 videos remained for analysis.

Assessment Tools and Procedures

Video evaluation used the modified DISCERN (m-DISCERN) for reliability, the Global Quality Scale (GQS) for quality, JAMA benchmarks for transparency, and the Video Power Index (VPI) for popularity. Two speech and language therapists independently rated the m-DISCERN, GQS, and JAMA parameters.

The m-DISCERN scale, developed by Singh et al., adapts the original DISCERN tool to assess health information reliability (14). It has five items with binary responses (1 for "yes," 0 for "no") for a total score from 0 to 5. Scores of 3 or higher indicate reliable information; scores below 3 indicate lower reliability.

Table 1. Correlation Analysis of Video Characteristics

	m-DISCERN	GQS	JAMA	VPI	Number of likes	Number of views	Duration (sn)	Number of comments	Passing time
mDISCERN	1								
GQS	**0.577** [a] **p=0.001***	1							
JAMA	**0.549** [b] **p=0.001***	0.336 [b] p=0.064	1						
VPI	-0.383 [b] p=0.034	-0.348 [b] p=0.055	**-0.642** [b] **p<0.001***	1					
Number of likes	-0.064 [b] p=0.734	-0.06 [b] p=0.75	0.006 [b] p=0.975	**0.639** [b] **p<0.001***	1				
Number of views	-0.213 [b] p=0.251	-0.200 [b] p=0.281	-0.314 [b] p=0.086	**0.852** [b] **p<0.001***	**-0.879** [b] **p<0.001***	1			
Duration (sn)	0.239 [b] p=0.196	0.356 [b] p=0.05	**0.684** [b] **p<0.001***	**-0.535** [b] **p=0.002**	0.158 [b] p=0.397	-0.104 [b] p=0.577	1		
Number of comments	-0.056 [b] p=0.764	-0.234 [b] p=0.204	-0.041 [b] p=0.828	**0.497** [b] **p=0.004***	**0.607** [b] **p<0.001***	**0.631** [b] **p<0.001***	-0.104 [b] p=0.577	1	
Passing time	-0.297 [a] (p=0.105)	-0.335 [a] (p=0.066)	-0.321 [b] (p=0.078)	0.318 [b] (p=0.082)	0.058 [b] (p=0.757)	0.222 [b] (p=0.23)	-0.131 [b] (p=0.481)	-0.101 [b] (p=0.59)	1

a: Pearson correlation coefficient; b: Spearman correlation coefficient; GOS: Global Quality Scale; JAMA: Journal of the American Medical Association; * p<0.034 after false discovery rate (FDR) correction.

The GQS is a five-point Likert scale for overall educational quality. Scores of 1 or 2 indicate low quality; 3 is moderate; 4 and 5 are high quality (15).

The JAMA benchmark criteria measure four dimensions of health information transparency: authorship, attribution, disclosure, and currency (16). Each dimension scores 0 or 1, for a total score from 0 to 4. Higher scores mean greater transparency and reliability.

The VPI was used to assess the popularity of the videos, following the formula established by Erdem et al. (17). The VPI is calculated as VPI = (Like Ratio × View Ratio) / 100. The like ratio is defined as (Number of Likes × 100) / (Number of Likes + Number of Dislikes). The view ratio is calculated by dividing the total number of views by the number of days since the video was uploaded.

For each video, the recorded variables included duration, comments, views, likes, dislikes, and upload date. Content analysis determined whether a speech and language therapist conducted the assessment, which core language domains were evaluated (naming, auditory comprehension, reading, writing, spontaneous speech, automatic speech), and whether speech features (phonation, articulation, resonance, prosody) were discussed. The analysis also noted whether the importance of SLT-led

Table 2. Comparison of Video Characteristics by Number of Language Domains Assessed

	Group 1 (videos assessed in a single language domain) n=12			Group 2 (videos assessed multiple language domains) n=19				
	Min–Max value	$\bar{X}$±SD	**Mean Rank**	**Min–Max value**	$\bar{X}$±SD	**Mean Rank**	**t/Z**	***p***
m-DISCERN	0.5-4	2.08±1.16	9.88	1.5-5	3.32±0.89	19.53	-3.341[t]	**0.002**
GQS	1.5-3.5	2.5±0.67	10.08	2-5	3.42±0.96	19.26	-2.892[t]	**0.007**
JAMA	0-3.5	1.83±1.17	10.25	1-4	3.11±0.91	19.63	-2.832[Z]	**0.005**
Duration (sn)	75-757	357.67±237.51	11.08	104-3525	1190.21±1074.27	19.11	-2.393[Z]	**0.017**
Number of likes	3-7500	1344.83±2790.01	17.92	3-2100	213.68±495.73	14.68	-1.014[Z]	0.31
Number of dislikes	0-195	20±55.54	17.42	0-45	3.63±10.71	14.66	-1.290[Z]	0.197
Number of comments	0-411	49.17±118.51	16.75	0-73	6.26±16.58	15.42	-0.481[Z]	0.631
Number of views	575-1819504	225207.58±539349.48	17.75	336-194580	18464.84±45265.76	14.63	-1.055[Z]	0.292
Passing time	107-4133	1842.5±1103.93	15.5	82-4837	1703.11±1224.5	15.53	0.365[t]	0.715
Video Popularity Index	47.91-129964.57	21227.13±40268.99	20.25	12.44-19049.388	2075.95±4772.08	12.89	-2.393[Z]	**0.017**

Abbreviations: $\bar{X}$ ± SD: Mean ± Standard Deviation; Min–Max Value: Minimum–Maximum value; GOS: Global Quality Scale; JAMA: Journal of the American Medical Association; $p < 0.05$ was considered statistically significant.

intraoperative assessments was mentioned. Videos were classified into two groups: Group 1 consisted of videos assessing a single language domain (e.g., repetition) (12 videos). Group 2 consisted of videos assessing multiple language domains (e.g., naming, automatic speech, repetition) (19 videos).

Statistical Analysis

Statistical analysis was conducted using SPSS (IBM SPSS Statistics 25). Normality was assessed with the Shapiro–Wilk test. Videos were grouped by the number of language domains assessed. Group differences were analyzed using the independent samples t-test for parametric data. The Mann-Whitney U test was used for non-parametric data. Relationships between variables were examined using Pearson or Spearman correlation tests, depending on data distribution. Correlation coefficients were classified as weak (0.10–0.39), moderate (0.40–0.69), or strong (0.70 or higher) (16). Statistical significance was set at $p<0.05$.

Ethical Considerations

Ethical approval for this study was obtained from the Izmir Bakırçay University Non-Interventional Clinical Research Ethics Committee (approval number: 2483).

Results

The m-DISCERN, GQS, and JAMA scores showed strong inter-rater agreement, with intraclass correlation coefficients of 0.83, 0.82, and 0.92, respec-

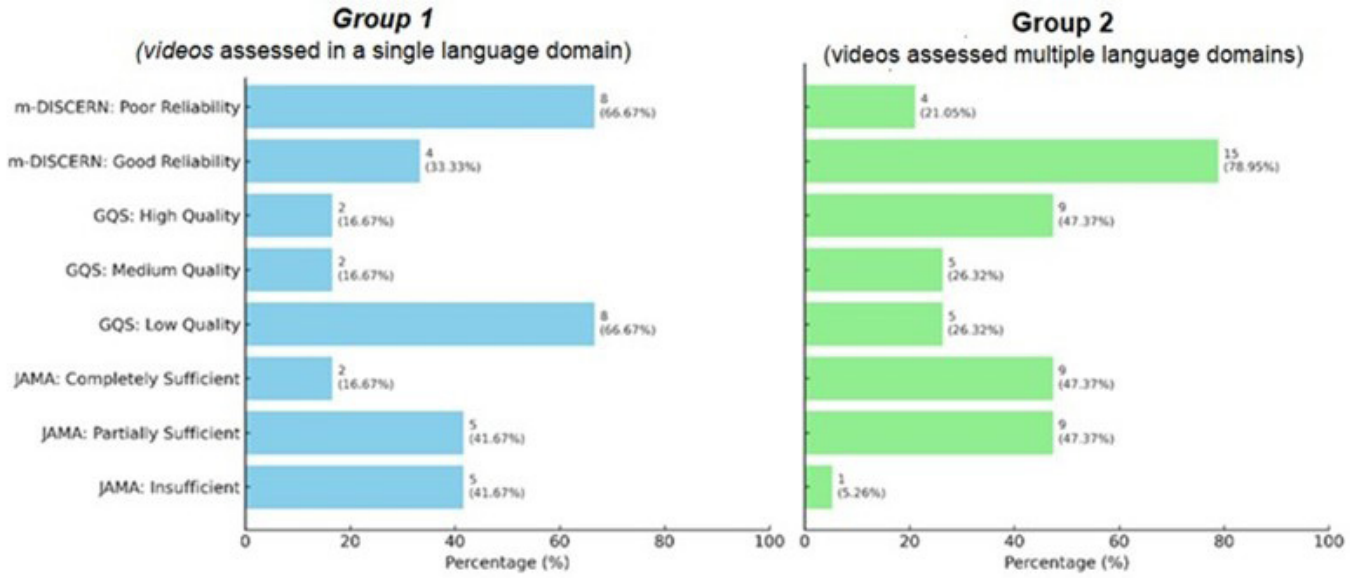

Figure 1. Quality and Reliability Scores of Videos Assessing Single vs. Multiple Language Domains

tively. The average ratings from the two independent speech and language therapists were used in the final analysis.

After applying the false discovery rate (FDR) correction with a significance threshold of $p < 0.034$, m-DISCERN scores showed a moderate positive correlation with both GQS ($r = 0.577$, $p = 0.001$) and JAMA scores ($r = 0.549$, $p = 0.001$). JAMA scores also exhibited a moderate negative correlation with VPI ($r = –0.642$, $p < 0.001$) and a moderate positive correlation with video duration ($r = 0.684$, $p < 0.001$). In contrast, the VPI showed a moderate negative correlation with video duration ($r = –0.535$, $p < 0.002$) and moderate positive correlations with the number of likes ($r = 0.639$, $p < 0.001$) and the number of comments ($r = 0.497$, $p = 0.004$). There was a strong negative correlation between the number of likes and views ($r=-0.879$, $p< 0.001$). The number of comments was moderately positively correlated with both the number of likes ($r=0.607$, $p< 0.001$) and views ($r=0.631$, $p< 0.001$) (Table 1).

When the quality of the videos was evaluated based on the number of assessed language domains, 47.37% of the videos addressing multiple language domains were classified as high quality according to the GQS. This group was the only one found to be completely sufficient according to the JAMA score (47.37%). It also exhibited a high level of reliability, as indicated by the m-DISCERN score (78.95%) (Figure 1).

There was a statistically significant difference in video duration, as well as in the mean scores of the m-DISCERN, GQS, JAMA, and VPI, based on the number of language domains. Videos assessing multiple language domains had significantly higher scores on the m-DISCERN ($p = 0.002$), GQS ($p = 0.007$), and JAMA ($p = 0.005$) scales. These videos also had longer durations ($p = 0.017$) compared to those evaluating a single language domain. Conversely, the VPI was significantly higher in videos assessing a single language domain compared to those covering multiple language domains ($p = 0.017$) (Table 2).

An analysis of the language assessment parameters revealed that only 19.4% of the videos included language assessments conducted by SLTs. Naming was assessed in 71.0% of the videos. This rate increased to 84.2% in videos that assessed multiple language domains. Writing skills were assessed in only 6.5% of the videos. Speech characteristics (phonation, articulation, resonance, and prosody) were addressed in 9.7% of the videos. The need for SLTs to perform language assessments was emphasized in only 3.2% of the videos (Table 3).

Discussion

This study evaluated the quality, reliability, transparency, and popularity of YouTube videos on “awake

Table 3. Distribution of Language Assessment Parameters in Analyzed Videos

Parameters	Group 1 (videos assessed in a single language domain) *n=12*			Group 2 (videos assessed multiple language domains) *n=19*			Total *n=31*		
	Yes (n, %)	No (n, %)	Unknown (n, %)	Yes (n, %)	No (n, %)	Unknown (n, %)	Yes (n, %)	No (n, %)	Unknown (n, %)
Were language skills assessed by SLTs?	2 (14.3)	10 (71.4)	2 (14.3)	4 (23.5)	13 (76.5)		6 (19.4)	23 (74.2)	2 (6.5)
Was naming assessed?	6 (50.0)	5 (41.7)	1 (8.3)	16 (84.2)	2 (10.5)	1 (5.3)	22 (71.0)	7 (22.6)	2 (6.5)
Was auditory comprehension assessed?	10 (83.3)	2 (16.7)		10 (52.6)		9 (47.4)	20 (64.5)	2 (6.5)	9 (29.0)
Was reading assessed?	10 (83.3)	2 (16.7)		11 (57.9)		8 (42.1)	21 (67.7)	2 (6.5)	8 (25.8)
Was writing assessed?	1 (8.3)	10 (83.3)	1 (8.3)	1 (5.3)	18 (94.7)		2 (6.5)	28 (90.3)	1 (3.2)
Was spontaneous speech assessed?	3 (25.0)	7 (58.3)	2 (16.7)	10 (52.6)	9 (47.4)		13 (41.9)	16 (51.6)	2 (6.5)
Was automatic speech assessed?	2 (16.7)	8 (66.7)	2 (16.7)	12 (63.2)	6 (31.6)	1 (5.3)	14 (45.2)	14 (45.2)	3 (9.7)
Information on phonation/articulation/resonance/prosody present?		12 (100.0)		3 (15.8)	16 (84.2)		3 (9.7)	28 (90.3)	
Was it stated that SLTs should perform language assessment?		12 (100.0)		1 (5.3)	18 (94.7)		1 (3.2)	30 (96.8)	

brain surgery and language." The use of established evaluation tools such as m-DISCERN, GQS, and JAMA scores improved the reliability and comparability of the assessments. Detailed analysis of language assessment parameters allowed evaluation of both overall quality metrics and clinically relevant subcomponents.

The study findings reveal a complex relationship between video quality, popularity indicators, and video characteristics. The strong alignment among m-DISCERN, GQS, and JAMA scores shows that reliability, educational value, and transparency tend to increase together, forming a coherent measure of information quality. Correlation analyses indicate that higher transparency and reliability scores are generally associated with longer, less popular videos. The positive correlation between video duration and JAMA scores suggests that providing more transparent information often requires longer videos. This aligns with previous studies (19-20), which found that longer videos are linked to higher quality and reliability. The VPI's positive correlations with

likes and comments, and its negative correlations with video duration and quality scores, suggest that audience engagement is often driven by shorter, more attention-grabbing formats rather than informational depth.

Group comparisons support these findings. Videos covering multiple language domains had significantly higher m-DISCERN, GQS, and JAMA scores, as well as longer durations, than those focused on a single domain. This suggests that comprehensive coverage improves both informational quality and educational value. In contrast, videos assessing only a single language domain had higher VPI scores, indicating that popularity is influenced more by brevity and presentation style than by informational depth or accuracy. These results are consistent with previous studies in other medical fields, which found that popular social media videos often have lower informational accuracy and clinical reliability (e.g., 2, 21). Overall, these findings highlight a disconnect between what attracts viewers and the delivery of clinically accurate, evidence-based information. This gap reflects a broader infodemic in online health communication, where popularity-driven algorithms can amplify misinformation or incomplete information (22).

The analysis of language assessment parameters showed limited SLT involvement in the reviewed videos. Naming was the most frequently assessed domain, while other essential skills, such as writing and speech features like phonation, articulation, resonance, and prosody, were rarely addressed. Language competence involves more than naming. Few videos acknowledged the need for SLT-led language assessment. Since comprehensive preoperative and intraoperative language mapping is critical for surgical planning and optimal outcomes (23), the underrepresentation of these domains and limited SLT involvement may contribute to incomplete public understanding and increase the risk of patient misinformation. In the context of awake brain surgery, these findings underscore the importance of assessment protocols that address multiple language domains, including auditory comprehension, reading, writing, speaking, and repetition, as emphasized by De Witte and Mariën (5).

Limitations

This study has several limitations. Restricting the analysis to English-language videos may have excluded high-quality content from other linguistic and cultural backgrounds. The cross-sectional design did not allow assessment of temporal changes or updates. The VPI metric was based only on view count, like ratio, and video duration, which do not capture qualitative aspects of audience engagement or educational impact. Future research should include content from diverse linguistic and cultural contexts and examine the longitudinal dynamics of video popularity and quality. Applying natural language processing (NLP) to viewer comments could also provide insights into audience perceptions, misconceptions, and learning outcomes (24).

Conclusion

In conclusion, this study demonstrates that while YouTube is a widely accessible source of information on awake brain surgery and language, its content varies significantly in quality, reliability, and transparency. Videos covering multiple language domains achieved higher scores, underscoring the value of comprehensive content. However, limited coverage of core language skills and infrequent SLT involvement highlight a misalignment between online content and evidence-based clinical practice. Addressing this misalignment requires coordinated action. Social media platforms should implement algorithmic adjustments, content verification, or quality labeling to prioritize evidence-based, clinically accurate videos over engagement-driven metrics (25). Professional associations and SLTs should develop and share high-quality, accessible materials to bridge the gap between scientific rigor and public engagement, improve patient education, and support interdisciplinary collaboration.

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