CLINICAL RESEARCH

Evaluating YouTube as a Patient Information Source for the Risks of Root Canal Treatment

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ABSTRACT

Introduction: YouTube is one of the most used social media platforms for health care information. Misinformation and poor educational content on this platform can exacerbate public anxiety and fear of root canal treatment. This study aimed to investigate the quality of videos examining risks of root canal treatment on YouTube. **Methods:** YouTube was searched using a combination of keywords relating to endodontic complications to replicate goal-orientated browsing. Video quality was assessed using a modified DISCERN score and global quality score by 2 authors independently. Manifest quantitative content analysis was used to capture information about the video and extent of interactions. The 10 most viewed videos were further analyzed in terms of the messaging and format of the videos. **Results:** The mean overall quality of the videos was relatively low (2.20). Videos produced by regulatory bodies had the highest mean score (3.00) and the shortest mean length (2 minutes 23 seconds) but had the fewest views and interactions. The poorest quality videos (mean 1.5) were produced by nonclinicians and news/media, which tended to be longer (mean 8 minutes 49 seconds) and received more engagement. Across all videos, information related to patient decision making tended to be poorly presented. **Conclusions:** The dental community, particularly institutions and organizations, need to strategically create engaging videos to redress patients' concerns about root canal treatment. This can counterbalance the existing misleading information and improve access to evidence-based content, which will ultimately affect patient decision making. *(J Endod 2023;49:155–161.)*

KEY WORDS

Disadvantages; endodontics; patient information; risks; root canal; YouTube

SIGNIFICANCE

Overall, YouTube videos provided poor information on the risks of root canal therapy, which could be detrimental to patient decision making. Regulatory bodies must produce more engaging evidence-based YouTube content to help redress patient concerns and counteract misinformation.

Root canal therapy (RCT) is a common dental procedure with approximately 15 million treatments being completed in the United States each year[1]. The aim of RCT is to adequately disinfect the root canal system, with the objectives of preventing pain, infection, and tooth loss[1]. Although RCT is an effective procedure with success rates of more than 82% to 92.6%[2], public perception is generally negative, with high levels of anxiety and fear[3], and a poor understanding of treatment benefits[4,5]. Historically, health professionals, specialist associations, and regulatory organizations have been responsible for educating and disseminating information to patients. Although there is a paucity of evidence specific to where patients seek information relating to endodontic treatment, a shift has been noted within health care more generally. Increasingly, patients are turning to alternative sources of information[6–8], with 45% of patients researching health care information before appointments with their health care professional[9]. Although there are several online platforms available, YouTube is a leading source of health care–related information[10]. YouTube as a platform allows users to upload, view, comment, and share video content. Videos are governed by YouTube's general terms of service, which limits posting of offensive material[11]. These terms of service are nonspecific, applying across all uploads. This provides a unique problem for health care, as almost any, inoffensive, video can be uploaded without critical review. This gives an opportunity for poor, outdated, health information to be viewed and shared, which may be one contributory factor to negative patient perceptions of RCT.

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The literature shows that the educational content of YouTube videos related to dentistry are inconsistent at best, with poor information on early childhood caries[12] and the link between alcohol and oral cancer infrequently discussed[13]. Regarding endodontics specifically, the evidence is limited. Studies examining pulp capping[14] and instrument separation[15] showed poor-quality videos with limited educational value. A broader study by Nason et al[16] showed many videos were incomplete, with dated content, remarking on the risks to patients using information without advice from their dental professional. However, this study is now approaching 10 years old, and since then YouTube's user base has doubled, with the potential for many more videos to have been uploaded in the meantime and with a wider potential spread. The study did not use a validated tool for assessing the quality of the information, and changes have also been made to YouTube's search algorithm, which may yield different results than back in 2014[17].

YouTube is not only a potential vehicle for poor educational content, but also misinformation, which was highlighted most recently with the volume of misinformation related to the side effects of COVID-19 vaccination[18], which, it has been suggested, will negatively affect vaccine uptake[19]. Recently, dentistry has had its own misinformation challenge in the form of the "Root Cause" documentary[20]. This documentary focused on the notion of focal disease theory[21], and its relationship to chronic diseases, including cancer. However, this theory is based on flawed science and has been discredited for a number of years[22]. What is perhaps the most interesting is the global spread and propagation of this misinformation in the forms of media coverage and blog posts, highlighted by the condemnation by the American Association of Dental Research, the American Association of Endodontists, and the American Dental Association[23]. The reaction to this documentary shines a spotlight on the information the public consumes and its potential reach. Such increasing awareness of misinformation among the public and experts has recently resulted in a letter, signed by more than 80 experts, urging YouTube to do more to tackle misinformation on its platform[24]. The potential implications of misinformation for patients are considerable; incorrect treatment options could lead to poorer outcomes, including tooth loss, spread of infection, and hospitalization[25].

Given this, a changing landscape of how our patients seek health information[6] and the need to update the study by Nason et al[16], the current study aimed to investigate the quality of videos examining risks of root canal treatment on YouTube.

METHODOLOGY

Data Collection

Our aim in data collection was to simulate how the average patient would search for information on YouTube by using goal-oriented browsing, that is, searching for specific information rather than general browsing[26]. Data collection was completed on November 3, 2021, using www.youtube.com, through a private browser to eliminate any influence from existing user Internet/search cookies[27]. Search terms can be found in Figure 1. Search filters were left as default, which sorted videos by "Relevance." At the time of writing, the layout of YouTube is a continuous feed of search results where the user scrolls down to access videos. There is no existing literature examining the numbers of videos users tend to watch following a YouTube search. Therefore, previous similar studies[16,28–30], as well as a consensus reached by the examiners, determined that the first 10 videos for each search term would be included. Figure 1 shows the searches conducted. A limit of 10 videos was chosen to mirror the average lay person search habits. Videos were excluded if they were a duplicate, not in English, as we did not have the means to translate the videos, or lasted longer than 1 hour, as this could be considered atypical for an interaction on YouTube[26]. All preliminary searches were checked by another member of the research team for reliability and comparison.

In line with similar existing studies[31–33], the quality of videos was assessed by 2 investigators using a Modified DISCERN tool[34] score and global quality score (GQS)[35]. The Modified DISCERN score evaluates clarity, reliability, and bias using several criteria and a scale of 1 to 5, with 1 being complete nonachievement of the criteria, and 5 being the complete achievement. The GQS examines the overall quality of content on a scale of 1 to 5, with 1 being poor quality and not useful to patients, and 5 demonstrates excellent content that is very useful to patients. Before assessment of videos, the 2 investigators completed interrater reliability achieving a kappa score of 0.82 on a sample of 10 endodontics-related videos not included in the final dataset. A third member of the research team assessed a selection of videos in which there was a variance of scores to verify the reliability of scores. The relevance and accuracy of the videos were determined by the same 2 reviewers and agreed with a third in the case of disagreement. Ethical clearance was granted by the University of Central Lancashire (UCLan) HEALTH Ethics panel (ref: 0088).

Analysis

Manifest, quantitative content analysis[36] was used. Each video was assessed for source, upload date, duration, number of views, number of interactions (based on likes and dislikes), target audience, and number of comments. A subsample of the 10 most viewed videos were further analyzed in terms of the messaging and format of the videos.

Quantitative data were analyzed using SPSS 27 (IBM Corp, Armonk, NY). Although our intent was to undertake either 1-way analysis of variance or Kruskal-Wallace H testing of significance with regard to source and other variables, small numbers in some cells meant that this could not be completed; therefore, descriptive statistics were undertaken.

RESULTS

Recent changes in YouTube do not give the user the total number of results available per search term. Therefore, a total of 120 videos were identified using a combination of the previously mentioned search terms. After application of exclusion criteria, 50 videos were identified for analysis.

Search 1: Risk AND root canal
Search 2: Complication AND root canal
Search 3: Disadvantage AND root canal
Search 4: Health risk AND root canal
Search 5: Risk AND root canal treatment
Search 6: Complication AND root canal treatment
Search 7: Disadvantage AND root canal treatment
Search 8: Health risk AND root canal treatment
Search 9: Risk AND endodontics
Search 10: Complication AND endodontics
Search 11: Disadvantage AND endodontics
Search 12: Health risk AND endodontics

FIGURE 1 – Search terms used.

TABLE 1 - Characteristics of the Most Viewed Videos

	Overall
Number of videos	
n (%)	10 (100)
Views	
Mean	1,037,189.10
(range)	(94,543–5,747,449)
Likes	
Mean	4532.50
(range)	(205–22,000)
Dislikes	
Mean	795.50
(range)	(46–3,700)
Comments	
Mean	821.11
(range)	(14–2,211)
Length	
Mean	06:12
(range)	(01:34–10:32)
Months since upload	
Mean	45.70
(range)	(6–90.0)
DISCERN score	
Mean	2.10
(range)	(1–3)

Table 1 shows that the mean overall quality of the videos was relatively low at 2.20. The videos ranged in total score from 1 to 4 and there was variation between sources; videos produced by regulatory bodies had the highest mean score (3.00) and was the only source not to produce a video with a rating of 1. They had the shortest mean length (2 minutes 23 seconds) but were also the least viewed and were interacted with the least, whether this is considered in terms of like, dislikes, or comments. The poorest overall-quality videos (mean 1.5) were produced by nonclinicians and news/media. These tended to be longer (mean 8 minutes 49 seconds) and received more engagement.

Table 2 shows the *n* and proportion of videos scoring with a 4 or 5 (ie, scoring favorably) on the different items of the modified DISCERN instrument. The highest-scoring item was providing balanced and unbiased information; however, this was only achieved by 42% ($n = 21$) of videos. Regulatory bodies performed best here ($n = 3$, 75%). These were also the best-rated videos in terms of having clear aims, meeting the aims, being clear on what sources of information were used, being balanced and unbiased, and accurately describing the RCT procedure and its benefits. Videos from clinicians and unknown sources were variable in terms of quality across the items, whereas those known to be produced by nonclinicians performed consistently poorly. Overall, the poorest scored items were as follows: being clear when the information used was produced, providing details for additional support and information, and for describing the following: the risks associated with RCT, signs and symptoms of complications, alternative treatment options, risks/complications associated with alternative treatments, how to prevent complications, and how treatment choices may affect overall quality of life. Each of these were rated as scoring highly less than 10% of the time across all videos.

The characteristics of the top 10 most viewed videos can be found in Table 3.

The overall DISCERN score of the most watched videos was slightly below that of the videos as a whole. They included the video with both the most likes (a step-by-step description of RCT by the American Association of Endodontists; this was also the most viewed video; 5,747,449) and the most dislikes (3700; produced by a "natural health" organization discussing damaging effects of RCT on the body's immune system and the individual's health and framed as a patient story).

The most viewed videos were all framed as public-facing information. Four focused on explaining what RCT is and a step-by-step guide to the procedure. The presentation of these varied from using illustrations to footage of the procedure; one had no context or voiceover and was simply a computer-generated imagery demonstration. Two videos were explicitly anti-RCT, describing them as causing other health conditions such as heart disease and damaging the immune system. One was the aforementioned video with the most dislikes (although it still had more likes) and the other was a sit-down interview with a cardiologist who had co-written a book on the dangers of RCT. There was one video that actively sought to discount these arguments, presented by 2 clinicians and was provided as suggested viewing for patients who had concerns about the safety of the procedure. However, this video had many fewer views (138,769) than either of the 2 anti-RCT videos (752,889 and 700,193 respectively). One of the 10 videos was about abscessed teeth more generally with RCT mentioned as a treatment option. One focused exclusively on pain after RCT in terms of why it may occur and what to do if pain persists. The final video appeared to be indirect advertising, presenting a case in which the clinician identified that a patient did not need RCT on the basis of using greater auricular nerve blocks.

DISCUSSION

Examination of our results demonstrates an overall poor quality of information available on YouTube for the risk of endodontic treatment. When categorized by subgroup, information produced from regulatory bodies and clinicians was generally of high quality. However, both these categories had the least number of video views. Views are arguably the greatest determinant of a video's success and reach, with videos of higher quality not necessarily having better views. It is well accepted that YouTube, along with other social media sites, is driven by user interactions[37], with improved interactions promoting videos and further driving engagement. Existing policy for regulatory bodies and institutions suggests limiting interactions and to remove or prohibit interactions to prevent possible liability, litigation, and privacy ramifications[38], yet our results suggest that the drawback to this is that these videos have the poorest engagement with comments, resulting in a detrimental effect on the views.

Although interactions drive views, we also need to consider is how videos gain initial traction. Two common ideas in the literature are "click baiting"[39] and the "rabbit hole effect"[40]. Click baiting is negative term generally described as the use of sensationalist titles or eye-catching thumbnails to draw the user into opening their content and closely tied to "fake news"[39]. Some examples from our study include *You'll Never Have a Root Canal After Watching This* (752,889 views) and *Say NO to Root Canals—Damaging to your Health* (700,193 views). "Down the rabbit hole"[40] was a term used to demonstrate how click baiting or misinformative ideas can spread antivaccine information. Tang et al[40] demonstrated that search networks and video recommendations for antivaccine videos are usually more extensive and interlinked than provaccine information. The result is that the user can descend the rabbit hole of misinformation much easier than that of evidence-based information. A similar trend can be found within this study predominantly with the North American holistic dentistry community. Many of these videos use sensationalist "click baiting" titles to draw the user's attention. In most cases these videos contain misinformation related to general health complications of RCT ranging from arthritis to cancer. This also raises a separate question of how the public perceives the source of the information. Self-proclaimed "holistic dentists" are qualified, registered dental professional and will likely be considered a trustworthy source from the public, particularly if general ideologies align; however, this is a topic for future research[41].

Our study demonstrates that there is a range of information on YouTube related to the risks of endodontic treatment. For the average user, there is conflicting and

TABLE 2 - Characteristics of Videos Overall and by Source

	Overall	Regulatory body	Clinician	Nonclinician	News/media	Unknown
Number of videos, n (%)	50 (100)	4 (8)	31 (62)	2 (4)	6 (12)	7 (14)
Views						
Mean	230,257.38	59,312.00	228,908.03	352,436.50	232,266.50	297,285.71
(range)	(0–5,747,449)	(4250–138,769)	(0–5,747,449)	(4680–700,193)	(900–752,889)	(15,813–18,426,32)
Likes						
Mean	1082.64	158.25	1073.65	2456.50	1566.00	843.86
(range)	(0–22,000)	(4–367)	(4–22,000)	(113–4800)	(0–4300)	(18–4500)
Dislikes						
Mean	186.38	16.25	96.42	1851.00	316.83	94.57
(range)	(0–3700)	(1–46)	(0–1800)	(2–3700)	(0–1400)	(1–532)
Comments						
Mean	210.94	46.00	123.83	1151.50	452.00	179.57
(range)	(0–2211)	(1–123)	(0–1106)	(92–2211)	(0–1570)	(0–795)
Length						
Mean	05:46	02:23	06:09	08:49	06:25	04:31
(range)	(01:07–19:40)	(02:13–02:52)	(01:21–19:40)	(08:29–09:09)	(03:13–11:11)	(01:07–16:08)
Months since upload						
Mean	44.92	64.00	40.48	42.50	40.33	58.29
(range)	(6–115)	(58–72)	(6–95)	(22–63)	(7–97)	(22–115)
DISCERN score						
Mean	2.20	3.00	2.23	1.5	1.67	2.29
(range)	(1–4)	(2–4)	(1–4)	(1–2)	(1–3)	(1–4)

misinformative advice readily available. From existing studies, it appears that the opportunity to find misinformative information is higher than that of evidence-based information. The dental profession generally needs to improve its response to misinformation and improve its online presence for users searching information. Recently, Yang et al[42] suggested several ways to combat misinformation. First, the use of "individual fact checkers" who comment on uploads to debunk misinformation on social media. There needs to be a concerted effort from individual dentists or a "call to arms" from dental associations such as the American Dental Association to encourage its members to fact check online information. Yang et al[42] further suggested that repeating the false claim along with evidence-based information in debunking posts can be an effective strategy at generating user engagement and responses. A second suggestion is a strategic approach from institutions, organizations, and individual fact checkers. Yang et al[42] suggested that a coordinated approach from these groups, to promote similar websites or URLs will result in a more central position for evidence-based information. This would improve co-sharing networks (suggested videos or similar posts) and prevent further spread of misinformation. To tackle the issue of click baiting, Varshney and Vishwkarama[43] have developed a computer-based tool using video content, individual human cognition, and user reputation to identify click bait videos. The "click bait video detector" demonstrated excellent results on test data, identifying 95.4% of click baiting videos. With adaptation, this tool may be used to highlight sensationalist or misinformative dental videos and, combined with a blocking or reporting tool, may be successful in removing and reducing these videos. The final suggested tool is to improve the online presence of predominately large institutions, such as specialist organizations and universities, in promoting evidence-based information. Our study demonstrated just 1 video from the American Association of Endodontists and no information from university-based institutions. A greater volume of information and user interaction from these trustworthy institutions is required to improve online visibility, promote evidence-based information, and also challenge misinformation. Based on our findings from our top 10 videos, recent (42 months), moderate-length videos (6 minutes) with higher user engagement were most viewed. Fode et al[44] suggested that engagement with online marketing experts and in some cases social media influencers to change viewing patterns for medical information is required. These suggestions will likely require significant investment from institutions, likely in the form of a dedicated social media team.

Our final suggestion is that lobbying from institutions to YouTube is required to highlight and prevent medical misinformation. Recently, YouTube has removed several users and videos for misinformation related to COVID-19 vaccination[45]. This could be a particularly opportunistic time to challenge these social media companies to evaluate their guidance and terms of service for medical-based information. Ideally, a critical review process would be ideal; however, smaller measures could be used, such as warning cards on videos highlighting to the user that the information is opinion rather than medical fact. Alternatively, efforts similar to those implemented by YouTube around demonetizing and removing misinformation related to COVID-19 videos should be considered; however, the specificity of such a system needs to be improved to prevent accurate information being removed[46].

There were some limitations to our study. During study design, our aim was to use layman's search terms in goal-orientated searches[26]. This could be argued to skew our dataset, as some of these terms were negatively framed. Having said this, it is, arguably, a more authentic reflection of patient searching behavior and therefore may better reflect the results a patient would obtain from a YouTube search than a more clinical approach. A second limitation was the use of dental professionals exclusively in data collection. This may have resulted in poorer DISCERN scores, given the existing higher-level knowledge of the data collectors. Having said this, expert knowledge is required to rate

TABLE 3 - Number of Videos Scoring 4 or 5 on DISCERN Scale Items by Source

	Overall	Regulatory body	Clinician	Nonclinician	News/media	Unknown
Are the aims clear?	17 (34.0)	3 (75.0)	13 (41.9)	0 (0.0)	0 (0.0)	1 (14.3)
Does it achieve its aims?	18 (36.0)	3 (75.0)	13 (41.9)	0 (0.0)	0 (0.0)	2 (28.6)
Is it clear what sources of information were used?	8 (16.0)	2 (50.0)	2 (6.2)	0 (0.0)	2 (33.3)	2 (28.6)
Is it clear when the information used or reported was produced?	3 (6.0)	0 (0.0)	1 (3.2)	0 (0.0)	1 (16.7)	1 (14.3)
Is it balanced and unbiased?	21 (42.0)	3 (75.0)	11 (35.5)	0 (0.0)	3 (50.0)	4 (57.1)
Does it provide details of additional sources of support and information?	3 (6.0)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	1 (14.3)
Does it refer to areas of uncertainty?	8 (16.0)	1 (25.0)	3 (9.7)	0 (0.0)	2 (33.3)	2 (28.6)
Does it accurately describe RCT?	16 (32.0)	4 (100.0)	8 (25.8)	0 (0.0)	3 (50.0)	1 (14.3)
Does it describe the benefits of RCT?	16 (30.0)	4 (100.0)	8 (25.8)	0 (0.0)	3 (50.0)	1 (14.3)
Does it describe the risks of RCT?	4 (8.0)	0 (0.0)	2 (6.5)	0 (0.0)	1 (16.7)	1 (14.3)
Does it describe what would happen if no treatment is used?	6 (12.0)	0 (0.0)	4 (12.9)	0 (0.0)	1 (16.7)	1 (14.3)
Does it describe the specific complications that could occur with RCT?	5 (10.0)	0 (0.0)	3 (9.7)	0 (0.0)	0 (0.0)	2 (28.6)
Does it describe the signs and symptoms of the complications?	2 (4.0)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)
Does it describe alternative treatment options?	4 (8.0)	0 (0.0)	3 (9.7)	0 (0.0)	0 (0.0)	1 (14.3)
Does it describe the risks/complications associated with alternative treatments?	2 (4.0)	1 (25.0)	1 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)
Does it describe how to prevent complications?	2 (4.0)	0 (0.0)	2 (6.5)	0 (0.0)	0 (0.0)	0 (0.0)
Does it describe how treatment choices may affect overall QoL?	3 (6.0)	0 (0.0)	2 (6.5)	1 (50.0)	0 (0.0)	0 (0.0)

QoL, quality of life; RCT, root canal therapy.

the accuracy of the clinical information. Future studies could include a lay person to help formulate search terms and contribute to DISCERN scoring to ensure a more accurate representation of this group.

Although the DISCERN scoring tool is a validated tool[34] and widely accepted, it is in the authors' opinion that further modification is required to improve robustness for video analysis. DISCERN was originally designed for written health care information traditionally found on web pages. An issue in the analysis of videos is that video information is usually more topic focused. Therefore, for example discussing the risks/benefits of an alternate treatment would rarely be included in videos, negatively affecting the DISCERN score. Further adaptation of the DISCERN scoring tool is needed for video content, likely requiring focusing of questions directly related to the topic.

CONCLUSION

The general findings of this paper demonstrate poor information relating to the risk of root canal treatments on YouTube. This poor and, in some cases, misinformation will likely have a detrimental effect on patient perceptions of root canal treatments and the decision making when considering treatment, increasing the risk of dental morbidity.

It is in our opinion that greater scrutiny and critical review of medical information from platforms such as YouTube is needed to prevent the spread of low-quality poor information.

The dental profession can no longer assume that our offices are where our patients get their information. There needs to be a greater voice and online presence from the dental community, particularly institutions and organizations, to improve the evidence base and information available for public consumption. Strategic creation of engaging, authoritative video content may work to mitigate extant misleading information and contribute to more informed patient decision making.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Stewart McLean: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing. **Neil Cook:** Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Alexander Rovira-Wilde:** Investigation. **Shanon Patel:** Validation, Writing – original draft, Supervision. **Shalini Kanagasingam:** Conceptualization, Methodology, Validation, Investigation, Writing – original draft, Writing – review & editing, Supervision.

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