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ORIGINAL RESEARCH ARTICLE

Evaluation of YouTube^{TM} as an Information Source for Indirect Restorations: Cross-Sectional Evaluation

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Abstract

Purpose: To evaluate the usefulness and quality of popular videos about indirect restorations shared by different uploaders on YouTube and to evaluate the demographic characteristics of the videos.
Materials and Methods: The most commonly used terms related directly to indirect posterior restorations were determined as "inlay" and "onlay" in this topic. Of the 400 videos (200 for each topic), 40 videos were selected for analysis. Evaluations were made for each video in terms of the following: (1) number of views, (2) number of comments, (3) days since up-load, (4) number of 'likes', (5) Viewing rate; [(number of views/number of days since upload) * 100%], (6) Viewer interaction, (7) Usefulness Index score, (8) 5-point global quality scale (GQS) criteria.
Results: No statistically significant difference was found among usefulness scores and video sources. (p=0.754). Based on the usefulness score, 20% were classified as good, 40% as poor, and 40% as moderate. No statistically significant difference was found among primary purpose of videos and video sources. (p=0.754). The greatest number of videos (42.5%) was uploaded by dentists (n=17). When the primary purpose is evaluated for the videos uploaded by dentists, the highest numerical value was determined as education for health professionals (52.9%) (n=9).
Conclusions: The contents of YouTube videos regarding the indications and production stages of inlay and onlay restorations need to be revised according to our evaluation criteria. The number of educational videos providing detailed content and information to patients should be increased.

Keywords: Indirect restoration; Inlay; Onlay; Video analysis; YouTube

Introduction

Conservative restorative dentistry offers a broad range of techniques and systems for the minimally invasive treatment of posterior teeth. Composite materials placed by direct or indirect methods are considered one of the best alternatives to restorative treatments, which are tooth-coloured and non-metallic. [1] Light-cured resin composite material is placed in the prepared cavity for indirect restorations. Being compatible with the modern concept of minimally invasive conservative restorative dentistry and allowing maximum preservation of tooth structure are the most important advantages of this technique. Another advantage they have is being performed in only one treatment appointment with low costs compared to other treatment options. Direct restorations also have disadvantages, such as low wear resistance and being associated with polymerization shrinkage. [2,3]

Metal, composite and/or ceramic restorative materials can be used in indirect restorations. Shape and function can be controlled better with indirect inlay/onlay restorations, especially in case of larger defects in posterior teeth. [4] The indirect technique allows the restoration to be produced outside the oral cavity by removing the caries tissue and taking an impression of the tooth prepared with the determined parameters. In the indirect technique, some disadvantages direct composite resin restorations have, for example, polymerization shrinkage, can be solved. [5] In addition, indirect restorations are post-cured with light or heat to provide better physical and mechanical properties. Ideal occlusal morphology and proximal contact are created, and natural compatibility with opposing tooth structure is provided. [6,7] However, this technique takes more time than the direct technique, requiring extra costs and an appointment. This may exceed the patient's wishes and budget. [8]

According to the shape and size of the cavities that need to be restored in the posterior region, indirect restorations after caries removal and cavity preparation are completed are named as follows: inlay restorations (cavity that does not require any tubercle cover), onlay restorations (cavities closed with one or more tubercles) and overlay restorations. (a custom onlay topology with full tubercle coverage). [9] When used effectively, the internet provides a help-

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ful platform for patients who want to learn about health-related issues.[10] In dentistry, besides getting information from the clinician, the internet is also one of the critical information sources. Along with Google™ and Facebook™, YouTube™ is greatly preferred by individuals to find information.[11] YouTube, a free video-sharing site with different content, started in 2005 as an online platform where non-professional users upload and share videos.[12] Health professionals or laypersons can upload health-related videos on YouTube. However, as these videos are not moderated, they may also contain inaccurate information.[13] Numerous studies have evaluated YouTube videos on dental procedures, including teeth whitening, wisdom tooth surgery, dental implants, denture care and orthodontics.[12–18]

Although different topics related to dentistry and medicine have been evaluated in YouTube videos[15,19–24], limited studies evaluate information on indirect restorations. Hence, this research aims to evaluate information in YouTube videos related to indirect restorations regarding the quality of information included with a usability score system and global quality scale (GQS). It also aims to examine the demographic characteristics of these videos, such as how many times they were viewed, how many likes and comments they received, how long ago they were uploaded, how long the videos took, the number of subscribers and the audience interaction. According to video demographic data, our first null hypothesis is that there will be no difference between usefulness scores and GQS scores. The second null hypothesis is that there will be no difference between video sources and usefulness scores regarding video demographics and GQS scores.

Material and Methods

On 12 November 2022 at 11:00 AM, a Google Trends search was performed to specify the keywords. Search criteria are set to the last five years and 'Worldwide'. The most commonly used terms related directly to indirect posterior restorations were determined as "inlay" and "onlay" in this topic. Since this study was conducted on public internet data, it does not require ethics committee approval.

The "Sort by relevance" filter was the search filter used in the present study following the purpose of the study. After clearing the computer history and cookies, the search was started. By using the URLs (universal resource locators) of the videos, playlists were made of the 200 videos for each keyword and 400 videos in the prepared playlists were watched. Videos that were not in English, those which lasted longer than 30 minutes, those which did not have sound, duplicates, videos that were irrelevant to the study and advertisements were not included. Two researchers (ID and MKÖ) independently analyzed the content of all selected videos. In case of any disagreement, the answers were debated until a consensus was eventually reached. Videos were grouped into four regarding their sources: (1) dentist, (2) health institution, (3) commercial company, and (4) individual users. The purposes of the videos are grouped under five headings: training for healthcare professionals, information for patients, sharing personal experience, general information, and product promotion.

Evaluations were made for each video in terms of the following: (1) number of views, (2) number of comments, (3) days since up- load, (4) number of 'likes', (5) Viewing rate; [(number of views/number of days since upload) * 100%], (6) Viewer interaction, which was found by using the formula of interaction index; [(number of likes/total number of views) * 100%], (7) Usefulness Index score, (8) 5-point global quality scale (GQS) criteria. The video content was evaluated with a usefulness score calculated using a 7-point scoring system (Table 1). By using the scale above, the content of videos was evaluated as poor (0 and 1 points), moderate (2 to 4 points), or good (5 to 7 points). Video quality was also evaluated with a 5-point global quality scale (GQS) criteria (Table 2). In order to assess rating reliability and consistency, 20 videos for each keyword were selected and re-rated by the authors one month after the first evaluation. The videos were scored (from 1 to 5) in terms of flow, quality, and educational usefulness for patients seeking information online by using the -point Global Quality Score (GQS) index (Table 2) as a second method of evaluation. Interaction index and viewing rate formulas: Interaction of YouTube users with the videos was calculated using Interaction index=(number of likes / total number of views)×100% and viewing rate=(number of views/number of days since upload)×100

Table 1. Usefulness score components and rate of observation in videos

Score Component	Point
Defination	1
Indications / Contraindications	1
Cavity preparation	1
Material Selection	1
Advantage / Disadvantage	1
Impression	1
Cementation	1
Total score	7

The data of the present study was analyzed with IBM SPSS V23 software. The normality distribution of the data was tested using the Shapiro-Wilk test. While Kruskal Wallis test was used for comparing non-normally distributed data according to groups of three or more, Dunn's test was used for multiple comparisons. The chi-square test was used to compare categorical data in terms of groups. The relationship between non-normally distributed data was examined with Spearman's rho correlation coefficient. $p<0.050$ significance level was used in analyses.

Results

As a result of the exclusion criteria, the initial sample of 400 videos was decreased to 40. Regarding the usefulness score, 40% of these 40 videos were poor, 40% were moderate, and 20% were good. Except for the variables of days since upload and interaction index, video sources were not found to be statistically significantly different in terms of GQS score or video demographics.(Table 3)

The primary purpose of videos and video sources was not statistically significantly different ($p=0.754$). The greatest number of videos (42.5%) was uploaded for education for health professionals. (Table 4)

Usefulness scores and video sources were not found to be statistically significantly different (p=0,754). Videos which had poor and moderate content were significantly higher in number than the videos with good content. It was found that the good content group had significantly higher GQS scores when compared with the content groups of poor and moderate ($P<001$) (Table 5).

Compared to the Usefulness group, median values of other parameters were not statistically significantly different ($p>0.050$) (Table 6).

No statistically significant difference was found between the usefulness group regarding the primary purpose ($p=0.804$) (Table 7).

Discussion

YouTube is being increasingly used as a source of information since it can be accessed free and easily. It would be safe to say that YouTube is the first platform that comes to mind when individuals want to have about general and dental health, as in all subjects, due to the gradually increasing popularity of the internet and social media. Although it has various advantages, it has a critical disadvantage that the information it presents cannot be verified in terms of reliability.[25] Since the videos published are not subject to any control mechanism, the accuracy of the transmitted information depends

Table 2. Global quality scale (GQS) criteria

GQS Description	GQS Score
Poor quality; very unlikely to be of any use to patients	1
Poor quality but some information present; of very limited use to patients	2
Suboptimal flow, some information covered but important topics missing; somewhat useful to patients	3
Good quality and flow, most important topics covered, useful to patients	4
Excellent quality and flow; highly useful to patients	5

Table 3. Comparison of video sources according to video demographics and GQS score (P<.05)

	Dentist	Health Instution	Commercial Company	Individual User	p*
Number of views	7503 (117 - 109891)	4876,5 (314 - 92844)	11673,5 (3696 - 70998)	4917 (275 - 68629)	0,863
Number of comments	12 (0 - 115)	2 (0 - 123)	1,5 (0 - 7)	1 (0 - 10)	0,188
Days since upload	719 (245 - 3496)[a]	1568,5 (410 - 4845)[ab]	4132,5 (1958 - 4998)[b]	1796 (45 - 4274)[ab]	0,032
Viewing Rate	20,3 (0,5 - 489,8)	3,8 (0 - 67,9)	0,6 (0,2 - 2)	7,9 (0 - 46,7)	0,065
Usefulness Index Score	3 (1 - 6)	3 (1 - 6)	1 (0 - 3)	3 (3 - 5)	0,099
GQS Score	2 (1 - 4)	2,5 (1 - 4)	1,5 (1 - 2)	3 (1 - 4)	0,336
Number of Likes	134 (4 - 1200)	45,5 (0 - 1000)	15,5 (10 - 100)	21 (1 - 307)	0,304
Interaction Index	1,7 (0,1 - 4,8)[a]	1,2 (0 - 4,6)[ab]	0,3 (0,1 - 0,4)[b]	0,7 (0 - 4,7)[ab]	0,029

*Kruskall Wallis test, a-b: There is no difference between groups with the same letter (Dunn test), median (minimum – maximum)

Table 4. Comparison of Video Sources and Primary Purpose

	Video Sources					
Primary purpose	dentist(n=17)	health instution(n=14)	commercial company(n=4)	individual user(n=5)	Total(n=40)	P
education for health professionals	9 (52,9)	4 (28,6)	1 (25)	3 (60)	17 (42,5)	0,754
information for patients	4 (23,5)	5 (35,7)	1 (25)	1 (20)	11 (27,5)	
presentation of product	0 (0)	1 (7,1)	1 (25)	0 (0)	2 (5)	
providing general information	2 (11,8)	2 (14,3)	0 (0)	0 (0)	4 (10)	
sharing personal experience	2 (11,8)	2 (14,3)	1 (25)	1 (20)	6 (15)	

Table 5. Comparison of usefulness scores by video sources

	Video Sources					
Usefullnes scores	dentist(n=17)	health instution(n=14)	commercial company(n=4)	individual user(n=5)	Total(n=40)	P
Poor	8 (47,1)	5 (35,7)	3 (75)	0 (0)	16 (40)	0,158
Moderate	7 (41,2)	4 (28,6)	1 (25)	4 (80)	16 (40)	
Good	2 (11,8)	5 (35,7)	0 (0)	1 (20)	8 (20)	

Table 6. Comparison of usefulness scores according to video demographics and GQS score

	Usefullnes group						p
	Poor		Moderate		Good		
	mean ± s.deviation	Median (min-max)	mean ± s.deviation	Median (min-max)	mean ± s.deviation	Median (min-max)	
Number of views	23421,75 ± 30445,74	10155 (690 - 109891)	19586,31± 27450,8	4844 (224-75437)	23747,75± 35654,49	4733,5 (117-92844)	0,726
Days since upload	1945,44± 1483,25	1562,5 (245 - 4731)	1876,44± 1600,47	1204 (521 - 4998)	1700,38 ± 1399,61	1327 (45 - 3541)	0,934
Interaction Index	1,06 ± 0,78	1,1 (0 - 2,67)	1,95 ± 1,76	1,25 (0,02 - 4,76)	2,01 ± 1,48	1,79 (0,36 - 4,6)	0,314
Viewing Rate	53,78 ± 123,83	3,96 (0 - 489,8)	18,28±30,84	5,5 (0,02 - 116,01)	21,2 ± 24,05	14,46 (0,46-67,74)	0,787
Like	326,38±459,9	63 (0 - 1200)	196,94 ± 312,98	78,5 (1-1000)	211,63 ± 221,69	177 (4-593)	0,834
GQS Score	1,5±0,63	1 (1 - 3)[b]	2,31±0,79	2,5 (1 - 3)[b]	3,75 ± 0,46	4 (3 - 4)[a]	<0,001
Number of comments	23,94±42,41	2 (0 - 123)	12,25±20,79	6,5 (0 - 83)	6,25 ± 7,36	2,5 (0 - 15)	0,835

Table 7. Comparison of usefulness scores according to the primary purpose

	Primary Purpose						p
	education for health Professional	information for patients	presentation of product	providing general information	sharing personal experience	Total	
Poor	5 (29,4)	5 (45,5)	1 (50)	2 (50)	3 (50)	16 (40)	0,804
Moderate	8 (47,1)	4 (36,4)	0 (0)	1 (25)	3 (50)	16 (40)	
Good	4 (23,5)	2 (18,2)	1 (50)	1 (25)	0 (0)	8 (20)	

on the uploaders' responsibility. This can result in both accurate and useful information as well as false information. The primary aim of the present study is to evaluate the quality of information provided by YouTube videos on indirect restorations.

Previous studies evaluated the first 60 to 202 videos found in search results.[12,15,20,22] Therefore, this study evaluated the first 200 videos that appeared as a result of the search for each keyword.

A successful functional and esthetic result can be achieved if certain clinical protocols are followed for posterior adhesive indirect restorations, such as careful consideration of indications and contraindications, preparation according to the clinical situation, selection of the correct restoration materials, restoration production with the correct tooth dimensions, and an appropriate cementation procedure. It can also make a difference in patient comfort by increasing clinical success.[9] As a result of this situation, a 7-point scoring system was developed to decide the usefulness score of each video, which includes all stages from the definition to the cementation of inlay-onlay restorations.

Usefulness scores and video sources were not found to be statistically significantly different (p=0.754). Poor and moderate content videos were significantly higher in number than good content videos. When the 40 selected videos were evaluated, 20% were classified as good, 40% as poor, and 40% as moderate. When we look at the upload source from the videos evaluated according to the exclusion criteria, dentists (n=17) took the first place and health institutions (n=14) took the second place. Considering the specificity of the topic, it can be estimated that dental professionals shared a great majority of the videos. It could be said that the reason for this is that the content of most videos in our study did not focus on indications/contraindications, material selection and impression, which may have led to poor scores.

The usefulness group, according to the primary purpose, was not found to be statistically significantly different (p=0.804). It was found that the purpose of most videos was education for health professionals (42.5%) (n=17). These videos are primarily aimed at education for dentists or dental students. A significantly higher number of moderate usefulness scores were found in 47.1% of these videos. This may be because the videos for dentists should have an explanation above a certain standard.

The primary purpose of videos and video sources were not found to be statistically significantly different (p=0.754). Most videos (42.5%) were uploaded by dentists (n=17). When the primary purpose is evaluated for the videos uploaded by dentists, the highest numerical value was determined as education for health professionals (52.9%) (n=9). According to the previous literature[26–28], multiple factors affect the success of inlay-onlay restorations, from indication to cementation. When dentists' videos about indirect restorations contain detailed information, they can become instructional videos for dentists or dental students who do not routinely perform the procedure rather than providing information to patients. A previous study found a similar situation, showing that ordinary people were less interested in high-level instructional videos.[29] Previous studies have used subjectively constructed scoring methods and GQS to evaluate the informational content of videos on YouTube.[12,30–34]

The GQS score is a 5-point scale that indicates the flow and quality of the video. It was found that the videos with good content had significantly higher GQS scores than those with poor and moderate content (P<001). The median values of other parameters were not statistically significantly different compared to the Usefulness scores (p>0.050). The fact that the videos with high GQS scores among the videos we examined are at a good level compared to the Usefulness scores can be interpreted as parallel to the increase in the richness of the content as the video quality increases.

In a previous study, researchers noted that although academic institutions and journals have recently created their own educational YouTube channels, health authorities and organizations have posted few highly educational and/or appropriate medical videos.[16] Among medical videos, only 27% were found to be highly educational.[29,35] Hegarty et al.[21] stated that to prevent misinformation, healthcare professionals should provide more information to social media resources, such as Google and YouTube. Bavbek and Balos stated that universities and educational institutions that provide information to the community without expecting anything in return could overcome the lack of reliable information in this field.[36] Our second null hypothesis, that there would be no differences among video sources in terms of video demographics and GQS scores and that there would be no difference among usefulness scores in terms of video sources, was also partially rejected. Except for days since the up-load and interaction index, video sources were not found to be statistically significantly different when GQS score or video demographics were considered.

Last but not least, another crucial issue is that today, sharing content such as patient education continues to be released without regulation or oversight. Because of this, patients and/or users should be educated about choosing the correct information and be guided as to which criteria they should look for. As a result, these scoring systems have taken their place in the scientific literature for professionals. Understandable and accessible criteria for users should be determined and disseminated. Providing and controlling knowledge—especially for health-related content —should be the duty of governments or educational institutions. Even if these organizations cannot control data, they should educate and inform the public on choosing reliable information sources.

There were some limitations in this study. Firstly, this study evaluated videos only in the English language. Further studies should be conducted to evaluate the videos in other languages to comprehend the phenomena country-by-country. Furthermore, this study investigated a limited timeline on the internet. Because the internet is a dynamic source, constantly evolving, such studies regarding the same topics should be conducted in the future.

Conclusion

It has been concluded that the contents of YouTube videos regarding the indications and production stages of inlay and onlay restorations need to be revised according to our evaluation criteria. The number of educational videos providing detailed content and information to patients should be increased.

Author Contributions

Study Design : I.D.
Literature Review : I.D , M.K.O.
Data Collection and Processing : I.D. , M.K.O.
Statistics : I.D.
Preparation of the Manuscript : I.D. , M.K.O.

Conflict of Interest

The authors declare no conflict of interest.

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