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Endodontics on YouTube: Evaluation of Content Compared to Evidence Based Standards

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Introduction:

With the advent of social media platforms in recent history, including YouTube in 2005, the ability of anyone to share information with anyone else in the digital world has become limitless. With the recent release of a film highlighting misinformation about root canal treatment there is cause for concern in the field of endodontics regarding patient education and treatment plan acceptance based on the misinformation received. The general public is mostly unaware of databases such as the Cochrane Library and other trusted sources of health information. Many people turn to sources of social media and search engines which present unchecked information that can be posted by literally anyone (Knosel et al 2011). While most patients do trust their doctors, this doesn't prevent them from seeking information on their own accord. This is especially true when patients are nervous about their condition or an upcoming procedure (Bell et al 2011). This enormous cache of information has been known to sway patient's treatment choices, attitudes toward care, and their relationship with their provider. (Glick 2013, Sood et al 2011, Morhan-Martin 2004).

Eight out of ten internet users have accessed health information, and this trend continues to grow (Madathil et al 2015). YouTube.com has over one billion users, viewing over one billion hours of video every day. YouTube is available in 88 countries, and can be accessed in 76 languages. On mobile devices alone, young adults aged 18-34 are watching YouTube more than any US television network. This impressive footprint accounts for nearly one third of all people on the internet (1). After Google.com, YouTube.com is the second most visited website in the world. Surpassing Facebook.com, Amazon.com, Wikipedia.org, and Twitter.com among many other strong contenders. This demonstrates that YouTube is an important part of US and worldwide information exchange and modern culture (2). YouTube is a growing source of healthcare information, and videos determined to be the best sources of information are not usually the most viewed (Knosel et al 2011, Murugiah et al 2011, Hassona et al 2016). Health information on YouTube has been found to be of overall poor quality and largely incomplete. (Steinberg et al 2010, MacLeod et al 2015, Kwok et al 2017). With increasing numbers of health-related videos being uploaded every day, the importance and potential impact of these videos is increasingly apparent (Samuel et al 2017).

Traditionally, patients received health information from their healthcare providers directly. Today's patients are more informed and prefer to be involved in the clinical decision-making process. They tend to value an active or collaborative participation in deciding their treatment, even for endodontic procedures (Azarpazhooh et al 2014). This may present a challenge in the doctor patient relationship as providers often find themselves defending their reasoning to patients who may have accessed misinformation (Glick 2013).

While there is a trend in professionals providing informative videos, health related searches still yield mostly content created by lay persons (Knosel et al 2011). Throughout the medical and dental field, many researchers agree there is a need for professional intervention whether it be warning patients of the lack of truthful health information on social media, directing them to more reliable sources of information in their search, or contributing themselves to the wealth of information available by providing evidence-based educational videos on social media (Sood et al 2011, Murugiah et al 2011, Hassona et al 2016, Bell et al 2011, Vance et al 2009, Hegarty et al 2017, Nason et al 2016, Rossi-Fedele et al 2016).

The purpose of this study was to compare endodontic information on YouTube.com when searching "what is a root canal," to selected evidence based endodontic information as outlined from the American Association of Endodontists (AAE) and European Society of Endodontology (ESE). Specifically, we set out to determine if information in the selected videos discusses the value of saving the natural dentition, standards of care in endodontics, and basic non-surgical root canal treatment guidelines based on evidence-based publications from the AAE and ESE. The results of this study aim to highlight the quality of information endodontic patients are accessing for guiding information.

Methods:

In an effort to simulate accessing information from a patient's perspective, YouTube.com was searched utilizing the search inquiry "what is a root canal." This phrase was selected as it is likely to reflect how a patient may search for this information as opposed to other more specialized terms such as "endodontics" or "non-surgical root canal treatment." The search was filtered using the "sort by" filter set to "relevance." The order of videos by "relevance" is determined by YouTube based on several factors including number of views, likes, and date the video was uploaded. Since search results can change day to day or minute to minute, to simplify this study a one-time search was used on a computer with cleared history and cookies. This one-time search was completed on June 22, 2018 and all videos to be assessed were selected on this date. It has been shown that a majority of people searching for information online will not look past the third page of search results (Hegarty et al 2017). Sixty-two videos were selected, as this includes the number of videos on the first three pages of search results. Inclusion criteria required the video have sound, be spoken or written in English and focused on initial non-surgical root canal therapy, on adults, on permanent teeth. Videos focused on other realms of endodontic treatment such as pediatric patients, regeneration, apexification, re-treatment, surgical cases, and trauma were excluded from this study. Videos were excluded if they were deemed irrelevant to this topic based on content, were drama based or satirical, or were a news report.

A survey of each video was completed utilizing 0-5 scale determining if the videos depict non-surgical root canal treatment according to selected evidence-based principles, recommendations and guidelines from the American Association of Endodontists and the European Society of Endodontology. A score of "0" indicated this topic was not mentioned. A score of "1" indicated the video strongly disagreed with the evidence-based guideline. A score of "2" indicated this video mostly disagreed with this guideline. A score of "3" indicated that the information in the video was neutral or mentioned (or showed) the topic but did not go into

detail or explain. A score of “4” indicated the video mostly agreed with accepted guidelines but did not explain in detail. Finally, a score of “5” indicated the video strongly agreed that guideline and explained it’s significance. (Table 1).

Table 1. Video Rating Scale

0	Topic was not mentioned
1	Strong Disagreement
2	Mostly Disagreement
3	Neutral/Mentioned/Shown
4	Mostly Agreement
5	Strong Agreement

These results were recorded in an Excel spreadsheet. Other data collected on the characteristics of the video were also recorded including length of the video, number of views, number of “likes”, number of “dislikes,” mention of endodontics as a dental specialty, type of author (dentist, endodontist, patient/potential patient, organization, unclear, physician, other dental specialist), perceived purpose of the video (personal account, advertisement, patient education tool, demonstration). The information collected was analyzed using descriptive and correlational statistics.

Normality of continuous data was assessed using the Shapiro-Wilk test. Medians and associated inter-quartile ranges (IQR) are used to describe central tendency and dispersion for non-normal data. Spearman’s correlations were used to assess potential monotonic relationships between a video’s duration, like to dislike ratio, views per month, and the age of the video. Relationships between categorical and continuous variables were determined using the Kruskal-Wallis test. P-values less than .05 were considered statistically significant. All analyses were weighted and conducted using SPSS version 25 (IBM, Chicago, IL).

Results:

A total of 78 videos were initially viewed, 16 were eliminated from analysis based on exclusion criteria. Six videos were eliminated for having no sound or having music only. Six videos were excluded for not being in English. Three videos did not focus on root canal procedures. One video was considered news/satire.

A total of 62 videos were assessed for their adherence to standards and information published by the AAE and ESE. The 62 videos analyzed had a combined total of 18,116,308 views. The median duration of the videos was 167 seconds (IRQ 30.5-303.5). Of the reviewed videos, the most recent had been available for only 2 months while the oldest had been

uploaded 139 months (11.6 years) prior to review. The median time online for the videos was 32 months (IQR 9-55).

A moderately strong positive relationship was found between the number of views per month and the duration of the video r(60) = .57, *P* <0.001. However, no relationship was noted between the number of views per month and either the time since the video was posted (*P*=0.40) nor it's like to dislike ratio (*P*=0.11). Similarly, no relationship was found between a video's duration and the time since the video was posted (*P*=0.43) nor it's like to dislike ratio (*P*=0.70).

The majority of videos (n=51) were determined to have educational or instructional content with regard to root canals while the remainder consisted of either personal accounts (n=10) or advertisement (n=1) (Figure 1). Among those videos categorized as educational, 28 had a male presenter, 11 had a female presenter, and 11 had no individual presenter. The presenter's gender had no effect on a video's duration, views per month, or like to dislike ratio (all *P*>0.05).

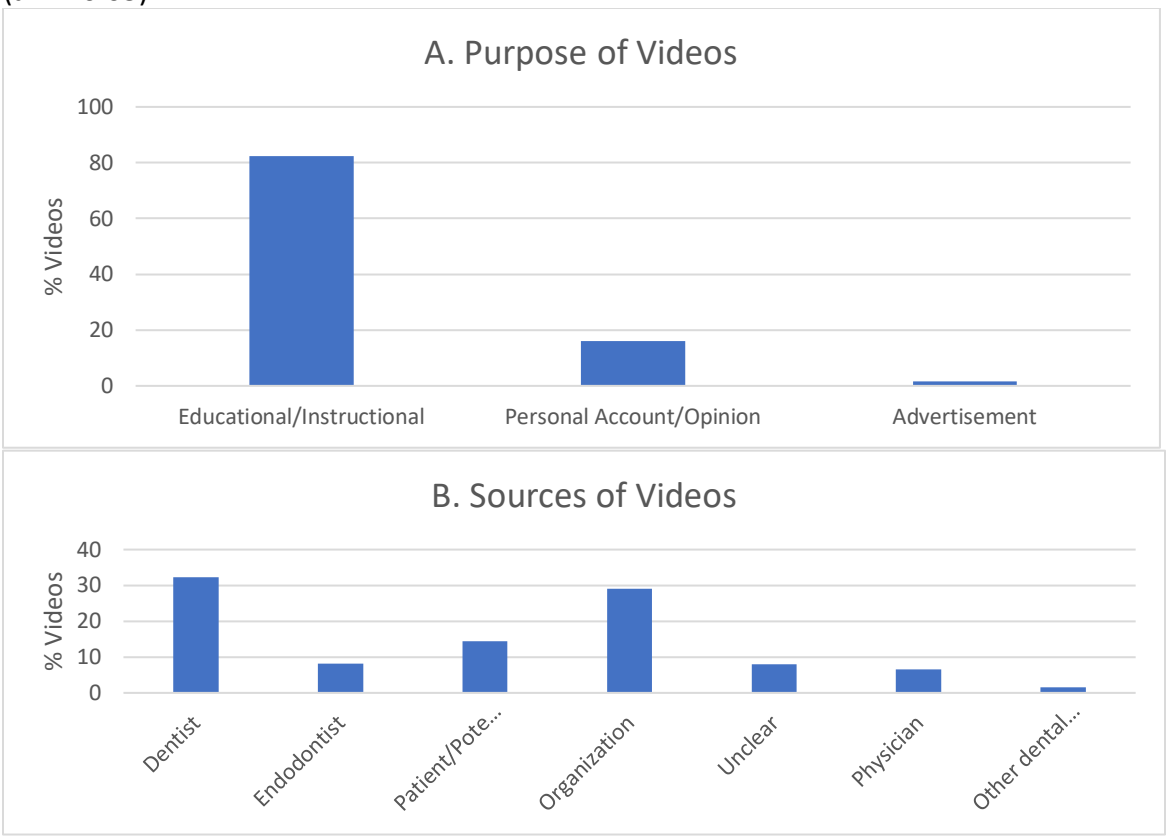

Figure 1. Histograms showing (A) The purpose of videos evaluated: 82.3% educational/instructional, 16.1% personal account/opinion, and 1.6% advertisement. (B) Categorized authors of the videos: Dentist 32.3%, Endodontist 8.1%, Patient/Potential Patient 14.5%, Organization 29%, Unclear 8%, Physician 6.5%, other dental specialist 1.6%.

Overall 64.5% (n=40) showed some degree of agreement with the select treatment principles investigated. The majority of videos (n=50) were determined to have some

educational content. About half (n=36) discussed the value of saving the natural dentition in a neutral to positive tone. Less than half (n=26) showed agreement with or adherence to standards of care or standards of practice in endodontics. Of the 62 videos reviewed, only 14 (22.6%) mentioned the specialty of endodontics and only 8 (12.9%) offered an explanation or description of the discipline.

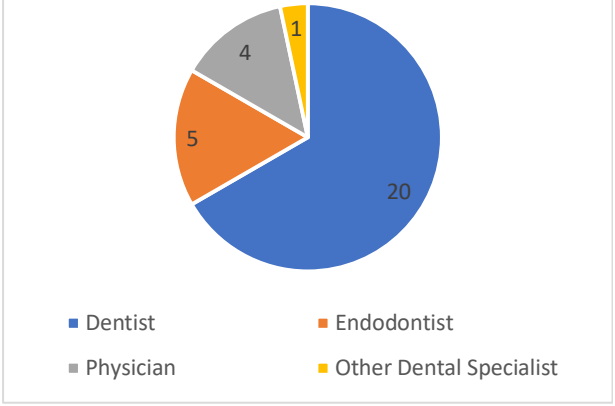

Figure 2. Proportions of health care professionals featured in videos

About half of the videos (n=30) showed speakers identified as either dentists, endodontists, other dental specialists or physicians. Only 5 of these were identified as endodontists (Figure 2). Of the four total videos with physician speakers, all four physicians supported the focal infection theory and discussed root canal treatment in a negative tone. Focal infection theory was supported by 7 videos and strongly contested and explained in accordance with AAE publications by only 2 videos.

Discussion:

While there is a wealth of accurate health information available on the internet, patients seeking this information may have a difficult time interpreting the validity of information, and may not search the exact terms that would bring them to the best information. In addition, the video creators' credentials are often difficult to determine, and rarely stated (Vance et al 2009). In a recent study evaluating endodontic information on YouTube it was shown that when searching the term "endodontic", 70% of the videos were posted by dentists or specialists whereas only 20% had these credentials when searching "root canal." The majority of the "root canal" videos were intended for the public versus for professionals and it was also shown that the videos found when searching "root canal" had more views (Nason et al 2016). In a study on toothache pain and Twitter use, it was determined that only 1 in 10 of those sharing their pain experience on social media mentioned seeking dental care, and that many users seek self-help and support on social media (Ahlwardt et al 2014). A large body of research has shown that many health information searches on YouTube yield mostly user generated content (Madathil et al 2015, Strychowsky et al 2013, Sorensen et al 2014, Hegarty et al 2017). In these studies, these particular types of videos are determined to have less value and be less informative, yet are likely to have more views than more accurate, relevant, educational videos (Hassona et al 2016, Strychowsky et al 2013). The opportunity for users to post their personal comments on these videos further compounds the issue, and the chance that patients seeking information will encounter bias and misinformation in their search (Madathil et al 2015). In this study, even videos with speakers identified as dentists and physicians still provided false and misleading information or presented root canal treatment in a negative tone.

In our current study, moderately strong positive relationship between the number of views per month and the duration of each video suggests motivation of YouTube viewers to seek out sources with greater perceived substance. Only one video in our search was provided by the AAE under the user name "rootcanalspecialists" and it was number 75 out of 78 videos searched. It was not within the first three pages of search results at the time this study was completed and therefore would not likely have been viewed by patients seeking information about root canals on YouTube.com.

One limitation in this study is that a single author (C.S.) rated each video's content. The determination by a single reviewer in scoring each question for each video may have influenced overall results. Another limitation is that a single search was completed using the phrase "what is a root canal." Youtube users may be more likely to only search "root canal" or other phrases, so it is unknown if the search phrase used represents the most likely search users would generate. Due to the nature of Youtube's search result algorithms, if this study were to be repeated on another date, search results and thus the videos analyzed may be different.

Conclusions:

A total of over 18 million views for the videos evaluated indicates YouTube users are searching for endodontic information on YouTube.com. The information they are receiving is largely incomplete or inaccurate and not in compliance with evidence-based standards and practices. Patients seeking helpful information on root canals are likely not aware that the information they are receiving is lacking substance and meaning. Endodontic providers need to spend more time providing quality patient education or directing patients to meaningful information online.

1) https://www.youtube.com/yt/about/press/ Accessed 11 August 2017

2) http://www.alexa.com/topsites/countries/US Accessed 11 August 2017

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VALUE OF THE SAVING THE NATURAL DENTITION

AAE Guide to Clinical Endodontics, 6th Edition/Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Objective: alleviate present and future adverse clinical signs/symptoms

Indications for endodontic treatment (diagnoses/conditions requiring endodontic treatment)

Endodontic Competency White Paper/Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Consideration of restorability part of the diagnosis/treatment planning steps

Root Canal Safety, AAE Fact Sheet

Decades of research contradict the beliefs of "focal infection" proponents. There is no valid, scientific evidence linking endodontically treated teeth and systemic disease

AAE Fact Sheet - Tooth Saving Tips

Saving a natural tooth through endodontic treatment should always be the first choice for the best health and cosmetic results

Advantages of saving natural tooth: efficient chewing, normal biting force, natural appearance, limit need for additional dental work

Never choose extraction because you think it will be cheaper

Never choose extraction because you think root canal treatment will be painful. (ROOT CANAL TREATMENT IS VIRTUALLY PAINLESS)

Never choose extraction because you think it will be quicker

STANDARDS OF CARE/STANDARDS OF PRACTICE IN ENDODONTICS

AAE Position Statement - Dental Dams/ Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Tooth isolation using the dental dam is the standard of care

Dental dam isolation minimizes the risk of contamination of the root canal system by indigenous oral bacteria

benefits of dental dam: aiding in visualization, preventing ingestion/aspiration of dental materials/irrigants/instruments

AAE Position Statement - Concerning Paraformaldehyde-Containing Endodontic Filling Materials and Sealers

Sargenti pastes should not be used for endodontic treatment, they are below the standard of care

AAE Position Statement - Use of Silver Points

AAE recommends against continued use of silver points

AAE does NOT recommend prophylactic revision of silver point obturation

AAE Position Statement - Use of Microscopes and Other Magnification Techniques

Use of operating microscope is an integral and important part of performance of modern endodontic techniques

Endodontics: Colleagues for Excellence, Fall 2014, The Standard of Practice in Contemporary Endodontics/ Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Use of electronic apex locator

Use of antimicrobial irrigants

Need for adequate coronal seal

Need for permanent restoration as soon as possible

Risk of instrument separation

Risk of perforation

Risk of sodium hypochlorite accident

NON-SURGICAL ROOT CANAL TREATMENT PRINCIPLES

AAE Guide to Clinical Endodontics, 6th Edition/ Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Definition of the specialty

Diagnostic evaluation for every tooth to be treated

Case difficulty assessment discussed

Informed consent is required

Follow up intervals discussed/indicated

Access based on size and shape of pulp chamber

Root canal sealers in conjunction with biologically acceptable obturating material to establish an adequate seal

Risk of separated instruments

Placement or indication for restoration as soon as possible

Objective: debride and shape root canal system

Objective: radiographic appearance of well obturated canal system with root filling as close as possible to the apical constriction in each canal.

Objective: to maintain health and/or promote healing and repair of periradicular tissues

Indications/procedure/objectives of placing a post

Indications/procedure/objectives of a core

Posterior endodontically treated teeth require cuspal coverage

Anterior endodontically treated teeth restoration based on clinical condition (protect remaining structure/provide seal)

Endodontic Competency White Paper/ Quality Guidelines for Endodontic Treatment: Consensus Report of the European Society of Endodontology

Radiographs part of diagnostic process

Use/benefits of CBCT

Responsibility of provider to ensure information is understood before asking patient to give informed consent

Responsibility of general dentist to refer when confronted with a case outside their capabilities

Endodontic treatment is essentially not complete until the permanent restoration is placed

Establishment of pre and post treatment prognosis required

AAE and AAOMR Joint Position Statement: Use of Cone Beam Computed Tomography in Endodontics - 2015/2016 Update
European Society of Endodontology position statement: The use of CBCT in Endodontics

Radiography is essential for successful diagnosis of odontogenic and non-odontogenic pathoses

Radiography is essential for successful treatment of the root canal systems

Radiography is essential for successful biomechanical instrumentation

Radiography is essential for evaluation of final canal obturation

Radiography is essential for assessment of healing

CBCT should be used only when the patients history and a clinical examination demonstrate that the benefits to the patient outweigh potential risks

CBCT should not be used routinely for diagnosis or screening

CBCT used only when need for imaging can not be met by lower-dose two dimensional radiography

Other:

Mention of endodontics as a dental specialty

Number of Views

Number of Likes

Number of Dislikes

Date of upload

Author: 1)Dentist 2) Endodontist 3)patient/potential patient 4)organization 5)unclear 6) physician 7)other dental specialist

Purpose: 1)educational/instructional 2)personal account/opinion 3)advertisement 4)not clear

Quality of video production/sound: 3)high quality/professional production 2)medium quality 1) poor

Author demographics: Race

Author demographics: Gender

Perceived author demographic: 1)younger than 20 2)20s 3)30s 4)40s 5)over 50 6)unclear

time length