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YouTube as a source of information on the COVID-19 pandemic

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ABSTRACT

Introduction: YouTube is a popular website where public can access and gain information from videos related to COVID-19. This paper seeks to assess the quality and validity of information available on YouTube, based on the current Center for Disease Control (CDC) and World Health Organization (WHO) guidelines.

Methods: We identified the 250 most-viewed videos from 1 January 2020 to 12 May 2020 on YouTube using keyword 'COVID 19'. Two independent reviewers analyzed the English-language videos as useful, misleading, or news updates.

Result: After excluding non-English and irrelevant videos, 100 videos were analyzed. Forty-four videos were classified as useful, 33 videos were classified as news updates, and 23 videos were classified as misleading. Independent users had five times increased odds of posting misleading videos (40% vs. 12%, OR = 5.05, 95% CI = 1.84–13.9, P = 0.001), whereas news agencies have 2.8 greater odds of posting useful or update videos (87% vs 44%, OR = 2.85, 95% CI = 0.959–8.45, P = 0.087).

Conclusion: YouTube is an increasingly important source of medical information during the COVID-19 pandemic. Most of the videos were useful, however due to the public nature of the platform, misleading information may also be easily disseminated. Independent users are more likely to post-misleading videos.

1. Introduction

COVID-19 was first reported in Wuhan, China in December, 2019. The WHO declared this as a pandemic on 11 March 2020. Internet-based content and resources related to COVID-19 subsequently proliferated, including on social media. Internet access has revolutionized how information is disseminated. Online resources have been frequently shown to be initial sources of public health information, understanding the consumption of different types of content can be an important consideration for effective intervention strategies [1].

YouTube is a popular platform to stream, save, and upload video content. Over 2 billion individuals access YouTube each month, however, in the month of April 2020, there was a 75% increase in news viewership due to the pandemic compared to last year [2]. YouTube benefits public health because evidence-based content is available for free to the public, but lack of regulation over false or misleading creates major challenges. Video content creation is generally available to users regardless of training or specialized knowledge. The YouTube COVID-19 Medical Misinformation Policy was published 20 May 2020, more than 2 months after pandemic status was declared

by the WHO, by which time thousands of videos had already been created [3]. The public may access information about COVID-19 even if they have not been verified by the Center for Disease Control and Prevention (CDC) and WHO. This may contribute to public paranoia as it promotes conspiracy theories and general misinformation [4].

Previously, the use of YouTube as a source of information has been evaluated for other epidemics such as H1N1 influenza and the Ebola outbreak [5,6]. This paper seeks to assess the quality and validity of information available on YouTube, based on the current CDC and WHO guidelines.

2. Methods

YouTube was searched using the keyword 'COVID 19'. The top 250 most-viewed videos from 1 January 2020 to 12 May 2020 were saved. Videos that were not in English and those with irrelevant content (e.g. political/economic issues related to the pandemic, COVID-19 and animal behaviors) were excluded, leaving 100 videos to be analyzed. Two independent reviewers analyzed the content of each video, then classified them into three different

categories. This methodology has been previously published [5,6].

(1) Useful:
   a. Videos that contain scientifically correct information about the disease as per CDC and/or WHO guidelines at the time that the video was uploaded. This may include disease symptoms, signs, treatment and prevention measures.
   b. Videos that correct inaccurate information in other videos (debunking myths).
   c. Videos that promote viewers to follow local official advice.
(2) Misleading: Videos that contain at least one unproven or inaccurate information about the disease (e.g. suggesting that the virus was made in a lab, unproven treatment methods, and the 5 G network hastens the spread of virus).
(3) News updates: Videos that contain information about the current status of the disease in terms of number of cases, mortality rate, lockdown strategies, or regional testing capabilities.

The videos were also categorized based on their source: WHO, CDC, academic health/hospital institution, non-governmental organization (NGO), news agency, and independent user. Kappa coefficient of agreement was used to determine the degree of agreement between the two researchers. Differences were finalized by a third researcher who was unaware of the initial determination. One-way ANOVA was used to assess differences based on the three category videos. Fisher's exact test was used to assess results from dichotomized data analysis.

3. Results

A total of 100 videos were included for analysis. The kappa coefficient of agreement regarding classification of these videos was 0.71. Forty-four 'useful' videos (n = 44) were followed by 'update' (n = 33)

and 'misleading' (n = 23) (Table 1). Total duration was 1538 minutes. There was no difference in duration based on category (p = 0.46). Differences based on total number of days on YouTube were significant (p < 0.001). In total, video categories garnered 240,596,438 views. 'Useful' videos have the highest viewership at 155,126,654. No significant difference was found based on views. While the number of likes (p = 0.046) did not differ significantly by type, dislikes did (p = 0.044). 'Useful' videos had the most likes (2.7 million) and the most dislikes (>98,000). Most 'Useful' videos discussed COVID-19 symptoms, treatment, transmission, and prevention. Misleading videos had 677,900 likes and 87,285 dislikes. News agencies constituted the overwhelming majority of sources for 'updates' (n = 27, 82%); whereas, independent users were the largest source for 'misleading' (n = 16, 70%) and 'useful' (n = 21, 48%) videos.

Of the total misleading videos (23), 7 videos (30.4%) were deemed 'false', 12 videos (52.2%) contained unproven theories, and 4 videos (17%) contained conspiracy theories (e.g. COVID-19 is a man-made virus; 5 G network spreads the virus). Independent users had five times increased odds of posting misleading videos (40% vs. 12%, OR = 5.05, 95% CI = 1.84–13.9, P = 0.001) whereas news agencies have 2.8 greater odds of posting useful or updates videos (87% vs 44%, OR = 2.85, 95% CI = 0.959–8.45, P = 0.087).

4. Discussion

Our study shows that among the most-viewed videos on YouTube from 1 January 2020 to 12 May 2020, most of the videos were classified as useful. There is no significant difference observed between total viewership numbers from misleading, useful, and news update videos. Similar trends were seen in the past during evaluations of YouTube's role as source of information for H1N1 influenza and Ebola virus outbreak [5,6].

Table 1. Detailed characteristics of various categories of YouTube videos with relevant information about COVID-19.

	Updates	Misleading Videos	Useful	p-value[a]
No. of videos (%)	33 (33)	23 (23)	44 (44)	
Total duration (minutes [%])	453.60 (29.5)	464.38 (30.2)	620.17 (40.3)	0.46
Mean duration (minutes±SD)	13.75 (22.91)	20.19 (25.09)	14.09 (16.95)	
Total # of days (±SD) on YouTube	532 (18)	737 (23)	1791 (22)	<0.001*
Total viewership (n [%])	44,279,945 (18.4)	41,189,839 (17.1)	155,126,654 (64.5)	0.068
Likes (mean, total)	9,941 (328,059)	29,474 (677,900)	63,848 (2,745,451)	0.046
Dislikes (mean, total)	1,071 (35,336)	3795 (87,285)	2,285 (98,241)	0.044
Viewership/day (median [interquartile range])	67,802 (39,203–67,802)	40,728 (19,413–94,508)	36,577 (20,080–74,479)	0.16
Source	Academic health/Hospital/ Institution: 0	Academic health/Hospital/ Institution: 1	Academic health/Hospital/ Institution: 6	
	CDC: 0	CDC: 0	CDC: 3	
	Independent User: 3	Independent User: 16	Independent User: 21	
	INGO/NGO: 3	INGO/NGO: 1	INGO/NGO: 5	
	News Agency: 27	News Agency: 5	News Agency: 7	
	WHO: 0	WHO: 0	WHO: 2	

[a]statistical analysis was performed with one-way ANOVA.
*p < 0.01.

From our assessment, 'useful' videos discussing COVID-19 symptoms, treatment, methods of spread, and preventative measures comprised the majority of video type. Videos discussing unproven symptoms and treatment methods comprised the majority of 'misleading' videos and a small number of videos also discussed conspiracy theories about COVID-19 (e.g. being a man-made virus) and method of spread (e.g. 5 G network spreading the virus). The majority of these videos were uploaded by independent users.

YouTube published 'COVID-19 Medical Mis information Policy', on 20 May 2020, which is the latest version to date, after this study was conducted. This states that, 'YouTube doesn't allow content that spreads medical misinformation that contradicts the World Health Organization (WHO) or local health authorities' medical information about COVID-19' and also stated that a violation of policy would result in content removal [3]. Further studies are needed to evaluate the impact that this policy had on public perceptions concerning COVID-19. Medical conspiracy theories have increasingly circulated through the American public. According to one study, up to 49% of Americans agree with at least 1 medical conspiracy theory and 18% agree with up to three theories or more [7]. These beliefs correlate with a variety of health behaviors, including the use of non-evidence-based therapies [7]. Further studies are needed to identify and assess the impact of false information, such as conspiracy theories about COVID-19, on YouTube.

5. Conclusion

YouTube is an increasingly important source of medical information during the COVID-19 pandemic. Most of the videos were useful, however due to the public nature of the platform, misleading information may also be easily disseminated. Independent users are more likely to post-misleading videos.

Disclosure statement

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