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BRIEF REPORT

Lyme Disease and YouTube™: A Cross-Sectional Study of Video Contents

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Objectives: Lyme disease is the most common tick-borne disease. People seek health information on Lyme disease from YouTube™ videos. In this study, we investigated if the contents of Lyme disease-related YouTube™ videos varied by their sources.
Methods: Most viewed English YouTube™ videos (n = 100) were identified and manually coded for contents and sources.
Results: Within the sample, 40 videos were consumer-generated, 31 were internet-based news, 16 were professional, and 13 were TV news. Compared with consumer-generated videos, TV news videos were more likely to mention celebrities (odds ratio [OR], 10.57; 95% confidence interval [CI], 2.13–52.58), prevention of Lyme disease through wearing protective clothing (OR, 5.63; 95% CI, 1.23–25.76), and spraying insecticides (OR, 7.71; 95% CI, 1.52–39.05).
Conclusion: A majority of the most popular Lyme disease-related YouTube™ videos were not created by public health professionals. Responsible reporting and creative video-making facilitate Lyme disease education. Partnership with YouTube™ celebrities to co-develop educational videos may be a future direction.

Key Words: health communication, Lyme disease, social media

INTRODUCTION

Lyme disease is the most common tick-borne disease, with approximately 300,000 cases diagnosed annually in the United States [1] and approximately 85,000 estimated cases diagnosed annually in Europe [2]. Lyme disease is also present in China, but exact estimates are not available. Meanwhile, Lyme disease is rare in Korea and Japan [2]. Lyme disease is known for different acute and chronic clinical manifestations in humans and it is capable of causing clinical symptoms in dogs, horses and sometimes cattle [1,3]. Common symptoms of acute illness include fever, headache, fatigue, and erythema migrans [1]. Effective health communication can be used to empower individuals to prevent potential acquisition of Lyme disease by avoiding tick-infested areas, wearing protective clothing or repellent, and subsequent timely checking for and correct removal of ticks [1].

Social media disseminates information efficiently, making it crucial for health communica-

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tion. With over 1 billion users, YouTube™ is the second most visited website [4]. Many health-related videos are uploaded, searched, and viewed daily [4], but no study to date analyzes Lyme disease-related YouTube™ videos. Given the large audience of YouTube™ users and the concern of accuracy regarding disease-related information released on these videos, it is important to know if the videos made by public health professionals reach a wide audience or not.

In this study, we investigated if the contents of Lyme disease-related YouTube™ videos varied by their sources.

MATERIALS AND METHODS

The approval for this study of Institutional Review Board at William Paterson University was waived since this study did not involve human subjects.

For this study, we adapted a research protocol that was previously established for the study of Zika virus-related YouTube™ videos [5] to allow for the study of Lyme disease-related videos. YouTube.com was searched with the keyword "Lyme Disease" on September 2, 2016. Videos were sorted by their number of views in descending order. After excluding two videos, one in French and one in Spanish, the 100 most viewed English language Lyme disease-related videos were manually coded for content and sources. Video sources were categorized as (1) consumer-generated (uploaded by non-healthcare-professionals who were members of the general public), (2) professional (uploaded by healthcare professionals), (3) news broadcasted by television networks, and (4) other internet-based news (news clips that were part of an internet-based program rather than one that was aired on network television). The video title, date of upload, URL, length, number of views, and number of thumbs-up and thumbs-down were recorded and analyzed. A random sample of 10 videos out of the sample (n = 100) were double coded; our manual coding was found reliable with 100% agreement.

Statistical analysis was performed in R 3.3.1 through R Studio [6]. Non-parametric methods were used to analyze the video length, number of views, thumbs-up, and thumbs-down. The Kruskal–Wallis H-test was used across categories, and the Nemenyi test was used for pairwise comparisons. Spearman's rho was used to assess bivariate correlation. Manually coded contents that were binary were analyzed using univariate logistic regression with the video source as the predictor variable.

RESULTS

There were 40 consumer-generated videos, 31 internet-based news videos, 16 professional videos, and 13 TV news videos among the 100 most viewed English videos on Lyme disease. Collectively, they were viewed 10,380,848 times. Consumer-generated videos were viewed 3,231,374 times, accounting for 31.1% of overall views, followed by TV news (2,783,934, 26.8%), internet-based news (2,395,154, 23.1%), and professional news (1,971,286, 19.0%). The difference in distribution of the overall views was marginally statistically significant between the categories (Kruskal–Wallis test, χ^2 = 7.98, p = 0.05); however, pairwise comparison revealed no significant difference between the categories.

Compared with amateur-generated videos, TV news videos were more likely to mention or feature a celebrity (odds ratio [OR], 10.57; 95% confidence interval [CI], 2.13–52.58; p = 0.004), to mention Lyme disease prevention through wearing proper clothing (OR, 5.63; 95% CI, 1.23–25.76; p = 0.03), and to mention Lyme disease prevention through spraying insecticides either on clothing or in the environment (OR, 7.71; 95% CI, 1.52–39.05; p = 0.01) (Table 1). Internet-based news videos were 4.3 times as likely as consumer-generated videos to mention non-specific prevention methods (OR, 4.29; 95% CI, 1.19–15.39; p = 0.03). Non-specific prevention methods were defined as mentions of the importance of prevention with little detail (e.g., prepare your home or use caution outside). Further details are presented in the online Supplementary Materials (available at https://doi.org/10.24171/j.phrp.2017.8.4.10).

DISCUSSION

Among the 100 most viewed YouTube™ videos on Lyme disease, 40 were uploaded by amateurs; only 16 were created by healthcare professionals. Prevention of Lyme disease relies primarily on education about personal protection measures, and signs and symptoms of the disease [7]. Most individuals with early-stage Lyme disease respond to antibiotic therapy very well [7]. With over half of low literacy adults who sought health information preferring the internet as their first choice for a source of information [8], the untapped potential of online videos in health communication could not be overstated. Professional sources ensure accurate and valid information dissemination. Our findings suggest the possibility that many Lyme disease-related YouTube™ videos made by public health professionals are not popular enough to make it to the list of the most viewed 100. Given YouTube's popularity, the public health implication of our

Table 1. The OR of different video source categories containing different categories of Lyme disease-related contents as compared to consumer-generated videos

Content category	OR (95% CI)	*p*-value
A celebrity featured or mentioned		
Internet-based news videos	0.85 (0.13–5.43)	0.86
Professional videos[a]	–	–
Television news videos	10.57 (2.13–52.58)	0.004
Borrelia burgdorferi spirochete shown or mentioned		
Internet-based news videos	0.76 (0.28–2.09)	0.59
Professional videos	0.43 (0.10–1.76)	0.24
Television news videos	0.83 (0.22–3.17)	0.78
Pain mentioned		
Internet-based news videos	0.59 (0.23–1.52)	0.28
Professional videos	0.82 (0.26–2.61)	0.73
Television news videos	0.36 (0.10–1.38)	0.14
Anxiety or fear of diagnosis mentioned		
Internet-based news videos	1.31 (0.17–9.87)	0.79
Professional videos	4.39 (0.66–29.22)	0.13
Television news videos	5.70 (0.84–38.88)	0.08
Bull's-eye rash shown or mentioned		
Internet-based news videos	0.64 (0.24–1.72)	0.38
Professional videos	0.62 (0.18–2.10)	0.44
Television news videos	0.60 (0.16–2.28)	0.46
Fatigue symptoms mentioned		
Internet-based news videos	1.24 (0.48–3.19)	0.66
Professional videos	0.90 (0.27–2.97)	0.86
Television news videos	1.29 (0.36–4.54)	0.70
Headache symptoms mentioned		
Internet-based news videos	0.68 (0.25–1.86)	0.46
Professional videos	0.56 (0.15–2.04)	0.38
Television news videos	0.74 (0.19–2.83)	0.66
Fever symptoms mentioned		
Internet-based news videos	0.68 (0.23–2.00)	0.49
Professional videos	1.06 (0.30–3.72)	0.93
Television news videos	1.04 (0.27–4.03)	0.96
Treatment mentioned		
Internet-based news videos	0.61 (0.22–1.69)	0.34
Professional videos	5.00 (0.58–42.80)	0.14
Television news videos	1.11 (0.25–4.86)	0.89
Damage to nervous system mentioned		
Internet-based news videos	0.63 (0.21–1.96)	0.43
Professional videos	2.05 (0.61–6.86)	0.24
Television news videos	1.65 (0.44–6.14)	0.46
Damage to joints mentioned		
Internet-based news videos	2.20 (0.76–6.40)	0.15
Professional videos	1.33 (0.34–5.25)	0.68
Television news videos	1.78 (0.43–7.28)	0.42
Damage to heart mentioned		
Internet-based news videos	0.59 (0.16–2.19)	0.43
Professional videos	0.27 (0.03–2.33)	0.23
Television news videos	1.20 (0.27–5.41)	0.81

Table 1. Continued

Content category	OR (95% CI)	*p*-value
Prevention: Preventive clothing mentioned		
Internet-based news videos	0.30 (0.03–2.83)	0.29
Professional videos	0.60 (0.06–5.82)	0.66
Television news videos	5.63 (1.23–25.76)	0.03
Prevention: Insecticides mentioned		
Internet-based news videos	1.32 (0.25–7.05)	0.74
Professional videos	1.76 (0.27–11.69)	0.56
Television news videos	7.71 (1.52–39.05)	0.01
Prevention: Removal of ticks mentioned		
Internet-based news videos	0.84 (0.22–3.28)	0.80
Professional videos	1.31 (0.28–6.02)	0.73
Television news videos	1.70 (0.36–8.05)	0.50
Prevention: Removal of habitat mentioned		
Internet-based news videos[a]	–	–
Professional videos[a]	–	–
Television news videos[a]	–	–
Prevention (not specific) mentioned		
Internet-based news videos	4.29 (1.19–15.39)	0.03
Professional videos[a]	–	–
Television news videos	0.75 (0.08–7.38)	0.81
Geography (where Lyme disease is most probable) mentioned		
Internet-based news videos	0.53 (0.15–1.92)	0.33
Professional videos	0.49 (0.09–2.58)	0.40
Television news videos	2.15 (0.56–8.23)	0.26
Ticks as vectors mentioned		
Internet-based news videos	0.87 (0.34–2.24)	0.78
Professional videos	0.82 (0.26–2.61)	0.73
Television news videos	0.96 (0.27–3.35)	0.94
Individual experience included		
Internet-based news videos	0.75 (0.28–1.96)	0.55
Professional videos	1.62 (0.44–5.95)	0.47
Television news videos	1.21 (0.32–4.65)	0.78
Products or services sold		
Internet-based news videos	3.65 (0.66–20.28)	0.14
Professional videos	4.39 (0.66–29.22)	0.13
Television news videos[a]	–	–
Lyme disease in animals mentioned		
Internet-based news videos	0.48 (0.09–2.68)	0.40
Professional videos	1.00 (0.17–5.77)	1.00
Television news videos	1.27 (0.22–7.50)	0.79
Natural cure mentioned		
Internet-based news videos	0.75 (0.17–3.41)	0.71
Professional videos	2.33 (0.54–10.14)	0.26
Television news videos	0.58 (0.06–5.51)	0.64

OR, odds ratio; CI, confidence interval.
[a]If all videos belonged to a particular category of source of video, resulting in a zero cell count in the other category, then we could not calculate the OR or the standard error, and *p*-values would not be meaningful.

study is that if we want to reach a wider audience with infectious disease prevention messages, more creative video-making might be needed. A future direction that public health professionals can consider is to collaborate with YouTube™ celebrities who have millions of online subscribers to co-develop interesting videos that educate the public about infectious disease prevention.

There are limitations to this study. The cross-sectional design could not capture the changing numbers of views and other meta-data. The cut-off point of 100 for the most popular videos was arbitrary. Our findings may not be generalizable to the less popular videos. We chose to focus on English videos; videos in other languages might have different contents. We did not code for misinformation, nor did we evaluate video quality, because these were beyond the scope of this study.

In conclusion, Lyme disease-related YouTube™ videos attracted over 10 million views. Responsible TV news reporting and innovative videos created by healthcare professionals could harness YouTube's untapped potential and facilitate health education on Lyme disease.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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