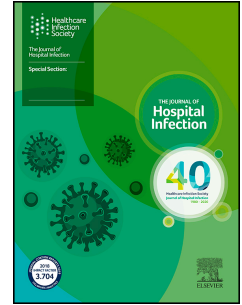


# Journal Pre-proof

YouTube and 2022 Monkeypox outbreak: opportunities for awareness and infection control

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# 1 YouTube and 2022 Monkeypox outbreak: opportunities for awareness and infection control

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## 14 15 **Conflict of interest:**

16 The authors declare no potential conflict of interest with respect to the authorship and/or  
17 publication of this article.

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19  
20 A global outbreak of human monkeypox (MPX) is concerning.<sup>1</sup> Cases have been reported in more  
21 than 40 countries, sparking widespread interest, and resulting in a possible increase in Internet  
22 searches, including video-sharing websites such as YouTube, a popular platform for streaming,  
23 saving, and uploading video content.<sup>2</sup> YouTube is one of the most popular sources because it is  
24 free and easy to access and provides essential opportunities for medical information dissemination.  
25 However, the lack of regulation over incorrect or misleading content creates significant  
26 challenges.<sup>3</sup> Previously, the use of YouTube as a source of information has been investigated for  
27 other epidemics.<sup>3-5</sup> Therefore, we analyzed the quality of available information about monkeypox  
28 from the most widely viewed YouTube videos.

29

30 On May 26, 2022, a search was conducted on the YouTube website (www.youtube.com) using the  
31 term 'monkeypox'. The 100 most viewed videos were reviewed and analyzed using the default'  
32 view count' filter. Exclusion criteria included non-English videos, duplicate videos, and videos  
33 with absent audio. Two independent reviewers classified videos as 'useful', 'misleading', or  
34 'neither', crossing-match the publications and guidelines from the CDC and the World Health  
35 Organization (WHO). The sources were classified as healthcare/public health individuals,  
36 academic/health institutions, talk shows, news agencies, or independent users. The content was  
37 categorized into six overlapping categories: epidemiology, forms of transmission, symptoms,  
38 diagnostic testing, treatment, and prognosis. An analysis of associations among the three  
39 independent variables ('misleading' videos, 'useful' videos, and 'neither' videos) was performed,  
40 and continuous and categorical variables were compared using the student t-test and Chi-square  
41 test, respectively. The statistical analysis was performed using the STATA v.14.0 software  
42 (StataCorp LP, College Station, TX).

43  
44 The videos have been watched a total of 23,000,533 times, and the number of views per video  
45 ranged between 69,556 and 1,794,685. Among the 100 videos, non-English-language videos  
46 (n = 31) and duplicates (n = 2) were excluded. A total of 67 videos were included in the study. Of  
47 these 67 included videos, 46 (68.6%) videos were classified as useful, 12 (17.9%) videos were  
48 classified as misleading, and 8 (11.9%) videos were classified as neither useful nor misleading.

49  
50 Most videos were posted by news channels (n =28, 41.7%), followed by independent users (n =14,  
51 20.8%), talk shows (n =11, 16.4%), healthcare/public health individuals (n =11, 16.4%), while  
52 only two (2.9%) of these were from academic/health institutions. Videos uploaded by  
53 healthcare/public health individuals were all classified as useful. Excluding the 'neither' videos,  
54 independent users were more likely to post misleading videos than useful videos (66.6% vs  
55 10.8%,  $p < 0.001$ ) (Table 1). Misleading videos had a higher number of likes when compared to  
56 useful videos ( $p = 0.012$ ) and the majority presented messages of conspiracy theories about the  
57 fake outbreak created by international companies to sell vaccines and that monkeypox is a disease  
58 only transmitted through sexual intercourse and it is exclusive to LGTBI people and men who have  
59 sex with men.

60

61 Previous studies have shown the association between general knowledge of infectious diseases  
62 and infection control,<sup>6</sup> although MPX is not a new disease in the world, cases are occurring in non-  
63 endemic countries, and healthcare workers also often use social media as a source of information,<sup>7</sup>  
64 YouTube is a platform with significant potential in infection control, especially in raising  
65 awareness of forms of transmission and prevention methods in the community and the hospital  
66 environment.

67  
68 Although the misinformation was only 11.9% of included videos, the risk of spread of misleading  
69 content is latent on YouTube; therefore, it should be implemented a medical misinformation policy  
70 in the early stages of the outbreak, as regulated in May 2020 for COVID-19,<sup>8</sup> with which YouTube  
71 removed the content that contradicted WHO or local health authorities' medical information.

72  
73 YouTube is an increasingly crucial source of medical information during the 2022 monkeypox  
74 outbreak and generally is a valuable source of information about monkeypox. However, the  
75 platform's open nature could quickly spread misleading content, especially those uploaded by  
76 independent users. Monitoring of YouTube content by healthcare institutions and experts could  
77 help infection control and reduce the spread of potentially harmful information in the event of  
78 further global disease outbreaks, as occurs with monkeypox.

79

## 80 **References**

- 81 **1.** Rodríguez-Morales AJ, Ortiz-Martínez Y, Bonilla-Aldana DK. 2022. What has been  
82 researched about monkeypox? A bibliometric analysis of an old zoonotic virus causing global  
83 concern. *New Microbes New Infect.* 2022:100993.
- 84 **2.** Ortiz-Martínez Y, Aristizábal-Agudelo A, Arroyo-Nisperuza Y, Niño-Mendoza J, Sotomayor-  
85 Hernández A, Moreno-Uparela S, Mendoza-Borja K. Evaluation of educational content of  
86 YouTube videos focused on hand hygiene: the need for professional communication. *J Hosp*  
87 *Infect.* 2019 Nov;103(3):356.
- 88 **3.** Li HO, Pastukhova E, Brandts-Longtin O, Tan MG, Kirchhof MG. YouTube as a source of  
89 misinformation on COVID-19 vaccination: a systematic analysis. *BMJ Glob Health.*  
90 2022;7(3):e008334.

- 91 4. Ortiz-Martínez Y, González-Ferreira F, Vega-Useche L, Álvarez-Ricardo M. Is YouTube an  
92 accurate and reliable source of yellow fever information during outbreaks? *Travel Med Infect*  
93 *Dis.* 2017;18:73-74.
- 94 5. D'Souza RS, D'Souza S, Strand N, Anderson A, Vogt MNP, Olatoye O. YouTube as a source  
95 of medical information on the novel coronavirus 2019 disease (COVID-19) pandemic. *Glob*  
96 *Public Health.* 2020;15(7):935-942.
- 97 6. Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, Tahir AH, Mashhood M.  
98 Knowledge, attitude, practice and perceived barriers among healthcare workers regarding  
99 COVID-19: a cross-sectional survey from Pakistan. *J Hosp Infect.* 2020 Jul;105(3):419-423.
- 100 7. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information  
101 on YouTube: A systematic review. *Health Informatics J.* 2015;21(3):173-94.
- 102 8. Janmohamed K, Walter N, Nyhan K, Khoshnood K, *et al.* Interventions to Mitigate COVID-  
103 19 Misinformation: A Systematic Review and Meta-Analysis. *J Health Commun.*  
104 2021;26(12):846-857.

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110 **Table 1.** Comparison of the characteristics of the monkeypox videos on YouTube is classified as  
 111 useful and misleading.

<i>Variable</i>	<b>Useful (n = 46)</b>	<b>Misleading (n = 12)</b>	<i>p</i> <b>value</b>
Number of views, median (IQR)	142,690 (98,311-192,977)	121,402 (89,108-209,078)	0.686
Number of likes, median (IQR)	4,400 (1,900-9,100)	8,950 (6,950-18,000)	<b>0.012</b>
Number of days on YouTube, median (IQR)	5 (3-6)	4 (2-6)	0.144
<b>Source</b>			
Healthcare/public health individuals, n (%)	11 (23.91%)	0 (0%)	0.097
Academic/health institutions, n (%)	2 (4.35%)	0 (0%)	1
Talk shows, n (%)	6 (13.04%)	3 (25%)	0.374
News agencies, n (%)	22 (47.83%)	1 (8.33%)	<b>0.019</b>
Independent users, n (%)	5 (10.87%)	8 (66.67%)	<b>&lt;0.001</b>
<b>Content area</b>			
Epidemiology, n (%)	40 (86.96%)	1 (8.33%)	<b>&lt;0.001</b>
Forms of transmission, n (%)	32 (69.57%)	11 (91.67%)	0.156
Symptoms, n (%)	37 (80.43%)	2 (16.67%)	<b>&lt;0.001</b>
Diagnostic testing, n (%)	5 (10.87%)	0 (0%)	0.573
Treatment, n (%)	8 (17.39%)	0 (0%)	0.185
Prognosis, n (%)	20 (43.48%)	4 (33.33%)	0.744

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