Analysis of content, credibility, and reliability of information on chronic obstructive pulmonary disease treatment in YouTube™ videos: a cross-sectional observational study

Análise de conteúdo, credibilidade e confiabilidade das informações sobre o tratamento da Doença Pulmonar Obstrutiva Crônica em vídeos do YouTube™: um estudo observacional transversal

Análisis de contenido, credibilidad y fiabilidad de la información sobre el tratamiento de la enfermedad pulmonar obstructiva crónica en vídeos de YouTube™: un estudio observacional transversal

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ABSTRACT | Chronic Obstructive Pulmonary Disease (COPD) is characterized by airway abnormalities, resulting in persistent airflow obstruction. Treatment involves pharmacological and nonpharmacological interventions which are supported by several COPD consensus and guidelines. YouTube can often be used to share information about treatments for chronic diseases like COPD; however, the credibility of such information may not be adequate. This study evaluates the reliability and credibility of information concerning COPD treatment disseminated on YouTube, the most popular social media platform, and assess its alignment with the GOLD guideline. A cross-sectional observational study was conducted to select the first 200 English-language videos on COPD treatment posted on YouTube. Video evaluation used validated instruments, including the DISCERN tool (quality assessment), the Health on the Net Foundation Code of Conduct - HONcode (credibility assessment), and the GOLD guideline (reference). Poor agreement with the GOLD guideline (97.4%) was found. HONcode assessment showed that 75.7% of the videos achieved a high credibility rating. Regarding information quality, 75.7% of the videos received positive ratings based on the DISCERN tool. Despite exhibiting adequate credibility, the analyzed videos displayed fluctuating levels of quality, ranging from medium to low.

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Moreover, there was limited consensus between the videos and the GOLD guideline. Continuous analysis of such content can be used to ensure dissemination of reliable information on YouTube.

Keywords | COPD; Videos; Treatment; Clinical Guidelines.

RESUMO | A Doença Pulmonar Obstrutiva Crônica (DPOC) é caracterizada por anormalidades das vias aéreas, resultando em obstrução persistente do fluxo aéreo. O tratamento dessa doença envolve intervenções apoiadas por vários consensos e diretrizes sobre DPOC. O YouTube pode muitas vezes ser utilizado para partilhar informações sobre o tratamento de doenças crônicas como a DPOC, no entanto a credibilidade dessa informação pode não ser adequada. Este estudo tem como objetivo avaliar a confiabilidade e credibilidade das informações relativas ao tratamento da DPOC no YouTube, a plataforma de mídia social mais popular, e avaliar seu alinhamento com a diretriz GOLD. Foi realizado um estudo observacional transversal, envolvendo a seleção dos primeiros 200 vídeos em inglês sobre tratamento da DPOC postados no YouTube. Os vídeos foram avaliados por meio de instrumentos validados, incluindo a ferramenta Discern (para avaliação de qualidade), o Health on the Net Foundation Code of Conduct – HONcode (para avaliação de credibilidade) e a diretriz GOLD (como referência). Os vídeos demonstraram baixa concordância com a diretriz GOLD (97,4%). Em relação à credibilidade, 75,7% dos vídeos obtiveram alto índice de credibilidade de acordo com a avaliação do HONcode. Quanto à qualidade da informação, 75,7% dos vídeos receberam avaliação positiva com base na ferramenta Discern. Os vídeos analisados apresentaram boa credibilidade, mas níveis variados de qualidade, variando de médio a baixo. Além disso, houve concordância limitada entre os vídeos e a diretriz GOLD. A

análise contínua de tal conteúdo pode ser utilizada para garantir o fornecimento de informações confiáveis no YouTube.

Descritores | DPOC; Vídeos; Tratamento; Diretrizes Clínicas.

RESUMEN | La enfermedad pulmonar obstructiva crónica (EPOC) se caracteriza por anomalías en las vías respiratorias que ocasionan una obstrucción persistente del flujo aéreo. El tratamiento de esta enfermedad implica intervenciones respaldadas por diversos consensos y guías sobre la EPOC. Aunque suelen utilizar YouTube para compartir información sobre el tratamiento de enfermedades crónicas como la EPOC, la credibilidad de esta información puede no ser adecuada. Este estudio tiene como objetivo evaluar la fiabilidad y la credibilidad de la información sobre el tratamiento de la EPOC en YouTube, una de las redes sociales más populares, y evaluar su alineación con la guía GOLD. Se realizó un estudio observacional transversal, que incluyó la selección de los primeros 200 vídeos en inglés, publicados en YouTube sobre el tratamiento de la EPOC. Los vídeos se evaluaron mediante instrumentos validados, como la herramienta Discern (para la evaluación de la calidad), el Código de Conducta HONcode (para la evaluación de la credibilidad) y la guía GOLD (como referencia). Los vídeos presentaron una baja concordancia con la guía GOLD (97,4%). En cuanto a la credibilidad, el 75,7% de los vídeos obtuvieron un alto índice de credibilidad según la evaluación de HONcode. En cuanto a la calidad de la información, el 75,7% de los vídeos recibieron una evaluación positiva basada en la herramienta Discern. Los vídeos evaluados tuvieron buena credibilidad, pero variados niveles de calidad, que van de mediano a bajo. Además, hubo un consenso limitado entre los vídeos y la guía GOLD. El análisis continuo de este tipo de contenido se puede utilizar para garantizar información confiable en YouTube.

Palabras clave | EPOC; Vídeos; Tratamiento; Guías clínicas.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a respiratory condition characterized by persistent and progressive airflow limitation, often accompanied by chronic inflammation of the airways due to exposure to inhaled particles and harmful gases[1,2]. COPD-affected individuals experience impaired functioning, lean mass loss, and various symptoms, including fatigue, dyspnea, and difficulty performing activities of daily living[1].

COPD treatment involves pharmacological interventions with long-term anticholinergic medications and nonpharmacological approaches aimed at improving quality of life and symptom control. Nonpharmacological

therapies like pulmonary rehabilitation include resistance and aerobic exercises, educational programs, breathing techniques, and smoking cessation guidance tailored to patients' needs[1,3].

Access to pulmonary rehabilitation programs is indeed a challenge, and several key factors contribute to this limitation, such as availability, referrals, and patient participation[4,5]. Consequently, COPD patients often turn to alternative sources of information—such as the Internet—for self-education and support[6] among which YouTube™ stands out as a popular video-sharing website[6]. Nonetheless, while the Internet offers several pieces of health information and self-care support, the lack of stringent quality control mechanisms can be a significant

concern. Such abundance of health advice online makes it challenging for individuals to discern reliable and accurate information from misleading or scientifically unfounded content[7,8].

Previous studies found that a substantial portion of the divulged content provided misleading or inaccurate information on health conditions such as rheumatoid arthritis and cerebral palsy. The potential to influence users negatively is indeed concerning[9-11], especially considering that the study focusing on videos about COPD solely addresses the number of likes and views[6]. Considering the lack of research focusing specifically on the content, credibility, and quality of COPD treatment-related information on YouTube, particularly in alignment with the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines.

This study aims to identify and evaluate the content of COPD treatment videos on YouTube, focusing on their reliability, credibility, and adherence to the guidelines.

METHODOLOGY

This cross-sectional observational study adhered to the reporting guidelines outlined in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) declaration. The study protocol was prospectively registered on the Open Science Framework (https://osf.io/adh56/) with the DOI 10.17605/OSF.IO/ADH56.

The study sample included 200 videos in English focusing on COPD treatment that individuals could perform independently. Video selection involved considering the first 200 videos found on YouTube based on research indicating that a 90% of users choose a result from the first three pages of search results. Additionally, 88% of users modify their search terms if the initial search result is not found[12].

Advertisement videos, duplicates unrelated to the study's purpose, videos focused on pulmonary rehabilitation without specifying COPD, or longer than 50 minutes were excluded. Studies have shown that shorter videos are more effective in retaining knowledge and generating interest[13,14].

Two independent trained researchers searched the videos on February 14th, 2023, using the incognito tab without logging into any browser accounts. Afterward, the browser history was cleared to avoid saved preferences influencing the results. Search terms included COPD, treatment, pulmonary rehabilitation, and exercises.

Data extraction was conducted independently by the evaluators, following a standardized checklist (Figure 1) based on the GOLD guidelines[1]. Variables included the year of publication, source (health institution and professional in the field or individuals without professional background in the area and lacking references), video quality, and audio quality.

GOLD compliance was assessed using a scoring scheme developed by the authors, who drew inspiration from the HONcode credibility analysis instrument[15]. Each item presence in a video was assigned 1 point, and the sum of these points determined the level of compliance with guidelines. Total scores were categorized as low (0 to 11 points), medium (12 to 24 points), or high agreement (25 to 34 points) (Figure 2).

Terms	
COPD	
Emphysema	1 Point
Chronic bronchitis	1 Point
Pathophysiology	
Fourth leading cause of death in the world	1 Point
Air flow limitations/breathlessness/ cough	1 Point
Harmful gases/ particles (ex: tobacco)	1 Point
Assessment	
Spirometry/ FEV1/GOLD classification	1 Point
SF-36/ CAT	1 Point
BORG	1 Point
Pharmacological treatment	
Bronchodilators/inhalers	1 Point
Anabolic hormones supplementation/steroids	1 Point
Non-pharmacological treatment	
Symptom reduction	1 Point
Improvement in functional status	1 Point
Improvement of DLA	1 Point
Reduction of costs with care of systemic manifestations	1 Point
Pulmonary rehabilitation	1 Point
Aerobic training	1 Point
Interval training	1 Point
Strength training	1 Point
Upper limbs training	1 Point
Flexibility stretch training	1 Point
Respiratory musculature training	1 Point
Spacer	1 Point
Power breathe	1 Point
Nebulizer	1 Point
Supplementary oxygen	1 Point

Figure 1. Continuation

Terms	
Noninvasive ventilation	1 Point
Breathing maneuvers and techniques	1 Point
Walking aid devices	1 Point
Self-management education	1 Point
Treatment adherence	1 Point
Smoking cessation avoid nocive particles	1 Point
Collaboration	1 Point

Figure 1. Content score (based on guidelines)

Analysis also included the number of views, likes, and comments extracted from each video. The 8-principle HONcode instrument[15] was used to assess content credibility which was considered high if a video adhered to six, seven, or eight of the mentioned principles, medium to 3 to 5 principles, and low if 0 to 2 principles (Figure 2).

The HONcode Principles	
Principle 1	Authority
	Give qualifications of author
Principle 2	Complementarily
	Information to support. not replace
Principle 3	Confidentiality
	Respect the privacy of site users
Principle 4	Attribution
	Cite the sources and date of medical information
Principle 5	Justifiability
	Justification of claims/balanced and objective claims
Principle 6	Transparency
	Accessibility, provide valid contact details
Principle 7	Financial disclosure
	Provide details of funding
Principle 8	Advertising
	Clearly distinguish advertising from editorial content

Figure 2. Health On the Net Foundation Code of Conduct (HONcode)

Information reliability was scored from 1 to 5 (reliability score), based on five questions (adapted from the DISCERN tool for assessing written health information)[16]. Higher scores indicated better content reliability[9,16]. The score obtained on the scale in each question was added, and its summation was classified from 1 to 14 points as low reliability, 15 to 19 as medium, and 20 to 25 as high reliability.

Statistical analysis

Analyses were performed using the Statistical Package for the Social Sciences Inc. (SPSS; Chicago, IL, USA; v.17). Frequency and median were used for non-normally distributed data. Spearman's correlation test was used to analyze the relationships between views, likes, and comments. The chi-squared test was used for categorical independent variables (video source, image, and audio qualities).

Cohen's Kappa coefficient was used to investigate the consistency between the two researchers based on McHugh values in compliance with guidelines, HONcode, and DISCERN[1,15,16].

RESULTS

Video characteristics

From the 200 videos sample, the following were excluded: 67 (33.5%) were duplicates, 14 (7%) were in a language other than English, and 4 (2%) exceeded 50 minutes in length. Most videos were published by health institutions and professionals in the field (76.5%). In analyzing the content of the videos, 64 (55.7%) focused on CPOD pathophysiology, 20 (17.4%) addressed questions for patient evaluation, 35 (30.4%) discussed pharmacological treatment, and 91 (79.1%) covered nonpharmacological treatment[2]. Table 1 summarizes the video characteristics.

Table 1. Video characteristics (n = 115)

Post Year	
2008	1 (0.9%)
2009	2 (1.7%)
2010	5 (4.3%)
2011	1 (0.9%)
2012	5 (4.3%)
2013	2 (1.7%)
2014	11 (9.6%)
2015	14 (12.2%)
2016	11 (9.6%)
2017	4 (3.5%)
2018	11 (9.6%)
2019	13 (11.3%)
2020	18 (15.7%)
2021	15 (13%)
2022	2 (1.7%)

(continues)

Table 1. Continuation

Post Year	
Audio quality	
Good	102 (88.7%)
Bad	13 (11.3%)
Image quality	
Good	112 (97.4%)
Bad	3 (2.6%)
Popularity	
View	31209 (6034 – 113546)
Comments	32 (105 – 1800)
Likes	441 (3.5 – 124)
Topics covered	
Pathophysiology	64 (55.7%)
Assessment	20 (17.4%)
Pharmacological treatment	35 (30.4%)
Nonpharmacological treatment	91 (79.1%)
Data presented as median (25th – 75th percentiles) and frequency (percentage)	

Cohen's Kappa coefficient values were 0.853 for the GOLD guideline, 0.630 for the HONcode instrument, and 0.613 for the DISCERN tool, suggesting a generally considerable agreement between researchers regarding video assessment.

Regarding content, the videos reached the maximum score only in the topic "terms" and "pharmacological treatment," representing 27.8 and 20.0% of videos, respectively. DISCERN yielded the highest score (17 points), followed by HONcode at 8 points (Table 2).

Table 2. Evaluation scores of included YouTube videos on COPD treatment

Scoring method	Maximum score	Highest score obtained	N and % (videos with maximum points per topic)
Content score			
Terms	3	3	32 (27.8%)
Pathophysiology	3	3	5 (4.3%)
Assessment	3	2	0 (0.0%)
Pharmacological treatment	2	2	23 (20.0%)
Non-pharmacological treatment	23	9	0 (0.0%)
DISCERN score (5 -25)	25	17	0 (0.0%)
HONcod score (0 – 16)	16	8	0 (0.0%)

Reliability, credibility, and adherence to the GOLD guidelines

Of the 115 videos included in the final sample, 112 (97.4%) showed low agreement with the guidelines, and 3 (2.6%) demonstrated medium agreement[1]. Most videos (75.7%) achieved high credibility, whereas 24.3% obtained medium credibility. As for the quality of health information, 75.7% of the videos received an average rating indicating moderate reliability, whereas 24.3% were rated as low reliability.

Table 3 presents the video scores and characteristics. Video classes or lectures had a higher content score than those produced by health professionals (p=0.021). Non-health professional videos achieved a lower HONcode score than the other sources, excepting commercial and patient videos (p<0.01). Video classes and lectures and academic videos presented a higher DISCERN score than patient and non-heath professional videos. Additionally, video classes or lectures had higher DISCERN scores than health professional videos (p<0.01). Number of comments was higher in video classes or lectures compared with medical-sourced videos (p=0.003)

Table 3. Video evaluation scores and characteristics according to source

	Video class or lecture (n = 26)	Academic (n= 10)	Medical sources (n=34)	Health professional (n=19)	Commercial (n=3)	Patients (n=5)	News media (n=9)	Non-Health professional (n=9)	P-value
Scores									
Content (0 – 34)	7.6 (6.4 – 8.9)[b]	7.9 (4.7 – 11.1)	6.4 (5.2 – 7.6)	4.4 (3.1 – 5.7)[a]	6.0 (1.7 – 10.3)	4.6 (2.0 – 7.2)	6.1 (3.3 – 8.9)	4.5 (2.3 – 6.8)	**0.021**
HONcode (0 – 16)	6.4 (5.9 – 6.8)[b]	6.6 (5.8 – 7.4)[b]	6.5 (6.2 – 6.8)[b]	5.7 (5.2 – 6.2)	7.0 (4.5 – 9.5)	5.8 (4.8 – 6.8)	6.3 (5.5 – 7.2)[b]	4.2 (3.4 – 5.1)[a]	**<0.01**
DISCERN (5 – 25)	12.5 (11.8 – 13.2)[b,d,f]	11.8 (9.9 – 13.6)[b,d]	11.1 (10.4 – 11.8)	9.2 (7.5 – 10.8)[e]	9.1 (7.5 – 10.8)	11.7 (10.2 – 13.1)[a]	6.8 (3.5 – 10.1)	9.8 (6.7 – 12.9)[c]	**<0.01**
Characteristics									
Views	193.0 (88.2 – 297.8)	179.9 (9.2 – 350.6)	828.5 (−601.0 – 2,258.1)	112.0 (24.2 – 199.8)	36.8 (−99.0 – 172.7)	32.3 (−10.6 – 75.2)	101.6 (6.7 – 196.4)	135.2 (−8.9 – 279.2)	0.74
Likes	1625.5 (525.6 – 2,725.4)	2,791.2 (−654.8 – 6,237.2)	747.1 (193.6 – 1,300.5)	708.1 (−99.5 – 1515.8)	19.5 (−113.9 – 152.9)	216.5 (−239.4 – 672.4)	152.3 (31.5 – 273.1)	732.4 (−278.6 – 1743.5)	0.44
Comments	105.9 (54.9 – 156.8)[b]	83.2 (−20.0 – 186.5)	33.3 (6.6 – 60.0)[a]	166.1 (52.9 – 279.2)	No comments	45.5 (−84.6 – 175.6)	37.4 (−15.5 – 90.3)	158.7 (13.5 – 303.8)	**0.003**

Data presented as mean (95% CI). One-way Anova or Kruskal-Wallis test. Significance p<0.05.

DISCUSSION

Our results show that the content of COPD treatment-related videos on YouTube presented adequate credibility but varied in quality from low to moderate levels. Additionally, there was little agreement with the GOLD guidelines.

In analyzing the characteristics of the 115 most viewed COPD-related videos, we noted that most published videos addressed more than one content domain, such as disease definition, etiology, diagnosis, and treatment. Easy and practical access to the information in YouTube videos allows disseminating health content to many individuals[6,17].

These findings concur with other studies that indicate that COPD patients frequently search the Internet for information about the disease, such as therapies and etiology[18].

Regarding publication source, most videos were made available by health-related channels and professionals in the field, who tended to publish mainly instructive lectures aimed at informing about COPD. This instructional approach follows current research on health education as a primary objective in the self-care of COPD patients[19,20].

Despite a high credibility rating, which indicates that health institutions mostly produce videos and provide contact details without any promotional intent, the quality of the health information in said videos was generally rated medium to low. This was due to a lack of references and clarification of the content presented according to DISCERN. Although professionals engage in sharing informative content about COPD treatment on YouTube, many of them still pass on some outdated paradigms. Since the target audience searching for this content may not be able to judge the information presented critically, the action must come from the creator to base information on criteria derived from scientific evidence, always providing references as additional material.

An important finding of the present study is that videos addressing COPD nonpharmacological treatment (79.1%) had the highest views. Seen as a non-pharmacological approach, rehabilitation promotes long-term benefits for the quality of life of COPD patients and includes specific muscle training for each individual[1,21,22]. However, most of the videos that addressed non-pharmacological therapies focused only on breathing techniques and flexibility training, rarely mentioning aerobic training, interval training, strength training, upper limb training, respiratory muscle training, and smoking cessation[22,23]. Moreover, only a few videos mentioned diagnostic and assessment guidelines that are essential for classifying patients' functional capacity and adjusting treatment accordingly[1,24].

Importantly, in the general context of treatment strategies, most YouTube videos about COPD treatment do not align with the current GOLD guideline recommendations[1]. Its use is strongly recommended

as management guidelines play a crucial role in clinical practice, providing adequate guidance for diagnosis, treatment and management of the disease. Like the study on cerebral palsy[10] and low back pain[11], many COPD videos on YouTube provide outdated or unsubstantiated information despite their intent to share knowledge.

Based on the present findings, it becomes evident the need to educate the target audience about the challenges of relying on platforms like YouTube for health information, as they may contain incomplete or unreliable content. Thus, it is crucial to promote the use of reliable, evidence-based sources. Future research should increase the reliability of videos on this platform by offering educational resources and guidance to content creators.

CONCLUSION

YouTube videos on COPD treatment present varying reliability between medium and low with little agreement with GOLD[1] guidelines despite high credibility, raising questions about how to properly improve information delivery. These findings can help raise awareness among the target audience about the challenges of seeking knowledge in platforms like YouTube, which may contain incomplete or misleading information. Promoting the use of reliable and evidence-based sources is crucial.

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