Cureus
Part of SPRINGER NATURE

Open Access Original Article

An Analysis of the Educational Quality of YouTube Videos on Transesophageal Echocardiography for Emergency Medicine: Does Popularity Predict Quality?

Review began 08/30/2026
Review ended 11/01/2026
Published 11/03/2026

© Copyright 2026
Mitina et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.119079

Alina Mitina [1], Tyler Wen [2], Kurt Hoffmeister [3], Rajasekhar Ramakrishnan [4], Di Coneybeare [5]

1. Emergency Medicine, Hackensack University Medical Center, New York, USA 2. Emergency Medicine, NewYork-Presbyterian, Columbia University Irving Medical Center, New York, USA 3. Anesthesiology, Columbia University Irving Medical Center, New York, USA 4. Biostatistics, Columbia University Irving Medical Center, New York, USA 5. Ultrasound and Medical Education, Columbia University Irving Medical Center, New York, USA

Corresponding author: Alina Mitina, alinamitina92@gmail.com

Abstract

Objective: Emergency medicine (EM) learners frequently use Free Open-Access Medical Education (FOAMED) resources, such as YouTube, to learn transesophageal echocardiography (TEE). As TEE becomes more widely used in EM, particularly during cardiac arrest, learners may rely on video popularity as a marker of educational quality. This study evaluated whether popularity correlates with educational value.

Materials and methods: A YouTube search identified 176 TEE videos, and 42 met the inclusion criteria. Popularity was measured using the Video Power Index (VPI). Three blinded experts independently evaluated videos using the Journal of the American Medical Association (JAMA) criteria, the Academic Life in Emergency Medicine (ALiEM) Approved Instructional Resources (AIR) score, and the Global Quality Score (GQS). Interrater reliability was assessed using intraclass correlation coefficients (ICCs). Spearman's rank correlation analysis examined associations between VPI and quality metrics, while Mann-Whitney U tests compared quality scores by video source.

Results: Interrater reliability was excellent for GQS (ICC 0.89), JAMA (ICC 0.91), and AIR (ICC 0.92) (all $p < 0.001$). No significant correlation was found between VPI and GQS ($\rho = -0.09$, $p = 0.62$), AIR ($\rho = -0.14$, $p = 0.40$), or JAMA ($\rho = -0.19$, $p = 0.27$). Academic/university-affiliated videos had significantly higher JAMA ($p = 0.044$) and AIR ($p = 0.042$) scores than non-academic videos. No significant difference was observed in GQS by source.

Conclusions: Video popularity does not predict educational quality for TEE content on YouTube. Academic/university-affiliated videos demonstrate higher credibility and educational value and may help EM learners identify high-quality TEE educational resources.

Categories: Emergency Medicine, Medical Education
Keywords: emergency medicine physician, online medical education, point-of-care-ultrasound, research in emergency medicine, social media analytics

Introduction

Social media encompasses a wide range of digital platforms that facilitate interaction among users, allowing for the creation, sharing, exchange, and discussion of content within virtual communities and networks [1]. The rise of social media has significantly transformed how the new generation of healthcare professionals access educational resources, giving rise to the concept of Free Open-Access Medical Education (“FOAM” or “FOAMED”). FOAMED emerged as a collaborative, evolving collection of open-access medical education resources that provides globally accessible, crowdsourced, contextual, and asynchronous content to supplement traditional educational methods [2]. The integration of social media into emergency medicine (EM) residency programs has also grown substantially over the years. A 2016 survey highlighted the significant use of asynchronous education among medical students pursuing surgery, surgical residents, and attendings in the United States [3], a trend that accelerated during the COVID-19 pandemic [4-6]. Ultrasound education, in particular, is well suited to online platforms because videos demonstrating techniques and imaging findings can be easily created and shared, making them effective tools for conveying inherently visual information [7]. YouTube (YouTube, LLC, San Bruno, CA) has risen to prominence as one of the most commonly used sources of FOAMED and has become an increasingly important educational resource across undergraduate, graduate, and continuing medical education [5,8-9]. However, unlike peer-reviewed journals or textbooks, much social media content lacks rigorous quality control, raising concerns about its accuracy, reliability, and educational value [10].

Recently, transesophageal echocardiography (TEE) has gained increasing attention in EM. In 2023, the

American College of Emergency Physicians released a framework for TEE in the emergency department (ED) [11]. TEE offers several advantages over traditional transthoracic echocardiography (TTE) during patient resuscitation, including minimizing interruptions in chest compressions, providing real-time feedback on compression effectiveness, identifying conditions such as fine ventricular fibrillation or pseudo-pulseless electrical activity, and providing procedural guidance [12]. YouTube is one of the top platforms used in ultrasound fellowships to consume and disseminate information [7].

Educational videos on YouTube, like other forms of social media content, lack standardized quality assessment. Without quality metrics, learners must select videos based on readily available data such as the number of views and likes. However, while YouTube offers numerous videos with thousands of likes and views on TEE, it remains unclear whether these videos are educational and reliable for their viewers.

In this study, our objective was to investigate whether the popularity of YouTube videos on TEE correlates with their quality as educational resources for EM ultrasound learners. By addressing this question, we aim to highlight the benefits and potential pitfalls of relying on online content for this emerging technology (TEE), which is increasingly used in EDs, and to offer guidance for quickly discerning and selecting high-quality videos.

This study was previously presented as a research poster at the Society for Academic Emergency Medicine (SAEM) Annual Meeting in Atlanta, Georgia, in May 2026.

Materials And Methods

Study design

This was a cross-sectional observational study evaluating the association between YouTube video popularity, measured using the Video Power Index (VPI), and educational quality, assessed using the Journal of the American Medical Association (JAMA) benchmark criteria, Academic Life in Emergency Medicine (ALiEM) Approved Instructional Resources (AIR) score, and Global Quality Score (GQS), among videos related to TEE.

Scoring tools

Measuring Popularity

We used the VPI to represent popularity. First described by Erdem et al. [13], the VPI is calculated as follows: $\frac{\text{view ratio} \times \text{like ratio}}{100}$, where the view ratio and like ratio are calculated as follows: $\frac{\text{likes} \times 100}{\text{likes} + \text{dislikes}}$. The VPI accounts for audience engagement through the number of views over time and overall audience approval, measured by the ratio of likes to dislikes. Views and likes are readily available on the YouTube page when viewing a video. Because YouTube no longer publicly displays dislike counts, they were obtained using the YouTube Dislike Viewer (https://v2.jabrek.net/yt-dislikes/). View counts, like counts, and estimated dislike counts were collected at the time of data extraction and used to calculate the VPI for each video.

Measuring Quality

After a review of the literature on previously established measures of quality for FOAMED resources, the study team chose three separate measurements of quality: (1) JAMA score; (2) ALiEM AIR score; and (3) GQS. Score metrics for each quality measure can be found in the Appendices.

JAMA Score

Developed by Silberg et al. [10], the JAMA score consists of four criteria, each assigned one point if met, resulting in a total score ranging from 0 to 4. These criteria assess the credibility and transparency of health-related online information, focusing on authorship, source attribution, conflict-of-interest disclosure, and information currency. By evaluating content authorship and source attribution, the JAMA benchmarks help assess the credibility and transparency of online health information.

AIR Score

The team behind ALiEM, a group of nationally recognized educators, developed the AIR score. The AIR score provides a structured method for evaluating FOAMED resources and helps clinicians identify potential biases or inaccuracies. In this study, the revised AIR scoring tool was used without modification. The scoring system consists of six questions, each rated on a scale from 0 to 2 [14]. The AIR score measures the educational value and trustworthiness of medical information shared through social media platforms.

Although the AIR tool was not developed specifically for YouTube videos, it was designed to appraise freely accessible online medical education and assess characteristics relevant to YouTube-based educational content, including educational utility, evidence-based content, and overall quality. Therefore, it was considered applicable for evaluating the educational value and trustworthiness of the YouTube videos included in this study.

GQS

The GQS assesses the overall quality and flow of each video. Resources are rated on a scale between 1 and 5 [15]. The GQS measures the presentation quality of the video based on its flow, structure, and ease of understanding.

Study setting

We performed a systematic search on Google for YouTube videos using the terms “transesophageal echocardiography OR TEE” AND “emergency medicine OR EM OR ED” on March 1, 2025. Search results were reviewed in the order presented by Google, without applying additional sorting or filtering criteria. Results that did not link to YouTube videos were excluded.

Population/video selection

The YouTube video search was conducted using an incognito browser window without logging into any Google or YouTube account to minimize the influence of prior search history, cookies, and account-based personalization. All available search result pages were reviewed. The search yielded 176 videos, all of which AM and DC independently screened for relevance. Of these, 119 were excluded as unrelated to TEE, including videos focusing on TTE, and 15 were excluded for being non-English, leaving 42 videos for the final analysis (Figure *1*). The two reviewers resolved disagreements about video eligibility through discussion and consensus. Although incognito browsing was used to minimize personalization, geographic location may still have influenced the search results generated by Google's algorithm.

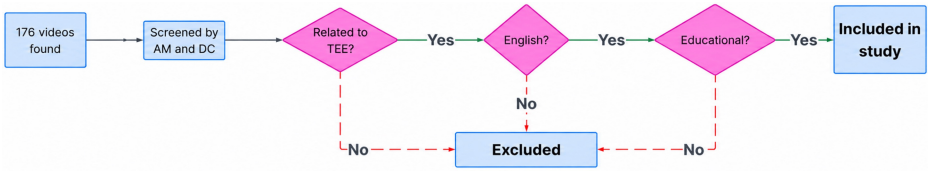


FIGURE 1: Flowchart of YouTube video screening and selection for study inclusion

Study protocol

TW downloaded each included video as a separate file and extracted VPI data (view counts, like counts, and estimated dislike counts), along with the video source, categorized as academic/university-affiliated or non-academic. Academic/university-affiliated videos were defined as those uploaded by recognized academic institutions, universities, or affiliated medical centers. Non-academic videos included content uploaded by industry-sponsored organizations, special interest groups, or commercial entities. Three independent raters (AM, DC, and KH), blinded to the VPI scores, evaluated each video using the JAMA, AIR, and GQS scoring systems. The three raters included an emergency ultrasound faculty member with a focused practice designation in Advanced Emergency Medicine Ultrasound (AEMUS), an AEMUS fellow, and a cardiac anesthesiologist. Prior to formal scoring, the three raters jointly viewed and rated two TTE YouTube videos to calibrate scoring interpretation and establish a shared understanding of each quality scale. Raters then independently scored all included TEE videos.

Data analysis

Descriptive statistics were used to summarize the quality scores of the included videos. Interrater reliability was assessed using intraclass correlation coefficients (ICCs) with 95% confidence intervals, calculated using a two-way random-effects model for absolute agreement based on single measurements. Correlations between quality metrics (JAMA, AIR, and GQS) and between quality metrics and VPI were evaluated using Spearman rank correlation analysis. Differences in quality scores by video source category (academic/university-affiliated vs. non-academic) were compared using the Mann-Whitney U test. All statistical analyses were performed using SPSS Statistics (IBM Corp. IBM SPSS Statistics for Windows. Armonk, NY).

Results

Of the 42 videos scored for quality, the mean JAMA score was 1.43 ± 1.19, with a median of 1.33 (IQR 2.00; range 0.00-3.67). The mean GQS score was 2.94 ± 1.22, with a median of 3.00 (IQR 2.00; range 1.00-5.00). The mean AIR score was 6.24 ± 3.51, with a median of 6.33 (IQR 5.17; range 0.67-12.00).

Interrater reliability among the three raters demonstrated excellent agreement across all quality metrics. The ICC was 0.89 for GQS (95% CI, 0.81-0.94; $p < 0.001$), 0.91 for JAMA (95% CI, 0.84-0.95; $p < 0.001$), and 0.92 for AIR (95% CI, 0.87-0.96; $p < 0.001$).

Spearman correlation analysis demonstrated strong positive relationships among all quality metrics. JAMA and AIR scores were highly correlated ($\rho = 0.93$, $p < 0.001$), as were AIR and GQS scores ($\rho = 0.91$, $p < 0.001$), with a slightly lower but still strong correlation between JAMA and GQS scores ($\rho = 0.80$, $p < 0.001$).

Spearman correlation analysis showed no significant association between video popularity, as measured by the VPI, and educational quality. Specifically, VPI showed no significant correlation with GQS ($\rho = -0.09$, $p = 0.62$), AIR score ($\rho = -0.14$, $p = 0.40$), or JAMA score ($\rho = -0.19$, $p = 0.27$).

Regarding video source, 18 videos were from academic/university-affiliated sources, whereas 24 were from non-academic sources. Table *1* shows mean and median scores by video source. For JAMA scores, academic/university-affiliated videos had a mean of 1.83 ± 1.02 and a median of 1.83 (IQR 1.33; range 0.00-3.33), compared with 1.13 ± 1.25 and a median of 0.67 (IQR 2.25; range 0.00-3.67) for non-academic videos.

Score	Source	Mean ± SD	Median	IQR	Range
JAMA	Academic	1.83 ± 1.02	1.83	1.33	0.00-3.33
	Non-academic	1.13 ± 1.25	0.67	2.25	0.00-3.67
GQS	Academic	3.28 ± 1.19	3.17	1.42	1.00-5.00
	Non-academic	2.69 ± 1.20	2.83	1.58	1.00-4.67
AIR	Academic	7.43 ± 3.55	7.50	4.33	0.67-12.00
	Non-academic	5.35 ± 3.27	4.67	4.00	1.00-12.00

TABLE 1: Average quality scores by video source across evaluation metrics

Academic/university-affiliated (n = 18), non-academic (n = 24)

AIR: Approved Instructional Resources, GQS: Global Quality Score, IQR: interquartile range, JAMA: Journal of the American Medical Association, SD: standard deviation

For GQS, academic/university-affiliated videos had a mean of 3.28 ± 1.19 and a median of 3.17 (IQR 1.42; range 1.00-5.00), compared with 2.69 ± 1.20 and a median of 2.83 (IQR 1.58; range 1.00-4.67) for non-academic videos.

For AIR scores, academic videos had a mean of 7.43 ± 3.55 and a median of 7.50 (IQR 4.33; range 0.67-12.00), compared with 5.35 ± 3.27 and a median of 4.67 (IQR 4.00; range 1.00-12.00) for non-academic videos.

Overall video quality, as measured by GQS scores, did not differ significantly between academic/university-affiliated and non-academic videos (Mann-Whitney $U = 158.0$, $Z = -1.48$, $p = 0.138$). However, academic/university-affiliated videos showed significantly higher credibility and educational quality than non-academic sources. These videos achieved higher JAMA scores ($U = 137.5$, $Z = -2.01$, $p = 0.044$) and AIR scores ($U = 136.0$, $Z = -2.04$, $p = 0.042$).

Discussion

Medical learners increasingly report YouTube as a primary source of educational information [3]. To our knowledge, this is the first study to evaluate the quality of YouTube videos on TEE. Our study demonstrated excellent interrater reliability among the three reviewers, suggesting that the JAMA, AIR, and GQS scoring tools can be applied consistently when evaluating FOAMED content. We chose three complementary quality measures to capture the multiple facets of educational value. All three quality measures correlated highly with each other. Overall, the quality scores indicated considerable room for improvement in the educational quality of YouTube videos on TEE.

We found no correlation between video popularity, as measured by the VPI, and credibility (JAMA),

educational quality (AIR), or overall video structure (GQS). These findings align with prior literature showing a poor correlation between video popularity and educational quality [16]. Learners who rely on view counts or likes to identify educational material may therefore be misled or, at best, waste valuable time [17]. Research on YouTube CPR videos found that their content was insufficient when compared with official guidelines and identified videos from healthcare institutions as more reliable sources of information [18].

However, in the absence of readily available quality indicators, viewers may rely on publicly displayed engagement metrics, such as likes and views, to judge video quality. Moreover, even a relatively niche topic such as emergency and resuscitative TEE presented an overwhelming number of choices, highlighting the need for a quick and reliable proxy for quality. This led us to evaluate whether video quality differed according to the source of the content.

Academic/university-affiliated videos outperformed non-academic sources in measures of credibility and educational rigor, achieving significantly higher JAMA and AIR scores. However, no statistically significant difference was observed in GQS scores, which assess video flow and ease of understanding. Therefore, while academic affiliation may serve as an initial indicator of credibility and educational value, it does not guarantee overall video quality. This aligns with a previous systematic review, which found that videos produced by academic physicians scored higher on average [19].

However, despite having higher quality scores, academic/university-affiliated videos demonstrated variability in quality [19]. An examination of the mean and median scores of academic/university-affiliated TEE videos also revealed considerable variability in educational quality. While the video source may provide a quick selection guide, it is not an infallible indicator of quality. As online medical education continues to expand, there is a growing need for scalable, objective methods to help users identify resources without depending on potentially misleading social media metrics.

One potential solution is to develop a standardized YouTube quality certification system that clearly labels vetted educational content for learners at the point of viewing. However, human screeners require substantial resources and time to curate and score content. Many criteria used in quality assessment, particularly those included in the JAMA score, involve readily identifiable information, such as authorship, attribution, and disclosures, that can be evaluated without content experts. Future studies could investigate the use of AI algorithms to screen FOAMED resources and assess their educational quality. AI algorithms have already demonstrated the ability to analyze more complex video-quality metrics and could provide a means of assessing educational quality with reduced human effort [20].

Limitations

This cross-sectional design represents a snapshot of YouTube content at a single time point; video metrics and platform algorithms are dynamic, and popularity and rankings may change over time. Our search strategy was limited to specific search terms, which may have excluded relevant content. The sample size was relatively small (42 videos), which may have limited statistical power. Although we used incognito browsing to minimize personalization, geographic location may still have influenced the search results generated by Google's search algorithm, potentially introducing selection and search bias. Additionally, using third-party estimates of YouTube dislike counts may introduce uncertainty about the accuracy and reproducibility of VPI calculations. Although the revised AIR assessment instrument was developed to evaluate FOAMED resources, its applicability to educational videos may be limited.

Conclusions

In this cross-sectional analysis of YouTube videos on TEE for EM learners, video popularity did not correlate with credibility, educational value, or overall video quality. Although engagement metrics such as views and likes are highly visible, they appear to be unreliable indicators of educational rigor.

Academic/university-affiliated videos showed higher JAMA and AIR scores; however, GQS scores did not differ significantly. These findings suggest that academic affiliation may be associated with certain measures of educational quality and may be a useful initial guide for rapid selection of high-quality content. As FOAMED resources continue to expand, future research should explore objective approaches, including the development of platform-based quality certification systems, to help learners identify trustworthy educational material.

Appendices

JAMA score

Rater 1

Rater 2

Rater 3

Name of video: _____

For each criterion, select 0 (Not Present) or 1 (Present).

1. Authorship
Authors and contributors, their affiliations, and relevant credentials should be provided.

0 = Not present

1 = Present

2. Attribution
References and sources for all content should be listed clearly, and all relevant copyright information noted.

0 = Not present

1 = Present

3. Disclosure
Website ownership should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, or commercial funding.

0 = Not present

1 = Present

4. Currency
Dates that content was posted and updated should be indicated.

0 = Not present

1 = Present

Total JAMA Benchmark Score: ____ / 4

AIR score

Rater 1

Rater 2

Rater 3

Name of video: _____

1. How much does this article impact clinical practice?

0 = Would not change clinical practice

1 = Would change clinical practice for some clinicians

2 = Would change practice for most clinicians

2. How concerned are you about the accuracy of this article?

0 = Extremely concerned about inaccuracies

1 = Somewhat concerned about inaccuracies

2 = Not at all concerned about inaccuracies

3. What is the educational value of this article for residents?

0 = Not at all valuable for clinicians

1 = Somewhat valuable for clinicians

2 = Extremely valuable for clinicians

4. Does this article reflect the practice of evidence-based medicine?

0 = Not at all evidence based

1 = Somewhat evidence based

2 = Extremely evidence based

5. Is the literature cited?

0 = None

1 = References are cited

2 = References are cited inline with the text

6. Are the authors clearly listed?

0 = The author is named without credentials, no author is named, or a pseudonym is used

1 = The author is named and the credentials are listed

2 = The author is named, credentials are listed, and conflicts of interest are disclosed

Total AIR Score: ____ / 12

GQS score

Rater 1

Rater 2

Rater 3

Name of video: _____

Quality of the video

Select the score that best represents the overall quality, flow, and usefulness of the video.

1 = Poor quality: Poor flow, and most information is missing

2 = Generally poor quality: Some information is given but is of limited use

3 = Moderate quality: Some important information is adequately discussed

4 = Good quality: Most relevant information is covered

5 = Excellent quality: Excellent quality and flow; very useful for physicians

GQS Score: ____ / 5

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Alina Mitina, Di Coneybeare

Acquisition, analysis, or interpretation of data: Alina Mitina, Tyler Wen, Kurt Hoffmeister, Rajasekhar Ramakrishnan, Di Coneybeare

Drafting of the manuscript: Alina Mitina, Di Coneybeare

Critical review of the manuscript for important intellectual content: Alina Mitina, Tyler Wen, Kurt Hoffmeister, Rajasekhar Ramakrishnan, Di Coneybeare

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Kaplan AM, Haenlein M: Users of the world, unite! The challenges and opportunities of social media . Bus Horiz. 2010, 53:59-68. 10.1016/j.bushor.2009.09.003
2. FOAM. (2018). Accessed: February 22, 2023: https://litfl.com/foam-free-open-access-medical-education/.
3. Rapp AK, Healy MG, Charlton ME, Keith JN, Rosenbaum ME, Kapadia MR: YouTube is the most frequently used educational video source for surgical preparation. J Surg Educ. 2016, 73:1072-6. 10.1016/j.jsurg.2016.04.024
4. Baldwin CS, DeMarinis AR, Singh NP, Khoury CA: Evaluation of emergency medicine residency programs' use of social media in the setting of the COVID-19 pandemic. J Am Coll Emerg Physicians Open. 2022, 3:12637. 10.1002/emp2.12637
5. Katz M, Nandi N: Social media and medical education in the context of the COVID-19 pandemic: scoping review. JMIR Med Educ. 2021, 7:25892. 10.2196/25892
6. Scott KR, Hsu CH, Johnson NJ, Mamtani M, Conlon LW, DeRoos FJ: Integration of social media in emergency medicine residency curriculum. Ann Emerg Med. 2014, 64:396-404. 10.1016/j.annemergmed.2014.05.030
7. Amini R, Wang JB, Trueger NS, Hoyer R, Adhikari S: Use of social media in emergency ultrasound fellowship programs. AEM Educ Train. 2017, 1:27-33. 10.1002/aet2.10005
8. Sutherland S, Jalali A: Social media as an open-learning resource in medical education: current perspectives. Adv Med Educ Pract. 2017, 8:369-75. 10.2147/AMEP.S112594
9. Curran V, Simmons K, Matthews L, Fleet L, Gustafson DL, Fairbridge NA, Xu X: YouTube as an educational resource in medical education: a scoping review. Med Sci Educ. 2020, 30:1775-82. 10.1007/s40670-020-01016-w
10. Silberg WM, Lundberg GD, Musacchio RA: Assessing, controlling, and assuring the quality of medical information on the Internet: caveant lector et viewor—let the reader and viewer beware. JAMA. 1997, 277:1244-5.
11. Use of transesophageal echocardiography (TEE) in the ED for shock, cardiac arrest, and procedural guidance. (2023). https://www.acep.org/member-sign-in?ReturnUrl=%2Fsiteassets%2Fnew-pdfs%2Fpolicy-statements%2Fuse-of-transesophogeal-e....
12. Teran F, Dean AJ, Centeno C, Panebianco NL, Zeidan AJ, Chan W, Abella BS: Evaluation of out-of-hospital cardiac arrest using transesophageal echocardiography in the emergency department. Resuscitation. 2019, 137:140-7. 10.1016/j.resuscitation.2019.02.013
13. Erdem MN, Karaca S: Evaluating the accuracy and quality of the information in kyphosis videos shared on YouTube. Spine (Phila Pa 1976). 2018, 43:1334-9. 10.1097/BRS.0000000000002691
14. Grock A, Jordan J, Zaver F, et al.: The revised Approved Instructional Resources score: an improved quality evaluation tool for online educational resources. AEM Educ Train. 2021, 5:10601. 10.1002/aet2.10601
15. Bernard A, Langille M, Hughes S, Rose C, Leddin D, Veldhuyzen van Zanten S: A systematic review of patient inflammatory bowel disease information resources on the world wide web. Am J Gastroenterol. 2007, 102:2070-7.
16. Azer SA, Algrain HA, AlKhelaif RA, AlEshaiwi SM: Evaluation of the educational value of YouTube videos about physical examination of the cardiovascular and respiratory systems. J Med Internet Res. 2013, 15:241. 10.2196/jmir.2728
17. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK: Healthcare information on YouTube: a systematic review. Health Informatics J. 2015, 21:173-94. 10.1177/1460458213512220
18. Katipoğlu B, Akbaş İ, Koçak AO, Erbay MF, Turan Eİ, Kasali K: Assessment of the accuracy of cardiopulmonary resuscitation videos in English on YouTube according to the 2015 AHA resuscitation guidelines. Emerg Med Int. 2019, 2019:1272897. 10.1155/2019/1272897
19. Helming AG, Adler DS, Keltner C, Igelman AD, Woodworth GE: The content quality of YouTube videos for professional medical education: a systematic review. Acad Med. 2021, 96:1484-93. 10.1097/ACM.0000000000004121
20. Huh H, Park JJ: Beyond computer-aided diagnosis: artificial intelligence as a "digital mentor" for POCUS image acquisition and quality assurance: a narrative review. Diagnostics (Basel). 2026, 16:858. 10.3390/diagnostics16060858