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Comprehensiveness and Reliability of YouTube as an Information Portal for Lumbar Spinal Fusion: A Systematic Review of Video Content

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ABSTRACT

Background: YouTube is a readily accessible, non–peer-reviewed video-based platform serving as a major source of online medical information presently. The aim of the current article is to analyze the comprehensiveness and reliability of the videos related to lumbar spinal fusion available on YouTube.

Methods: A YouTube search was conducted to analyze videos on lumbar spinal fusion using the search terms *lumbar fusion*, *spinal fusion*, and *lumbar interbody fusion*. Consequently, 107 videos met the inclusion criteria and were short-listed. Videos were analyzed for video information data, including views, likes and dislikes, views per day, likes per day and likes per view, and reliability and comprehensiveness scores.

Results: Of the 107 videos included in the study, a majority (75.7%) were found to be *poor* in comprehensiveness. There was no correlation found between video information data and reliability and comprehensiveness scores.

Conclusions: Patients browsing YouTube for additional medical information on lumbar spinal fusion will be presented with large volumes of poor-quality data with a majority of videos lacking important preoperative and postoperative information.

Clinical Relevance: The current study provides both patients and physicians with an opportunity to understand the limitations of online content on lumbar spinal fusion available on YouTube. This knowledge about online medical information may further enhance the quality of patient-physician interaction and understanding.

Level of Evidence: 5.

Other & Special Categories

Keywords: Internet, YouTube, spinal fusion, spine surgery, reliability, online medical information

INTRODUCTION

Lumbar spinal fusion surgery has seen an exponential rise in the past few decades. The volume of elective spinal fusion surgeries in the United States has increased from 122 679 cases (60.4 per 100 000) in 2004 to 199 140 (79.8 per 100 000) in 2015 with a 177% rise in the aggregate hospital cost.[1] This can be attributed to several factors, such as increased life expectancy and patient expectations, improved anesthetic techniques and perioperative management making surgeries possible even in the presence of multiple comorbidities, and minimally invasive and endoscopic techniques improving surgical outcomes and leading to faster recovery.[2–4]

Rapid and dynamic technological advancements in telecommunication have made the Internet an inexpensive and popular source of medical information. Recent cross-sectional surveys and trends demonstrate that up to 60%–80% of American patients access the Internet for medical information.[5,6] Moreover, 82% of these patients were found to have seldom or never discussed the information received from the Internet with their physician with two-thirds claiming to have made a health decision influenced by the information they found online.[7] YouTube is a popular, unrestricted, and non–peer-reviewed site for short videos with a large viewership and forms a major medium for dissemination of online health information. However, the health information available on it is seldom reliable or accurate and is often incomplete.[8] Misinformation or incomplete information may jeopardize the physician-patient relationship and add to preexisting stress and anxiety. While several studies have reviewed media content on YouTube for various

Table 1. DISCERN criteria[9] for reliability (1 point for each item; a total of 5 points).

Item	Criteria
1	Are aims clear and achieved?
2	Are reliable sources of information used? (published articles cited, a specialist's opinion)
3	Is information presented balanced and unbiased?
4	Are additional sources of information listed for patient reference?
5	Are areas of uncertainty addressed?

medical conditions, none have thus far specifically analyzed the content related to lumbar spinal fusion. It is the need of the hour that both physicians and patients be cognizant of the quality, accuracy, and reliability of the YouTube content available on the subject. In this study, we have analyzed the comprehensiveness and reliability of the videos related to lumbar spinal fusion available specifically on YouTube.

MATERIALS AND METHODS

A YouTube search was conducted on April 9, 2020, for analyzing videos pertaining to lumbar spinal fusion using search terms *lumbar fusion*, *spinal fusion*, and *lumbar interbody fusion*. Results were sorted according to relevance; caution was taken to use a Web browser without preexisting saved videos or *cookies* to conduct the search. The first 50 search results for each of the search terms were included and saved. Videos that were in languages other than English not pertaining to lumbar spinal fusion, exclusively containing information on physical or mental rehabilitation, or without audio or captions were excluded. Moreover, videos in multiple parts or common to all 3 search terms were counted as a single entry.

The data on each video were collected by 3 reviewers (PA, JRS, and SM) under 2 subsections. JRS collected the video information data for each video. Primary data comprised the duration, year of upload, country, type, target audience, views, and likes and dislikes, and secondary data included days since upload, views per day, likes per day, and likes per view calculated from primary data. PA and SM independently reviewed all the selected videos and rated them for reliability according to the DISCERN scoring criteria[9] (Table 1) and comprehensiveness using a novel scoring system (Table 2). This new scoring system was adapted by 2 fellowship-trained spine surgeons from similar articles in the literature to make it more relevant for lumbar spinal fusion surgery.[7] The videos were given reliability and comprehensiveness scores out of 5 and 12 points, respectively. All videos were further grouped into 3 categories—*good* (9–12), *average* (4–8), and *poor* (0–3) based on their comprehensiveness scores. In a case of conflicting scores between the 2 observers, an average of both the scores was used.

Categorical and continuous data were expressed as frequencies or percentages and mean, respectively. Primary and secondary video information data were calculated as the mean of each group and compared using the Kruskal-Wallis test. Also, the Spearman correlation test was used to find correlations between video information data and comprehensiveness and reliability scores. A P value less than 0.05 was taken as significant. All statistical analysis was done using IBM SPSS Statistics version 20 (IBM, Chicago, Illinois).

RESULTS

Of the 150 short-listed videos (50 with each search terms), 43 were excluded for reasons such as

Table 2. Checklist for rating comprehensiveness (out of a total of 12 points).

Item	No. of Points
Section A: Preoperative education	
Discussion of nonoperative options	1
Discussion on the concept of spinal fusion	1
Discussion of indications for surgery	1
Preoperative preparation	1
Section B: Surgical	
Discussion of patient positioning and type of anesthesia	1
Discussion of surgical procedure and techniques	1
Discussion of instrumentation used for spinal fusion	1
Discussion of open vs minimally invasive vs endoscopic	1
Section C: Postsurgical	
Discussion of postoperative mobilization and/or physiotherapy and rehabilitation	1
Discussion on functional outcome (improved mobility, pain, quality of life, and so forth)	1
Discussion on possible complications including but not limited to (infection, cerebrospinal fluid leak, pseudoarthrosis, nerve or sac injury, implant failure, venous thromboembolism, resurgery)	0.5 each, for a maximum of 2 points

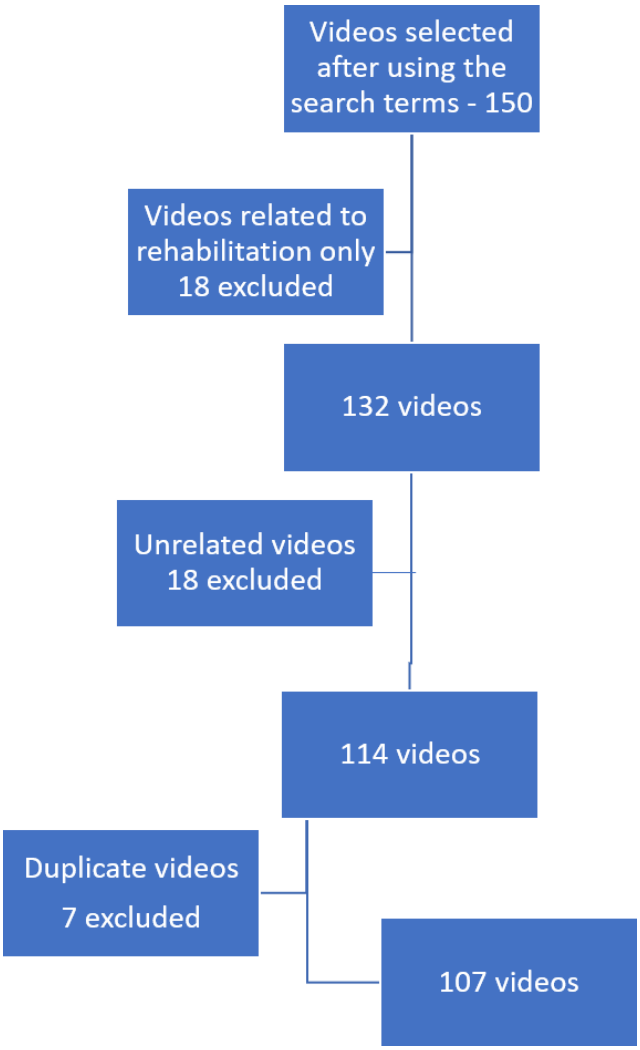

Figure 1. Flowchart depicting search methodology for inclusion of videos.

duplication, irrelevance, and others as mentioned above (Figure 1). A total of 107 (n = 107) videos were finally analyzed for video information data, reliability, and comprehensiveness.

Video Information Data

A majority of the videos were produced in the United States (99 out of 107). Other countries contributing to the list included India (3), Hong Kong (2), Switzerland (1), Cyprus (1), and Egypt (1) (Figure 2). Nonphysician and physician educational videos comprised 52 and 38 videos, respectively, while the remaining videos were testimonials (14), advertisements (1), or news videos (2) (Figure 3). With respect to the target audience, 62 videos were patient oriented, whereas 45 were physician oriented. The average number of views per video were 85 616, and the total number of views was

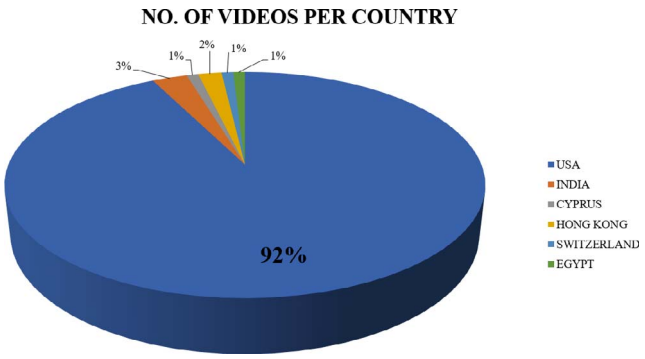

Figure 2. Country-wise distribution of videos.

9 160 979. The average number of "likes" was found to be 328.06 per video (range 0–9400), while the average number of dislikes was found to be 25.03 per video (range 0–512). The average duration for each video was 9.33 minutes (range 00.40–59.43 minutes). Secondary data were derived using this primary video information data. The mean number of views per day, likes per day, and likes per view was found to be 46.19, 0.18, and 0.005 per video, respectively.

Reliability

The interrater agreement for rating reliability of the videos using the DISCERN score was found to be good (weighted kappa 0.84; confidence interval [CI] 0.79–0.89) between the 2 observers. The mean reliability score was found to be 1.63 ± 1.1 out of 5.

Comprehensiveness

The interrater agreement between the 2 observers was found to be good (weighted kappa 0.86; CI 0.81–0.91) for rating comprehensiveness of the videos using the comprehensiveness rating checklist. The mean comprehensiveness score was found to be 2.82 ± 2.2 out of 12. On subdividing the videos according to their comprehensiveness scores, 81

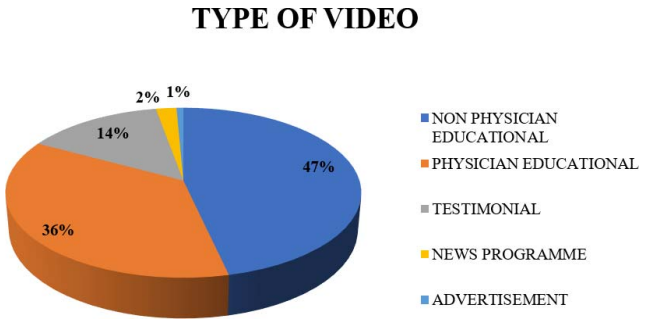

Figure 3. Type-wise distribution of videos.

Table 3. Video information data and reliability scores for the included videos and comparison between the 3 categories of videos.

					Comparison (*P* Value)		
	Total	Poor: 81	Average: 23	Good: 3	Poor vs Average	Average vs Good	Poor vs Good
Views (min-max)	85 616 (19–1 648 021)	82 729 (19–1 075 480)	100 634 (133–1 648 021)	75 607 (1332–212 177)	—	—	—
Likes (min-max)	328.06 (0–9400)	326.48 (0–9400)	328 (1–4900)	359 (6–1032)	—	—	—
Dislikes (min-max)	25.03 (0–512)	24.27 (0–512)	27.77 (0–450)	22.66 (2–630)	—	—	—
Views per day (±SD)	46.19 [(±115.82)	46.34 (±116.6)	34.86 (±98.8)	128.91 (±218.2)	.66	.19	.24
Likes per day (±SD)	0.18 (±0.5)	0.18 (±0.63)	0.12 (±0.30)	0.62 (±1.06)	.65	.06	.24
Likes per view (±SD)	0.005 (±0.006)	0.004 (±0.0009)	0.005 (±0.005)	0.005 (±0.006)	.08	1.0	.19
Reliability (±SD)	1.63 (±1.1)	1.34 (±0.9)	2.52 (±1.0)	2.66 (±1.1)	<.0001	.82	.01

videos were found to be poor (75.7%), while 23 and 3 videos were found to be average (21.4%) and good (2.8%), respectively. Further primary and secondary video information data for each group were analyzed separately. There was no significant difference between the 3 groups with respect to secondary video information data, including views per day, likes per day, and likes per view. However, reliability scores of the *poor* group were significantly less than the *average* and *good* groups (Table 3). On further analyzing the content of the videos, adequate preoperative content (score in the first section ≥ 3) was discussed in only 6 videos, while 31 videos were found to have no information on preoperative preparation and nonoperative management (score in the first section $= 0$). Similarly, adequate intraoperative and postoperative content (scores in sections 2 and $3 \geq 3$) was discussed in 15 and 4 videos, respectively, while 35 and 66 videos had no intraoperative or postoperative information (scores in sections 2 and $3 = 0$), respectively (Figure 4). Finally, on correlation analysis, none of the video information data variables were found to have any correlation with reliability or comprehensiveness scores (Table 4).

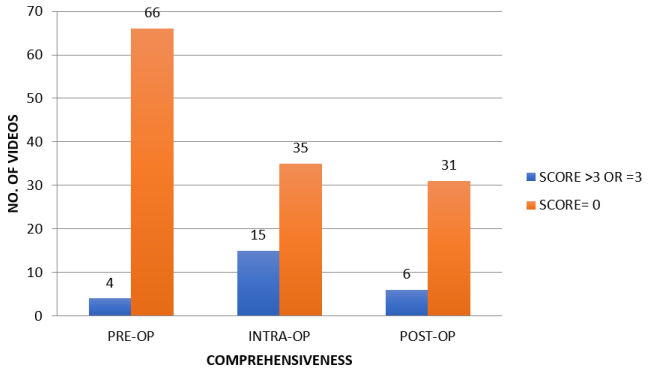

Figure 4. Section-wise distribution of videos (good: score more than or equal to 3 in a section; poor: score equal to 0 in a section).

DISCUSSION

YouTube is an accessible, non–peer-reviewed video-based platform serving as a major source of online medical information presently. However, the quality and reliability of the medical information available on YouTube is questionable across various medical and surgical conditions.[7,10–13] In a systematic review analyzing the available articles providing medical information on the Internet, Eysenbach et al[8] concluded that quality is a major concern in 70% of articles. Regarding spine surgery, 3 articles were found to have evaluated YouTube content on lumbar discectomy, scoliosis, and anterior cervical discectomy and fusion. All 3 articles reported the quality of content on YouTube to be poor.[14–16] This article evaluates the reliability and comprehensiveness of the available content on YouTube pertaining to lumbar spinal fusion and has found results comparable to preexisting literature.

The included videos were found to have considerable viewership; however, their reliability and comprehensiveness were found to be rather poor. About three-fourths of the videos were categorized as *poor* based on their comprehensiveness scores, whereas only 3 videos were categorized as *good*, suggesting major lacunae in the information provided by these videos on lumbar spinal fusion. The top 3 videos rated as *good* in comprehensiveness

Table 4. Correlation of video information data variables with reliability and comprehensiveness.

	Reliability *r* (*P* Value)	Comprehensiveness *r* (*P* Value)
Views	0.07 (.4)	0.01 (.9)
Likes	0.01 (.85)	0.0003 (.99)
Dislikes	0.05 (.6)	0.003 (.9)
Views per day	0.05 (.5)	0.01 (.9)
Likes per day	0.003 (.9)	0.03 (.7)
Likes per view	0.06 (.5)	0.02 (.8)

Table 5. List of top 3 videos with maximum comprehensiveness scores.

Name	URL
Extreme lateral interbody fusion	https://www.youtube.com/watch?v=D1EMg1Y4h2s
Lateral lumbar interbody fusion, Addison Stone, MD	https://www.youtube.com/watch?v=9fNc71SAzZ4
Spinal fusion surgery, parts 1 and 2	https://www.youtube.com/watch?v=37UqKwdGFX4

scores are listed in Table 5. On subanalyzing the primary and secondary video information data for the 3 categories of videos, the *poor* category videos were found to have reliability scores significantly less than the *average* and *good* categories; however, there was no significant difference among other variables, such as views per day, likes per day, or likes per view between the 3 categories, indicating comparable viewership regardless of the comprehensiveness and reliability of the videos.

Lumbar spinal fusion has seen significant advancements in the past few decades. The surgical procedure has evolved from a conventional open technique with considerable postoperative hospital stay to a minimally invasive technique with minimal postoperative hospital stay.[2–4] Regional anesthesia and pain management with neuraxial blocks has helped spinal fusion evolve as an outpatient procedure. Often, patients undergoing an elective spinal fusion have to make a choice with respect to the surgical and anesthetic technique, the instrumentation, type and sometimes even the hospital. Moreover, the information on possible risks and complications associated with the procedure adds apprehension and confusion to the preexisting dilemma, often necessitating access to supplementary sources of information. YouTube has a high volume of information in the form of short videos on various medical and surgical conditions and acts as a ready source of quick and inexpensive information. A recent survey by NBC News reported that 85% of physicians have experienced instances where they have been consulted by patients with information from the Internet.[17]

The authors in the current study found a majority of the videos related to lumbar spinal fusion available on YouTube to be *poor* in comprehensiveness and unreliable. Moreover, these videos had a considerable viewership that was comparable to *average* and *good* category videos. The high volume of poor-quality information may lead to misinformation and confusion on the part of the patient, and this could further adversely affect the patient-physician relationship. As demonstrated by a survey-based study among 1050 practicing physicians in the United States, nearly 40% believed that patients with online information about their disease adversely affects the efficiency of their visit.[18]

There are a few limitations to the study. First, only the initial 50 videos were short-listed for each search item, and this may have led to exclusion of some videos. However, the decision of including the first 50 videos was made on the assumption that most patients seeking information will not go beyond 50 search results. Also, multiple search terms were used to enhance the coverage of videos. Second, the scoring system used for rating the comprehensiveness of a video was developed from previous works by MacLeod et al[7] after including certain modifications to make it suitable for lumbar spinal fusion. There are no preexisting validated scoring criteria to rate comprehensiveness of online media content. However, the current scoring system was developed by a consensus of 2 fellowship-trained spine surgeons with expertise in spinal fusion procedures. Finally, the search results in YouTube keep changing with time and place due to its dynamic search algorithm.

Practice Implications

The current study provides both patients and physicians an opportunity to understand the limitations of online content on lumbar spinal fusion available on YouTube. The authors in the current study found glaring lacunae in the postoperative content discussion in the majority of the videos. A total of 66 videos had no content discussing the complications associated with or rehabilitation following lumbar spinal fusion surgery. While restricting non–peer-reviewed health-related videos on YouTube is neither feasible nor reasonable, it is prudent to take steps to minimize the dissemination of low-quality health information through YouTube and other Internet sites. Physician-initiated discussion regarding health information available online, especially that emphasizing inadequately discussed topics and its selective usage during the first interaction with the patient, may play a major role in spreading awareness and dissuading patients from relying on the Internet for their health

concerns. A significant proportion of online videos (35.5%) were produced by physicians. The scoring criteria and the checklists discussed in the current article emphasizing reliability and comprehensiveness may serve as a blueprint for physicians for future videos. Finally, enhancing communication skills to build a rapport and trust between the patient and the physician may further play an important role by allaying the anxiety, dilemmas, and confusion obviating the need to seek additional information.

CONCLUSIONS

Patients browsing YouTube for additional medical information on lumbar fusion procedures will be presented with large volumes of poor-quality data. Preoperative information including nonsurgical management and postoperation information such as complications and rehabilitation was lacking in the majority of videos; thus, the importance of physician-initiated discussion on these topics cannot be understated. This review further emphasizes on the need for good-quality and reliable educational videos on lumbar spinal fusion.

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