

Original research

YouTube is a poor source of patient information for knee arthroplasty and knee osteoarthritis

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ABSTRACT

Background: The objective of this study was to assess the educational quality of YouTube videos pertaining to total knee arthroplasty and knee osteoarthritis.

Methods: A systematic search for the terms “knee replacement” and “knee arthritis” was performed using YouTube’s search function. Data from the 60 most relevant videos were collected for each search term. Quality assessment checklists with a scale of 0 to 10 points were developed to evaluate the video content. Videos were grouped into poor quality (grade 0–3), acceptable quality (grade 4–7), and excellent quality (grade 8–10), respectively.

Results: Overall, 106 videos were categorized. For videos regarding total knee arthroplasty ($n = 50$), 64% of videos were of poor educational quality (32/50), 28% were of acceptable quality (14/50), and 8% were of good educational quality (4/50). Common missing information included discussion of surgical complications and implant duration. For videos regarding knee arthritis ($n = 56$), 66% of videos were of poor educational quality (37/56), 32% were of acceptable quality (18/56), and 2% were of good educational quality. Common missing information were causes and risk factors for knee arthritis and long-term prognosis.

Conclusions: The present study suggests that YouTube is a poor educational source for patients regarding knee arthroplasty and knee arthritis. Recognizing the limitations of YouTube as well as which topics are not commonly presented may better guide physicians to educate their patients.

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Introduction

Knee osteoarthritis (OA) is the most prevalent joint disease and affects around 19% of adults aged over 45 years in the United States. It is a leading cause of chronic pain and disability [1–3]. The gold-standard treatment option for end-stage knee arthritis includes total knee arthroplasty (TKA) [4]. TKAs are common, with more than 600,000 procedures

performed each year in the United States [5]. It is projected to become one of the most common procedures in the forthcoming decades [6].

While doctors have traditionally been the source of health information for patients, a growing number have turned to the Internet as a source of health-care information. Currently, over 61% of adults in the United States use the Internet to find health-care information regularly, and 80% have searched for health topics online at least once [7]. YouTube, a video platform website, is one of the most popular websites for information exchange, with more than 1 billion views every month [8].

Recently, there has been concern over the accuracy and validity of health information found on YouTube videos [8–10]. Because sources such as YouTube are increasingly being accessed by patients and may influence their decision-making process, physicians should be aware of the quality of content

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Table 1
Knee arthroplasty video score checklist.

Preoperative education	Available points
Discussion of preoperative preparation	1 point
Discussion on the concept of a knee arthroplasty	1 point
Surgical	
Discussion of implant duration	1 point
Discussion of reason for replacement	1 point
Discussion of nonoperative options	1 point
Restoration of physiologic knee biomechanics	1 point
Postsurgical	
Discussion of postoperative mobilization and/or physiotherapy	1 point
Discussion on functional outcome (improved mobility, pain, quality of life, and so forth)	1 point
Discussion on possible complications including but not limited to (infection, periprosthetic fracture, dislocation, nerve injury, implant failure, venous thromboembolism)	0.5 points each, for a maximum of 2 points

found on YouTube. By understanding the quality of information used by patients, physicians may better tailor their education toward the patient needs. The objective of this study was to assess the educational quality of YouTube videos pertaining to both TKA and knee OA.

Material and methods

Two systematic searches were made using the YouTube's search function. The first search used the term “knee replacement” to find videos pertaining to TKA. A second search was performed using the term “knee arthritis” to find videos pertaining to knee OA. The term “replacement” and “arthritis” was used instead of “arthroplasty” and “osteoarthritis”, respectively. This was done after consensus agreement because of its more colloquial use and their comparatively higher search volume as indexed by the company Google [11,12]. The 2 searches were performed on April 6, 2018, in New Orleans, Louisiana, USA. The search was performed using a web browser without any saved history or “cookies”. Videos were filtered by relevance alone. Exclusion criteria comprised videos that were not in English, did not address the primary topic, or did not contain audio or captions. Duplicated videos as well as multipart videos were viewed as one.

Data from the 60 most relevant videos were collected for each search term. Data included Universal Source Locator, video title, number of total views, duration of views, date of publication, number of “likes” and “dislikes,” and number of comments.

The videos were assessed for educational quality regarding the diagnosis and treatment of knee arthritis and the use of TKA. Videos were assessed using a grading checklist, adapted from the previous works of MacLeod et al and Koller et al [8,9]. One novel checklist was used for the analysis of the educational quality for TKA (Table 1). A separate novel checklist was used for assessing the educational quality for knee OA (Table 2). The checklists were created with current evidence and expert opinion. Both checklists had a grading scale of 0–10. Depending on the variable, single points or half points were given for each item on the checklist. Videos were further categorized by their publisher: physician/hospital sponsor, nonphysician medical professional, patient, or other. The type of videos was also

Table 2
Knee arthritis video score checklist.

Discussion of symptoms	1 point
Discussion of limitations on activities of daily living	1 point
Discussion on different etiologies of knee arthritis (osteoarthritis, rheumatoid arthritis, septic, and so forth)	1 point
Discussion on risk factors (obesity, previous trauma or surgery and so forth)	1 point
Discussion of pathophysiology	1 point
Discussion of nonoperative options including but not limited to (lifestyle modification and weight loss, NSAIDs, PT, injection, brace)	0.5 points each, for a maximum of 2 points
Discussion of operative treatment such as replacement	1 point
Discussion of imaging or workup, or radiograph was presented	1 point
Discussion about prognosis	1 point

NSAIDs, nonsteroidal anti-inflammatory drugs; PT, physical therapy.

classified, as either educational, surgical technique, testimonial, news, advertisement, or others.

Videos were grouped into educational quality, either poor (grade 0–3), acceptable (grade 4–7), or good (grade 8–10). Four independent reviewers assessed the videos using the same grading system and independently scored the videos. Discrepancies regarding the scoring were clarified by consensus discussion. Interobserver reliability of the grading score was evaluated for all videos, using interclass correlation coefficient. Ordinal logistic regression and binary logistic regression were used to analyze associations between overall score and other measured variables. *P*-values less than 0.05 were considered significant. There was no institutional review board approval required for the present study.

Results

Five videos were excluded from the final data. Reasons for exclusion included videos not in English (*n* = 2), videos without either audio or subtitles (*n* = 2), and video not pertaining to the topic of knee arthroplasty or arthritis (*n* = 1).

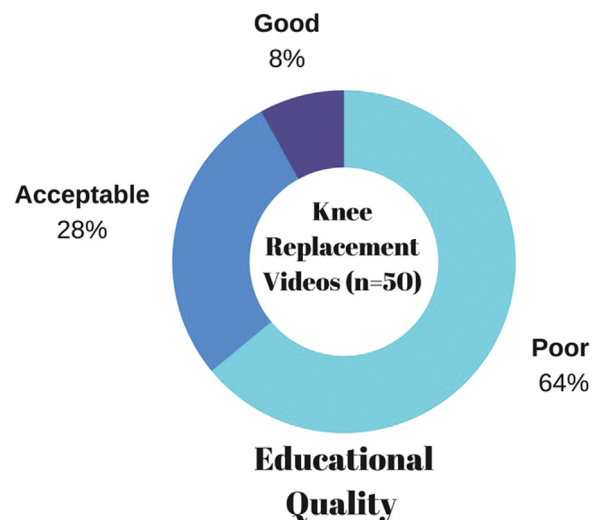
**Figure 1.** Summary of assessment scores for videos regarding total knee arthroplasty.

Table 3
Frequency of topics discussed per checklist.

Knee arthroplasty videos checklist	Percentage of videos discussed	Knee arthritis video checklist	Percentage of videos discussed
Discussion of preoperative preparation	16% (8/50)	Discussion of symptoms	42.86% (24/56)
Discussion on the concept of a knee arthroplasty	44% (22/50)	Discussion of limitations on activities of daily living	19.64% (11/56)
Discussion of implant duration	10% (5/50)	Discussion on different etiologies of knee arthritis (osteoarthritis, rheumatoid arthritis, septic, and so forth)	14.29% (8/56)
Discussion of reason for replacement	14% (7/50)	Discussion on risk factors (obesity, previous trauma or surgery and so forth)	17.86% (10/56)
Discussion of nonoperative options	10% (5/50)	Discussion of pathophysiology	37.50% (21/56)
Restoration of physiologic knee biomechanics	28% (14/50)	Discussion of nonoperative options including but not limited to (lifestyle modification and weight loss, NSAIDS, PT, injection, brace)	82.14% (46/56)
Discussion of postoperative mobilization and/or physiotherapy	56% (28/50)	Discussion of operative treatment such as replacement	23.21% (13/56)
Discussion on functional outcome (improved mobility, pain, quality of life, and so forth)	38% (19/50)	Discussion of imaging or workup, or radiograph was presented	21.43% (12/56)
Discussion on possible complications including but not limited to (infection, periprosthetic fracture, dislocation, nerve injury, implant failure, venous thromboembolism)	30% (15/50)	Discussion about prognosis	14.29% (8/56)

NSAIDS, nonsteroidal anti-inflammatory drugs; PT, physical therapy.

Acceptable intraobserver intraclass correlation coefficients were observed for the arthroplasty checklist (>0.9) and the arthritis checklist (>0.9), respectively.

For videos regarding knee arthroplasty, a total of 50 videos were analyzed. The average number of views per video was 135,074, with a total overall view count of 6,753,687. The average duration per video was 14.5 minutes. The average number of “likes” per videos was 422. The average number of “dislikes” per video was 38.2. The average number of comments per video was 82.3. When assessing educational content, the average score was 4.1 of a total of 10 (min 0.5, max 9). Sixty-four percent of videos were deemed to be of poor educational quality (32/50), 28% were of acceptable quality (14/50), and 8% were of good educational quality (4/50). (Fig. 1) Physicians/hospital sponsors produced 50% of the videos and were for educational purposes. Industry-sponsored advertisements were found in 4% of the videos (2/50). The most frequently discussed topics included an explanation of the concept of a TKA (44% of the videos) and postoperative physical therapy (56%). Discussion on nonoperative options and implant duration was the least commonly discussed topic and was present in 10% of the videos (Table 3). There was no correlation between the assessment score and any other video characteristic variable (Table 4).

For videos regarding knee arthritis, a total of 56 videos were analyzed. The average number of views per video was 243,346, with total overall views of 13,627,388. The average duration per video was 4.97 minutes. The average number of “likes” per videos was 1424.5. The average number of “dislikes” per video

was 120.8. The average number of comments per video was 59.6. When assessing educational content, the average score was 2.7 of a total of 10 (min 0.5, max 8). Sixty-six percent of the videos were deemed to be of poor educational quality (37/56), 32.1% were of acceptable quality (18/56), and 1.8% were of good educational quality (1/56) (Fig. 2). Physicians/hospital sponsors produced 39.3% of the videos. Industry-sponsored advertisements accounted for 8.9% of the videos (5/56). Discussion on symptoms and nonoperative treatments predominated, with 42.9% and 82.1% of the videos discussing these topics, respectively. Discussion on the different etiologies of knee arthritis and the long-term prognosis were the topics least discussed and were present in 14.3% of the videos (Table 3). Videos with longer duration (odds ratio 1.63, $P < .05$) and videos with more views (odds ratio 1.03, $P < .05$) had higher assessment scores (Table 5).

Discussion

Currently, over 50% of North Americans access health information online at least once a month. The exchange of video-based information is going to rapidly grow within the next few years, and videos are going to become the primary source of information [13,14].

Physicians are increasingly being affected by this fact. This has a growing impact on the patient-physician relationship, and 38% of physicians believed that the patient bringing information made the visit less efficient [15]. This may be attributed in part by the poor educational quality of online videos. In an analysis

Table 4
Knee arthroplasty video data (N = 50).

Video characteristics	Mean	Minimum	Maximum	Score assessment	95% CI	P-value
				Multivariate ordinal regression OR		
Views per video	135,074	282	1,855,167	1.00	0.99–1.01	.383
Duration (minutes)	14.53	1.54	88.31	1.03	1.00–1.06	.090
Number of “likes”	422	0	4916	1.00	1.00–1.01	.471
Number of “dislikes”	38	0	350	1.00	0.97–1.02	.877
Number of comments	82	0	1130	1.00	0.99–1.01	.735

CI, confidence interval; OR, odds ratio.

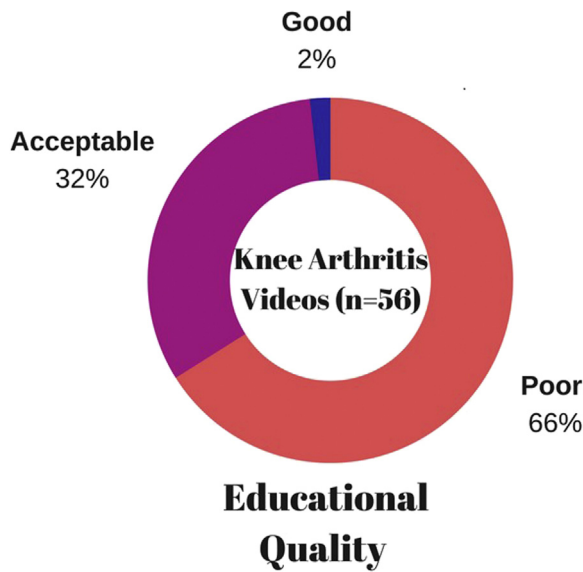


Figure 2. Summary of assessment scores for videos regarding knee arthritis.

of 133 YouTube videos concerning hip arthritis by Koller et al., their study showed that 84–86% of the videos had poor quality regarding diagnostic or treatment information. Only 2–4% of their videos had excellent information quality [9]. Another study by MacLeod et al. analyzed 52 videos for information quality regarding femoroacetabular impingement and found that 19.2% of their videos were not useful [8]. In our study, only 8% of the videos regarding TKA were deemed to be of good educational quality (4/50), with 64% of the videos (32/50) being of poor educational quality, and 28% (14/50) being of acceptable educational quality. Of the videos concerning knee OA, only one video was found to be of good educational quality, with the rest being of poor (66%) or acceptable (32%) educational quality (Fig. 3). This study suggests that the majority of videos related to TKA and knee OA are of poor educational quality. Looking at previous literature, it appears that the lack of strong educational quality expands to other orthopaedic topics as well.

The relationship between video characteristics and overall educational quality has been previously studied. Video characteristics include factors such as the amount of views, comments, “likes,” and “dislikes”. There have been variable reported results. MacLeod et al. found no difference between educational quality and video characteristics [8]. Stauton et al. reviewed 50 videos regarding scoliosis and found that greater educational quality videos were associated with a lower

number of views [10]. They attributed this to the possibility that higher quality information may be less “attractive” or “readable” and may affect popularity. This was also supported by Jones et al. who after their analysis of 55 videos regarding Dupuytren’s disease showed that videos deemed “useful for patients” had the least number of mean views [16]. However, these findings were not shown in our study. The total number of views did not appear to affect the score of videos regarding knee arthroplasty. For videos discussing knee arthritis, higher scores were associated with increased total views. This wide variation in reported results may be influenced by the differing patient base who searches and interacts with each video category.

Investigating what topics are less commonly presented through YouTube may assist physicians in counseling their patients. In our study, discussion regarding nonoperative options and implant duration were seen in only 10% of the videos discussing TKA. The lack of discussion regarding nonoperative treatments in videos is seen in other studies [8,9]. Our study also found that discussion on the etiology and long-term prognosis was lacking in videos on knee OA. Brookes et al. found similar findings after reviewing 81 videos discussing lumbar discectomy and noted that information about the pathophysiology of lumbar disc herniation and the natural course of disc herniation was lacking [17]. The authors noted that these findings may reflect the market for which some of these videos were intended, as a notable proportion of publishers were from individuals or organizations offering treatment options. Discussion about nonoperative treatments or surgical complications may therefore deter patients.

This study may provide a basis for physicians to advise patients on the limitations of using YouTube as an information source for TKA and knee OA. With up to 85% of physicians having experienced an instance where a patient brought information found on the Internet for a consultation, we believe this study has an immediate impact on delivering clinical care in an orthopaedic setting [18]. Physicians should use this as an opportunity for open discussion and for educating patients on topics found in online videos. In one study, 86% of the patients surveyed were concerned about unreliable information online [14]. In another study, 87% of patients who searched for information online encountered confusing websites, but less than half (46.3%) discussed the content with their physician [19]. Therefore, the importance of a physician-initiated discussion should not be understated.

There are limitations to this study. First, while the assessment tool used in this study is adapted from the previous works of MacLeod and Koller et al., there is no general validated tool to assess the quality of video-based health information. Second, no grading system was used to assess or penalize inaccurate information. In addition, our analysis was limited to content on

Table 5
Knee arthritis video data (N = 56).

Video characteristics	Mean	Minimum	Maximum	Score assessment	95% CI	P-value
				Multivariate ordinal regression OR		
Views per video	243,346	145	4,384,340	1.03	1.00–1.05	.009
Duration (minutes)	4.97	0.55	21.36	1.63	1.10–2.32	.007
Number of “likes”	1424	0	30,565	1.00	0.99–1.00	.098
Number of “dislikes”	120	0	2639	0.98	0.94–1.02	.292
Number of comments	60	0	421	1.01	0.58–0.98	.581

CI, confidence interval; OR, odds ratio.

Views per video and duration of video were found to be significantly different between scoring groups and are indicated in bold.

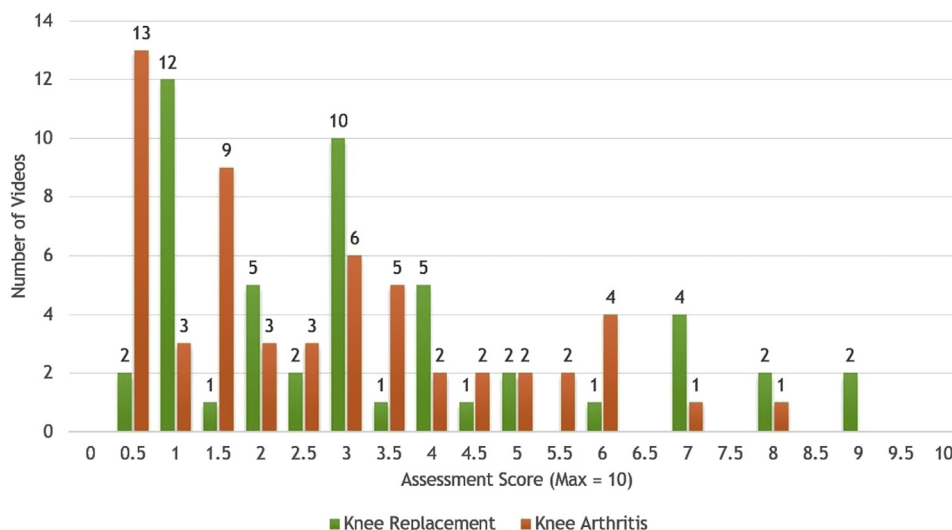


Figure 3. Combined analysis of assessment scores.

YouTube, and it is possible that other video-hosting sites may have videos with greater educational quality. Finally, the videos available on YouTube are constantly changing because of its search algorithm.

Conclusions

YouTube is increasingly being accessed by patients for health information regarding TKA and knee OA. However, our study suggests that the educational quality of videos regarding these topics is poor. The medical community can improve online patient education by emphasizing topics that were less discussed in these videos. For educational material regarding knee arthroplasty, this includes discussion on nonoperative options and implant duration. Patient education regarding knee OA should emphasize etiology and long-term prognosis. Physicians should be aware of the limitations of YouTube to better counsel their patients.

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