Original research

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

Michael Wong, BA a, *, Bhumit Desai, BS a, Michele Bautista, MPH a, Ohmin Kwon, BS a, Nicholas Kolodychuk, MD b, George Chimento, MD a

a Department of Orthopedic Surgery, Ochsner Clinic Foundation, New Orleans, LA, USA
b Department of Orthopedic Surgery, Cleveland Clinic Akron General, Akron, OH, USA

A R T I C L E   I N F O

Article history:
Received 10 August 2018
Received in revised form 25 September 2018
Accepted 26 September 2018
Available online 7 November 2018

Keywords:
Internet
YouTube
Knee
Arthritis
Replacement

A B S T R A C T

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.

© 2018 The Authors. Published by Elsevier Inc. on behalf of The American Association of Hip and Knee Surgeons. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

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...
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 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.](image)
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 video was 422. The average number of comments per video was 82.3. When assessing educational content, the average score was 4.97 minutes. The average number of views per video was 243,346, with a total overall view count of 13,627,388. The average duration per video was 88.3 minutes. The average number of “likes” per video was 1.01. The average number of “dislikes” per video was 1.02.

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...
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 |
|------------------------|------|---------|---------|------------------|-------|---------|
| 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 | .998    |
| Number of “dislikes”   | 120   | 0       | 2693    | 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.
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.

References

[1] Murray CJ, Atkinson C, Bhalla K, et al. The state of US health, 1990-2010: burden of diseases, injuries, and risk factors. JAMA 2013;310:591.
[2] Vos T, Flaxman AD, Lozano R, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the global burden of disease study. Lancet 2012;380:2163.
[3] Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. Arthritis Rheum 2008;58:26.
[4] Manen Van, Nace J, Mont MA, et al. Management of primary knee osteoarthritis and indications for total knee arthroplasty for general practitioners. J Am Osteopath Assoc 2012;112(11):709.
[5] HCPUnet, healthcare cost and utilization project. Agency for healthcare research and quality. http://hcupnet.ahrq.gov. [Accessed 1 April 2018].
[6] Maradit Kremers H, Larson DR, Crowson CS, et al. Prevalence of total hip and knee replacement in the United States. J Bone Joint Surg Am 2015;97(17):1386.
[7] Frost JH, Massagi MP. Social uses of personal health information within PatientsLikeMe, an online patient community: what can happen when patients have access to one another’s data. J Med Internet Res 2008;10(3):e15.
[8] MacLeod MG, Hoppe DJ, Simunovic N, et al. YouTube as an information source for femoracetabular impingement: a systematic review of video content. Arthroscopy 2015;31(1):136.
[9] Koller U, Waldstein W, Schatz KD, et al. YouTube provides irrelevant information for the diagnosis and treatment of hip arthritis. Int Orthop 2016;40(10):1995.
[10] Staunton PF, Baker JF, Green J, et al. Online curves: a quality analysis of scoliosis videos on youtube. Spine (Phila Pa 1976) 2015;40(23):1857.
[11] Google trends. https://trends.google.com/trends/explore?date=today%205-ygeo--US&gprop=youtube&q=knee%20arthroplasty,knee%20replacement. [Accessed 4 January 2018].
[12] Google trends. https://trends.google.com/trends/explore?date=today%205-ygeo--US&gprop=youtube&q=knee%20arthrosis,knee%20osteoarthritis. [Accessed 4 January 2018].
[13] Starman JS, Gettys FK, Capo JA, et al. Quality and content of internet-based information for ten common orthopaedic sports medicine diagnoses. J Bone Joint Surg Am 2010;92(7):1612.
[14] Fox S, Rainie L. E-patients and the online health care revolution. Physician Exov. 2012;28(6):14.
[15] Murray E, Lo B, Pollack L, et al. The impact of health information on health care and the physician-patient relationship: National U.S. Survey among 1050 U.S. physicians. J Med Internet Res 2003;5:e17.
[16] Jones M, Wilberg A. Evaluating youtube as a source of patient information on dupuytren’s disease. World J Plast Surg 2017;6(3):396.
[17] Brooks FM, Lawrence H, Jones A, et al. YouTube™ as a source of patient information for lumbar discectomy. Ann R Coll Surg Engl 2014;96(2):144.
[18] NBC News. More people search for health online. http://www.nbcnews.com/id/3077086/t/more-people-search-health-online. [Accessed 6 January 2018].
[19] Bao H, Zhu F, Wang F, et al. Scoliosis related information on the internet in China: can patients benefit from this information? PLoS One 2015;10:e0118285.