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A quality analysis of robotic-assisted knee replacement surgery videos on Youtube

Ertuğrul Şahin[1], Mustafa Vezirhüyük[2]

[1]Department of Orthopaedics and Traumatology, Faculty of Medicine, Kafkas University, Kars, Turkey
[2]Department of Orthopaedics and Traumatology, Şanlıurfa Training and Research Hospital, Şanlıurfa, Turkey

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ABSTRACT

Aim: Robotic technology has been used to decrease soft tissue dissection and improve postoperative rehabilitation in several areas and robotic-assisted knee replacement has gained popularity last decades. Youtube has an uncontrolled source, making it difficult to verify the correctness of its process. It is critical to assess what they include. This study aimed to assess the quality of the YouTube video content related to robotic-assisted knee replacement surgeries

Material and Method: We conducted a search on YouTube using the keywords "robotic-assisted knee replacement". The headings of the first 50 videos on YouTube were obtained and simultaneously evaluated by two orthopedic surgeons.. We analyzed the general features and categorized videos according to content. The videos were evaluated by using the DISCERN and JAMA scores.

Results: 37 videos were included. Twenty-three videos contained total knee replacement surgery while fourteen consisted of unicondylar prosthesis system. The content of the videos included 51.4% (n=19) interviews, 16.2% (n=6) live surgery, 13.5% (n=5) patient testimonials, 8.1% (n=3) animation and presentation-lesson, and 2.7% (n=1) model81.1% of the videos were uploaded by hospital accounts. These were followed by health channels (8.1%), firms (5.4%), doctors (2.7%), and patients (2.7%) the average DISCERN score was 40.1±9.4 and the average JAMA score was 2.2±1

Conclusion: The quality of the information in videos on robotic-assisted knee replacement surgery is poor, YouTube is not currently an appropriate source of such information for patients and there appears to be a disproportionate amount of information focusing on robotic-assisted knee replacement surgery.

Keywords: Internet, YouTube, knee, replacement, robotic

INTRODUCTION

Robotic technology has been used to decrease soft tissue dissection and improve postoperative rehabilitation in several areas including, general surgery, cardiology, obstetrics and gynecology, and ophthalmology (1). Over the last decade, robotic-assisted knee replacement has gained popularity for improving templating for preoperative planning, more accuracy in implant positioning, and precision in the execution of the bone cuts during the procedure (2,3).

YouTube is an easily accessible, publically accessible video-based platform serving as a major source of various topics including medical information for both patients and health cares presently. These developments in internet technology illustrate the concept of the 'YouTube generation', with numerous advantages of information sharing and challenges in assuring the quality of the shared videos (4-7). On the other hand, it is an uncontrolled non-peer-reviewed source, making it difficult to verify the correctness of its process. It is critical to assess what they include.

While considering this need, we designed this study and aimed to assess the quality of the YouTube video content related to robotic-assisted knee replacement surgeries.

MATERIAL AND METHOD

Our study was exempted from the ethical review board by our institution, as there was no human or animal participation in the study and the information used is juridically available for the public. The study according to the World Medical Association Declaration of Helsinki, as no patient data or materials were used and all videos used for the study are available on a public

Corresponding Author: Ertuğrul Şahin, ertugrulsahinn@hotmail.com
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social media website (YouTube). A YouTube search using the keywords " robotic-assisted knee replacement surgery" was performed on 13 May 2021. Analysis was restricted to the viewed videos more than 10.000 count. Videos were recorded by date of upload, length, number of views, comments, likes and dislikes. Videos were categorized by type of prothesis (total or unicondylar), content (interview, animation, live surgery, patient testimonial, model and presentation-lesson) and upload sources (doctor, hospital, health channel, firm, patient). Non-audio and non- English-language presentations were excluded.

Video reliability was scored by two orthopedic surgeons simultaneously using the Journal of the American Medical Association (JAMA) and Quality Criteria for Consumer Health Information (DISCERN) criterias. The mean scores of JAMA and DISCERN systems were calculated from each scores of surgeons. The data distributions were checked with the Kolmogorov-Smirnov normality test. Continuous variables were reported by the mean and standard deviation (SD). The differences were compared using the independent-samples t-test for normally distributed data and the Mann-Whitney U test for the nonnormally distributed data. Categorical data were represented as numbers and percentages (%). Categorical variables were analyzed with Fisher's exact test and the chi-square test was used to detect differences. Interobserver correlations were calculated with the intraclass correlation coefficient (ICC) (8). An ICC value < 0.40 indicates poor agreement, 0.40–0.59 indicates fair agreement, 0.60–0.75 indicates good agreement, and above 0.75 indicates excellent agreement (9). $p < 0,05$ considered to be statistically significant results. Statistical analysis was performed using SPSS version 25.0 (SPSS Inc, Chicago, IL).

Quality Assessment

Each video with a recorded title was viewed by two orthopaedic surgeons, and evaluated with DISCERN (Quality Criteria for Consumer Health Information) and JAMA (Journal of the American Medical Association) scoring systems.

DISCERN Scoring System

The DISCERN tool was used to analyze quality of the videos on YouTube. The DISCERN scoring system was formed by the Oxford University and British Library employees, and used by healthcare consumers. The DISCERN score includes 15 questions about the content of health information. Users assess the content with a 5-point scale, and total scores differs between 15-75 points. Questions in DISCERN are divided into two sections. The first section (1-8 questions) addresses reliability of the publication, while the second section (9-15 questions) focuses quality of the information about treatment options. DISCERN scores between 63 and 75 points were classified as 'excellent', 51 and 62 as 'good', 39 and 50 as average, 28 and 38 as 'poor', and < 28 as very poor. Higher scores obtained from the scale indicated higher quality of information (10) (**Table 1**).

Table 1. DISCERN scoring system

Section	Questions	No	Partly	Yes
Reliability of the publication				
	1. Explicit aims	1	2 3 4	5
	2. Aims achieved	1	2 3 4	5
	3. Relevance to patients	1	2 3 4	5
	4. Source of information	1	2 3 4	5
	5. Currency (date) of information	1	2 3 4	5
	6. Bias and balance	1	2 3 4	5
	7. Additional sources of information	1	2 3 4	5
	8. Reference to areas of uncertainty	1	2 3 4	5
Quality of information on treatment choices				
	9. How treatment works	1	2 3 4	5
	10. Benefits of treatment	1	2 3 4	5
	11. Risks of treatment	1	2 3 4	5
	12. No treatment options	1	2 3 4	5
	13. Quality of life	1	2 3 4	5
	14. Other treatment options	1	2 3 4	5
	15. Shared decision making	1	2 3 4	5

JAMA Scoring System

This system is a quality scale used for evaluation of information obtained from the healthrelated internet sites. It consists of 4 criteria of "Authorship, Attribution, Disclosure, Currency". Each item is evaluated with 0 (does not meet the desired criteria) or 1 point (meets the desired criteria). The minimum score that can be obtained from these scale is 0 and maximum score is 4 points. Higher scores obtained from the scale shows increased quality of the information, which is assessed (11) (**Table 2**).

Table 2. JAMA scoring system

Section	Questions	No	Yes
Authorship	Authors and contributors, their affiliations, and relevant credentials should be provided	0	1
Attribution	References and sources for all content should be listed clearly, and all relevant copyright information should be noted	0	1
Disclosure	Website "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest	0	1
Currency	Dates when content was posted and updated should be indicated	0	1

RESULTS

Among the 51 videos assessed, 37 were included. Twenty-three videos contained total knee replacement surgery while fourteen consisted of unicondylar prosthesis system. The mean duration per video was 602±1027 seconds. The mean view count per video was 47.483±44.449. The total view count was 1.756.855. The median number of likes per video was 72 (0-386).

The content of the videos included 51.4% (n=19) interview, 16.2% (n=6) live surgery, 13.5% (n=5) patient testimonial, 8.1% (n=3) animation and presentation-lesson, and 2.7% (n=1) model. The distribution of video contents according to the type of prosthesis were shown in **Table 3**. Although "Live surgery" video contents were more preferred for unicondylar systems than total knee systems, we found no statistically significant difference (p=0.11) while we did not see any "model" and "presentation- lesson" contents in unicondylar system videos.

Table 3. Distribution of video content according to prosthesis type

Category of video content	Prosthesis Type	
	Total n (%)	Unicondylar n (%)
Interview	13 (56.5)	6 (42.9)
Animation	1 (4.3)	2 (14.3)
Live surgery	2 (8.7)	4 (28.6)
Patient testimonial	3 (13)	2 (14.3)
Model	1 (4.3)	0 (0)
Presentation-Lesson	3 (13)	0 (0)

81.1% of the videos were uploaded by hospital accounts. These were followed by health channels (8.1%), firms (5.4%), doctors (2.7%), and patients (2.7%). The distribution of video sources according to the type of prosthesis were shown in **Table 4**. The rate of video sources between two systems were similar. There was no total knee prosthesis videos were uploaded by doctors and patients.

Table 4. Relationship between source of videos according and prosthesis type

Upload Source	Prosthesis Type	
	Total n (%)	Unicondylar n (%)
Doctor	0 (0)	1 (7.1)
Hospital	20 (87)	10 (71.4)
Health channel	2 (8.7)	1 (7.1)
Firm	1 (4.3)	1 (7.1)
Patient	0 (0)	1 (7.1)

The average DISCERN score analysed by the two viewers was 39.4±9.3 and 40.7±9.5 respectively. The average JAMA score of the videos analysed by the two viewers was 1.9±1 and 2.5±1, respectively. Hence, the average DISCERN score was 40.1±9.4 and average JAMA score was 2.2±1. When the DISCERN scores of both viewers were analysed using the Spearman test, we found a strong correlation 0.974. In addition, the JAMA scores of the two viewers using the Spearman test were determine to have a strong correlation 0.803. After analysing the average DISCERN scores of the two viewers, we found that the quality of the videos was very poor in 2.7%, poor in 51.4%, average in 32.4%, good in 5.4% and excellent in 8.1% of the videos contributed to our study.

In the videos with total knee group, the average DISCERN score was 41.5, while the average DISCERN score of videos with unicondylar knee group was 37.7. However there was no statistical difference between the groups (p=0.25). However, the two groups' assessment of JAMA scores were found to be statistically significant (p=0.02).

We compared the DISCERN and JAMA scores of the videos between the hospital and other groups. In terms of DISCERN and JAMA scores, we found insignificant differences between these various groups (p=0.72 and p=0.63, respectively).

"Interview" was the largest subgroup of videos in terms of the content, we compared DISCERN and JAMA scores assessments between the interview videos and others. The average DISCERN scores of the interview videos were lower than those of the others without statistical differences (38.2 vs 42, p=0.21). In addtion that, the average JAMA scores also did not show any significant difference between the interview videos and the others (p=0.9).

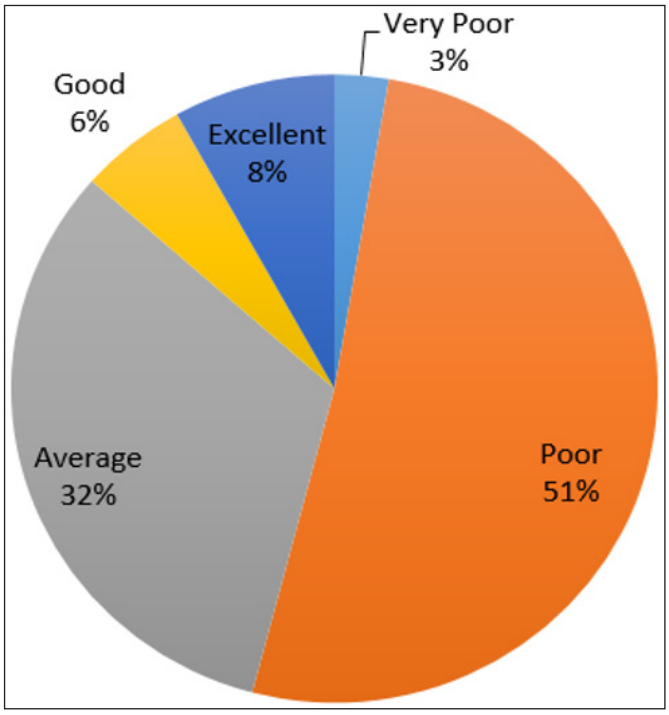

Figure 1. Summary of assessment scores for videos regarding robotic-assisted knee replacement videos

DISCUSSION

This study showed that the quality and reliability of robotic-assisted knee replacement-related information offered on YouTube is low. Approximately 4.5% of all searches on the web include health topics. Health-related queries are performed 6.75 million per day in Google alone (12). On the other hand, most of them are uploaded by nonphysicians and/or institutions. Among these shares, patient testimonials, advertisements, and alternative treatment options become more important. majority of these videos contain misleading and even faulty information. An appropriate video must give accurate information on reasons, treatments, and procedures to viewers, while a video will be misleading if it contains inappropriate information or suggests treatments that have not been proven by competent sources.

Physicians are increasingly being affected by the rapid growth of video-based information. This fact has a negative impact on the patient-physician relationship, and 38% of physicians thought that the patient bringing information decreased the visit efficiency (13). This might be related to the poor educational quality of online videos. In by Koller et al. (14), conducted an analysis of 133 YouTube videos regarding hip arthritis and showed that 84-86% of the videos had poor quality concerning diagnostic or treatment information. Only 2-4% of the videos' quality was excellent. MacLeod et al. (15) evaluated the information quality of 52 femoroacetabular impingement videos and reported that 19.2% of their videos were not useful. In another study, Wong et al. (16) assessed the quality of YouTube videos pertaining to total knee arthroplasty (TKA) and knee osteoarthritis and 64% of videos were of poor educational quality regarding TKA. In our study, 13.5% of the videos regarding robotic-assisted knee replacements were deemed to be of good and excellent quality, with 54.1% of the videos being very poor and poor, 32.4% being of average quality. This study suggests that the majority of videos related to robotic-assisted knee replacements are of poor educational quality. Looking at previous literature, it shows that the lack of high educational quality spreads to other orthopedic topics as well.

In our study, we investigated the quality, and reliability of the videos about robotic-assisted knee replacement surgery on YouTube. In the literature, this study is the first, to investigate this topic. Consistent with the literature, most of the videos were shared by non-physicians (17). Of the 37 videos, 97.3 % were uploaded by non-physicians with 81.1% shared hospital accounts, 8.1% by health channels, 5.4% by firms, and 2.7% by patients. The majority of videos uploaded by non-physicians are not specific to our study, and in the literature review, a considerable part of health-related YouTube videos include anecdotal information and patient experiences. However, in our study, most of the videos shared by hospitals contained interviews with doctors. This difference is due to robotic systems being special and very expensive devices and it is difficult to access them easily. Since hospitals try to put forward their valuable property and they prefer to represent it by interviewing doctors.

The relationship between video characteristics that view, comment, "like" and "dislikes" counts, and educational quality has been previously conducted. There have been different wide-ranging results. MacLeod et al. (15) reported that there was no difference between educational quality and video characteristics. However, Stauton et al. (18) conducted 50 videos regarding scoliosis and reported that high-educational quality videos were related to a lower number of views. They thought that higher quality information may be less "interesting" or "readable" and may reduce popularity. This was also supported by Jones et al. (19) who analyzed Dupuytren's disease videos and found that videos deemed "useful for patients" had the least number of mean views. Additionally, these findings were shown in our study also but we did not detect any statistical differences. It might be because of the small sample size. The total number of views might affect the score of videos regarding robotic-assisted knee replacement videos. We thought that it may be more difficult to represent higher quality information in an attractive or "readable" way, which would therefore directly impact the popularity.

In this study, the mean length of the videos was approximately 10 minutes. Previous studies have shown the mean video length between 6.17-10.35 minutes (20,21). Our results were consistent with the literature.

The current study quantified that the mean number of views was 47,483 and that, collectively, all videos at the time of the analysis had been watched a total of 1.756.855 times. This is compatible with other studies that have sought to analyze the quality and popularity of orthopedic-related YouTube videos. Kunze et al. (22) reported that the mean number of views of the first 50 YouTube videos regarding the posterior cruciate ligament was 50,477 and that the total viewing number was 14,141,285. Staunton et al.(18) found that the mean number of views of the first 50 videos concerning scoliosis was 71,152. Other orthopedic-based YouTube analyses have represented lower mean video-viewing rates as low as 2,651.513 and 34,037 views per video,6 further supporting the idea that robotic-assisted knee replacement is a topic that has a wide range of viewership.

In our study, there was a negative correlation between DISCERN and JAMA scores and like count. These results showed that high-quality videos are not as popular as

low-quality videos. Furthermore, various studies in the literature have reported that low-quality videos are more popular (23-25).

The exclusion and inclusion criteria of the videos and the number of videos included in our study were in accordance with other studies (18,26). Because the aim of our cross-sectional study was to develop an instant search model by seeking the information obtained from the patient's perspective, instead of evaluating all the information about disc herniation on YouTube.

Limitations of this study include a DISCERNE AND JAMA score based on a subjective assessment. In addition, changes in the keywords used to result in the retrieval of different videos would affect the results. Another limitation was the conclusion that different results could be obtained when searches were performed at different times, and alternative evaluation methods could provide different results. Therefore, in our study, we included videos that were found as a result of the search performed on the same day and at the same time for both researchers. The videos analyzed only first 50 videos generated by the search query. Although this limits the generalizability of the findings to all robotic-assisted knee replacement videos currently available on YouTube, viewers rarely explore more than the first few pages of a search for information (27). Finally, different results would be obtained with different sorting schemes, and the video sequence retrieved depended on YouTube's interpretation of our keywords.

CONCLUSION

Our study contributes to a better understanding of the available information about robotic-assisted knee replacement surgery, which is widely viewed on YouTube. The results suggest that the quality of the information in videos on robotic-assisted knee replacement surgery is poor, YouTube is not currently an appropriate source of such information for patients and there appears to be a disproportionate amount of information focusing on robotic-assisted knee replacement surgery. The medical community can improve online patient education by focusing on the topics discussed in these videos. Physicians should be aware of the limitations of YouTube and provide up-to-date and peer-reviewed content.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study has a crosssectional design. Ethics committee approval was not obtained as there was no human or animal participation in the study, and the videos were public. The study according to the World Medical Association Declaration of Helsinki, as no patient data or materials were used and all videos used for the study are available on a public social media website (YouTube).

Informed Consent: Since there was no human or animal participation in the study, and the videos were public, need informed not required.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

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