

# Could YouTube™ encourage men on prostate checks? A contemporary analysis

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## Summary

**Objectives:** To assess YouTube™ videos' quality on prostate checks, especially on the digital rectal exam (DRE), and to investigate if they can inform patients correctly and eradicate their beliefs and myths.

**Methods:** A search using as keywords "digital rectal exam for prostate cancer" was performed on the YouTube™ platform. We selected the first 100 videos. To assess video quality content, Patient Education Materials Assessment Tool for audio-visual content (PEMAT A/V) and Misinformation tool were used.

**Results:** Seventy-three videos were suitable for the analyses. The median PEMAT A/V Understandability score and PEMAT A/V Actionability score were 46.2% (interquartile range [IQR]: 30.8-76.9) and 50.0% (IQR: 25.0-75.0), respectively. The median PEMAT A/V Understandability and Actionability scores were 69.2% (IQR: 46.2-88.5) vs 46.2% (IQR: 30.8-61.5) ( $p = 0.01$ ) and 100.0% (IQR: 87.5-100.0) vs 25.0% (IQR: 25.0-68.8) ( $p < 0.001$ ), for healthcare workers vs patients, respectively.

According to the Misinformation tool, the median misinformation score of the overall videos was 2.2 (IQR: 1.7-2.8). According to the target audience, the misinformation score was 2.8 (IQR: 2.4-3.5) vs 2.0 (IQR: 1.5-2.8) ( $p = 0.02$ ), for healthcare workers vs patients, respectively.

**Conclusions:** Currently, based on our analyses, YouTube™ videos' quality on DRE resulted unsatisfactory according to the PEMAT A/V score and the Misinformation tool. Videos targeted to healthcare workers got higher quality scores if compared to videos targeted to patients. Therefore, YouTube™ videos' may not be considered a reliable source of information on DRE for patients.

**KEY WORDS:** Internet; Urology; Misinformation; Prostate cancer; Social media.

Submitted 13 June 2022; Accepted 14 July 2022

## INTRODUCTION

Prostate cancer (PCa) is the most common malignancy among elderly men, with 1 276 000 new diagnoses and 359 000 deaths in 2018 worldwide (1, 2). Nowadays, PCa burden is expected to grow to almost 2.3 million new cases and 740 000 deaths by 2040 (1, 3). Several studies show as survival is closely related to the stage at

diagnosis: The 5-year survival rate is 100% in patients diagnosed with the earliest stage disease and less than 33% if diagnosed at the latest stage (4-7).

Screening is the best way for PCa early diagnosis and it is recommended to all men with no risk factors over 50 years (8, 9). Digital rectal exam (DRE) in addition to prostate-specific antigen (PSA) blood test is the most used test to screen for PCa. According to American Urology Association (AUA), DRE has considered a useful tool in men referred for an elevated PSA (10). Moreover, according to European Association of Urology (EAU) guidelines, in 18% of cases PCa is detected by suspect DRE alone, irrespective of PSA level (11, 12). A suspect DRE in patients with a PSA level  $< 2$  ng/mL has a positive predictive value (PPV) of 5-30% (13). Despite DRE usually is not painful and only takes a short time, fear and shame of patients appear as barriers. This is usually due to imagination, beliefs, and fantasies that lead the men to envision the DRE as something much more awkward than it is. The lack of knowledge or misinformation could be reversed by more comprehensive information (14, 15).

YouTube™ is the most well-known online video sharing site with five billion videos watched daily and has such a large and diverse community of users, it could be a media channel for improving public awareness and understanding (16, 17). Additionally, over the past 2 years, the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) spread, has made internet consultation a remarkable source of medical information (18-23). Several studies have already evaluated the quality of YouTube™ videos concerning different medical fields. To the best of our knowledge, no studies on DRE were found in the literature. Previous studies analyzed YouTube™ videos' quality on urological (20, 21, 24-30) and non-urological topics (31, 32), highlighting a diffuse inaccuracy. No previous investigators evaluated YouTube™ videos' quality on DRE as a tool for patients' information.

The current study aimed to assess YouTube™ videos' quality on prostate checks, especially on DRE, and to investigate if they can inform patients correctly and eradicate their beliefs and myths.

## MATERIALS AND METHODS

### Search strategy and video selection criteria

On April the 14<sup>th</sup> 2021, from 5.30 p.m to 7.30 p.m (CEST), a search using as keywords “digital rectal exam for prostate cancer” was performed on the YouTube™ platform. The search was limited to the English language. To avoid research bias, any personal account was logged out and a proxy located in the United States via Virtual Private Network (VPN) software was set. We recorded the first 100 videos displayed by relevance. The following exclusion criteria were applied (Figure 1): non-English language videos (n = 5), podcasts (n = 1), commercial purpose videos (n = 3), animal videos (n = 1), videos over 30 minutes (n = 3), off-topic videos (n = 14). If duplicated, only one was considered. We recorded, for all the eligible videos, the following variables: length (seconds), views, persistence on YouTube™ (days), thumbs-up (a social media term for like), thumbs-down (a social media term for dislike), number of comments, number of videos with disabled comments, channel subscribers (the people or accounts that are subscribed to the channel), video authors (healthcare workers vs patients vs interviewers), target audience (healthcare workers vs patients), Video Power Index (VPI) estimating video popularity (20).

### Quality and misinformation assessment tools

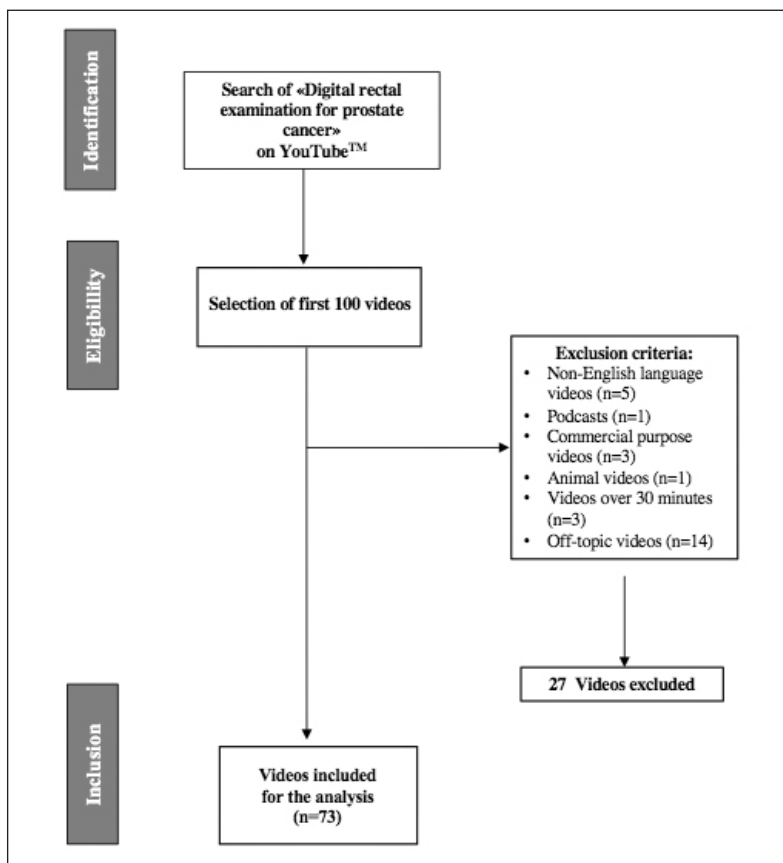
Two investigators, a Senior (GS) and a Junior (SM) Urology

Resident, analysed the quality of the eligible videos, and when in contrast an additional investigator, an Associate Professor (NL), mediate the disagreement. The quality assessment was performed for the overall eligible videos. Patient Education Materials Assessment Tool for audio-visual content (PEMAT A/V) 33 and the Misinformation Tool were used to assess videos' quality (16, 20, 24-26).

First, the PEMAT A/V is developed to evaluate how viewers could process the information displayed in the videos and how viewers could use them. It is composed of 17 questions addressing the content Understandability (questions 1-13) and Actionability (questions 14-17). Three answers were permitted (agree = 1, disagree = 0, not available = NA). The score of all items is added together, divided by the number of items on which the material was rated, and multiplied by 100 to give a percentage score for understandability and actionability, respectively. There is no set cutoff value for the scores. Higher scores detect more understandable and actionable content (31, 33).

Second, the Misinformation tool is a validated tool that explores the grade of video misinformation (16, 20, 24, 26). It consists of 4 questions: “Does the video clearly describe the procedure?”, “Does the video clearly describe the difference between neoplastic disease and other prostate diseases?”, “Does the video give information on the pain during the examination?”, “Does the video describe the next steps to be performed after the examination?”. It ranges from 1 (extreme misinformation) to 5 (no misinformation).

**Figure 1.** PRISMA diagram depicting inclusion and exclusion criteria of YouTube™ video search.



### Statistical analyses

Descriptive statistics were presented as medians and interquartile ranges (IQR) and ranges for continuously coded variables or counts and percentages for categorically coded variables. Chi-square and Kruskal-Wallis tested the statistical significance in proportions' and medians' differences. Potential variables correlations were assessed with Pearson's test. In all statistical analyses, the R software (www.rproject.org) environment for statistical computing and graphics (R version 4.0.0) was used. All tests were two-sided with a level of significance set at  $p < 0.05$ .

## RESULTS

### Videographic characteristics

Of all 100 videos, 73 were suitable for the analyses (Table 1). The median length was 244 seconds (IQR: 129.0-549.0; range: 38.0-2541.0). The median number of views was 12954 (IQR: 1780.0-199548.0; range: 31.0-17141766.0) and the median persistence on YouTube™ was 985 days (IQR: 237.0-2155.0; range: 1.0-4550.0). Moreover, across the sample, the median number of thumbs-up, thumbs-down, comments and subscribers were 41 (IQR: 6.0-256.0; range: 0-200000.0), 4 (IQR: 1.0-45.0; range: 0-3673.0), 3 (IQR: 0-35.0; range: 0-12695.0),

7120 (IQR: 1350.0-38100.0; range:0-1670000.0), respectively. Disabled comments were recorded in 5 (6.8%) videos. Of all videos, 26.0% (n = 19), 13.7% (n = 10), 2.7% (n = 2), 2.7% (n = 2) and 54.8% (n = 40) were produced by medical doctor, private users, nurse, hospital and other, respectively. Finally, 20.5% (n = 15) and 79.5% (n = 58) videos were targeted to healthcare workers vs patients, respectively.

**Video quality assessment**

The overall median PEMAT A/V Understandability and actionability scores were 46.2% (IQR: 30.8-76.9) and 50.0% (IQR: 25.0-75.0), respectively. According to target audience, the median Understandability score was statistically significant higher for videos targeted to healthcare workers, relative to patients (69.2% [IQR: 46.2-88.5] vs 46.2% [IQR: 30.8-61.5], p = 0.01). Moreover, also the median Actionability score was statistically significant higher for videos targeted to healthcare workers, relative to patients (100.0% [IQR: 87.5-100.0] vs 25.0% [IQR: 25.0-68.6], p < 0.001) (Table 2). The overall median misinformation score ranged from 1.0 (IQR: 1.0-4.0) to 2.0 (IQR: 1.0-4.0). According to target audience (healthcare workers vs patients) the median Misinformation score ranged from 1.0 (IQR: 1.0-1.5) to 4.0 (IQR: 3.0-5.0) vs 1.0 (IQR: 1.0-3.0) to 2.0 (IQR: 1.0-4.0), respectively. Specifically, the largest median misinformation score differences between videos targeted to healthcare workers vs patients were recorded for question 1 (4.0 [IQR:3.0-5.0] vs. 1.0 [IQR:1.0-3.0], p < 0.001) and 2 (4.0 [IQR:1.5-4.5] vs. 2.0 [IQR:1.0-3.0], p = 0.02), defined as “Does the video clearly describe the procedure?” and “Does the video clearly describe the difference between neoplastic disease and other prostate diseases?”, respectively. Moreover, the Median Total Misinformation score was 2.2 (IQR:1.7-2.8). Specifically, according to target audience (healthcare workers vs patients), the median Total Misinformation

score was 2.8 (IQR:2.4-3.5) vs 2.0 (IQR:1.5-2.8) (p = 0.02), respectively (Table 3).

**Table 1.** Videographic characteristics of overall YouTube™ videos (n = 73) and according to target audience (healthcare workers vs patients) recorded on April 14<sup>th</sup>, 2021.

| Videos characteristics           |  | Healthcare workers<br>15 (20.5)                         | Patients<br>58 (79.5)                            | p-value  |        |
|----------------------------------|--|---|--|--|--------|
| Length, n (sec)                  | Median (IQR)<br>Range  | 244 (129.0-549.0)<br>38.0-2541.0                        | 586 (412.0-719.0)<br>60.0-1380.0                 | 219 (120.2-373.2)<br>38-2541                           | < 0.05 |
| Views                            | Median (IQR)<br>Range  | 12954 (1780.0-199548.0)<br>31-17141766                  | 40905 (5046.5-245701.5)<br>31.0-851104.0         | 11412 (1720-131047.8)<br>68-17141766                   | 0.4    |
| Persistence on YouTube™, n (day) | Median (IQR)<br>Range  | 985 (237-2155)<br>1-4550                                | 386 (48.0-1508.5)<br>1.0-3864.0                  | 1043 (320.2-2604)<br>2-4550                            | 0.1    |
| Thumbs-up, n                     | Median (IQR)<br>Range  | 41 (6.0-256.0)<br>0-200000.0                            | 97 (27.0-248.0)<br>0-6815.0                      | 21.5 (6.2-255.2)<br>0-200000.0                         | 0.4    |
| Thumbs-down, n                   | Median (IQR)<br>Range  | 4 (1.0-45.0)<br>0-3673.0                                | 11 (1.0-56.5)<br>0-249.0                         | 4 (0.2-44.8)<br>0-36730                                | 0.7    |
| Number of comments, n            | Median (IQR)<br>Range  | 3 (0-35.0)<br>0-12695.0                                 | 11 (1.5-30.0)<br>0-682.0                         | 2 (0-34.2)<br>0-12695.0                                | 0.3    |
| Disabled comments, n (%)         | No<br>Yes  | 68 (93.2)<br>5 (6.8)                                    | 14 (93.3)<br>1 (6.7)                             | 54 (93.1)<br>4 (6.9)                                   | 0.99   |
| VPI, n                           | Median (IQR)<br>Range  | 23.9(2.1-233.5)<br>0-11972.6                            | 62.8 (12.9-444.6)<br>0-11972.6                   | 14.8 (1.9-206.5)<br>0-8454.4                           | 0.3    |
| Subscribers, n                   | Median (IQR)<br>Range  | 7120 (1350.0-38100.0)<br>0-1670000.0                    | 4650 (3830.0-31400.0)<br>60.0-63700.0            | 9710 (1320.0-159750.0)<br>0-1670000.0                  | 0.8    |
| Author, n (%)                    | Medical Doctor<br>Private User<br>Nurse<br>Hospital<br>Other | 19 (26)<br>10 (13.7)<br>2 (2.7)<br>2 (2.7)<br>40 (54.8) | 8 (53.3)<br>3 (20)<br>1 (6.7)<br>0 (0)<br>3 (20) | 11 (19)<br>7 (12.1)<br>1 (1.7)<br>2 (3.4)<br>37 (63.8) | 0.02   |

*IQR: Interquartile Range; VPI: Video Power Index.*

**Table 2.** PEMAT A/V scores of overall YouTube™ videos (n = 73) and according to target audience (healthcare workers vs patients) recorded on April 14<sup>th</sup>, 2021.

| Pemat A/V         |                       | Overall<br>(N = 73)         | Healthcare workers<br>15 (20.5)  | Patients<br>58 (79.5)       | p-value |
|-------------------|-----------------------|-----------------------------|----------------------------------|-----------------------------|---------|
| Understandability | Median (IQR)<br>Range | 46.2 (30.8-76.9)<br>0-100.0 | 69.2 (46.2-88.5)<br>30.8-100.0   | 46.2 (30.8-61.5)<br>0-100.0 | 0.01    |
| Actionability     | Median (IQR)<br>Range | 50.0 (25.0-75.0)<br>0-100.0 | 100.0 (87.5-100.0)<br>50.0-100.0 | 25.0 (25.0-68.8)<br>0-100.0 | < 0.001 |

*IQR: Interquartile Range.*

**Table 3.** Misinformation scores of overall YouTube™ videos (n = 73) and according to target audience (healthcare workers vs patients) recorded on April 14<sup>th</sup>, 2021.

| Misinformation score   |                       | Overall<br>(N = 73)       | Healthcare workers<br>15 (20.5) | Patients<br>58 (79.5)     | p-value |
|--|-----------------------|---------------------------|---------------------------------|---------------------------|---------|
| Does the video clearly describe the procedure?   | Median (IQR)<br>Range | 2.0 (1.0-4.0)<br>1.0-5.0  | 4.0 (3.0-5.0)<br>2.0-5.0        | 1.0 (1.0-3.0)<br>1.0-5.0  | < 0.001 |
| Does the video clearly describe the difference between neoplastic disease and other prostate diseases? | Median (IQR)<br>Range | 2.0 (1.0-4.0)<br>1.0-5.0  | 4.0 (1.5-4.5)<br>1.0-5.0        | 2.0 (1.0-3.0)<br>1.0-5.0  | 0.02    |
| Does the video give information on the pain during the examination?                                    | Median (IQR)<br>Range | 2.0 (1.0-4.0)<br>1.0-5.0  | 3.0 (2.0-3.0)<br>1.0-5.0        | 2.0 (1.0-4.0)<br>1.0-5.0  | 0.7     |
| Does the video describe the next steps to be performed after the examination?                          | Median (IQR)<br>Range | 1.0 (1.0-3.0)<br>1.0-5.0  | 1 (1-1.5)<br>1.0-4.0            | 1.0 (1.0-3.0)<br>1.0-5.0  | 0.4     |
| Total Misinformation score   | Median (IQR)<br>Range | 2.2 (1.7-2.8)<br>1.0-4.75 | 2.8 (2.4-3.5)<br>1.5-4.25       | 2.0 (1.5-2.8)<br>1.0-4.75 | 0.02    |

*IQR: Interquartile Range.*

### Variable correlations

We recorded a positive statistically significant correlation between video length and PEMAT A/V Actionability ( $r = 0.26$ ,  $p = 0.02$ ), video length and Misinformation Question 1 ( $r = 0.33$ ,  $p = 0.005$ ), video length and Misinformation Question 2 ( $r = 0.24$ ,  $p = 0.05$ ). Conversely, no correlations were recorded between length and PEMAT A/V Understandability ( $p = 0.06$ ), length and Misinformation Question 3 ( $p = 0.07$ ), and length and Misinformation Question 4 ( $p = 0.4$ ). Similarly, no correlations were recorded between all the other Videographic characteristics and quality videos' assessment tools (all  $p > 0.05$ ).

### DISCUSSION

The current study aimed to assess *YouTube*<sup>TM</sup> videos' quality on prostate checks, especially on DRE, and to investigate if they can correctly inform patients and eradicate their beliefs and myths. To the best of our knowledge, no studies on DRE were found in the literature. We addressed this void and identified several noteworthy observations.

First, of all 73 videos eligible for the analyses a median of about thirteen thousand views was recorded, conversely less than fifty thumbs-up, thumbs-down and comments were registered, highlighting a poor interaction between users and *YouTube*<sup>TM</sup> videos currently available on DRE. This observation may result from non-sufficient high videos quality, in terms of Videographic characteristics or content. Moreover, we recorded that out of 73 videos, about 80% were targeted to patients and more than 50% were produced by people of no medical field. Consequently, most of the videos present on *YouTube*<sup>TM</sup> on DRE aimed to explain DRE to people without a medical background. These observations support further the aim of the present study, which was to investigate if *YouTube*<sup>TM</sup> videos could be used as a reliable tool of correct information prostate checks and especially on DRE. Second, according to the PEMAT A/V score, the overall median Understandability was 46.2% and the overall median Actionability was 50.0%. The Understandability reflects how viewers could process the information displayed in the videos, while the Actionability reflects how viewers could use them. According to *Shoemaker et al.*, a PEMAT score  $< 70\%$  is considered poorly understandable or poorly actionable (34). In consequence, we recorded poorly understandable and actionable content based on our results. Specifically, the median Understandability score of videos targeted to healthcare workers was 69.2% and median Actionability score was 100.0%. Conversely, the median Understandability score of videos targeted to patients was 46.2% and the median Actionability score was 25.0%. Therefore, based on our results, videos targeted to healthcare workers were actionable and only slightly below the limit of the understandability. Furthermore, based on our results, videos targeted to patients were neither understandable nor actionable. Unfortunately, no previous investigators examined *YouTube*<sup>TM</sup> information on DRE. However, we compared our results with the ones achieved in other studies dealing with the fairness of *YouTube*<sup>TM</sup> videos on different medical topics. For example, *Rubel et al.*, analyzed 50

*YouTube*<sup>TM</sup> videos focused on sinusitis, reporting similar Understandability and Actionability scores (57.5% and 33.3, respectively), relative to our results (35).

Conversely, *Morra et al.*, analyzed the quality of 100 *YouTube*<sup>TM</sup> videos on Bladder Pain Syndrome, reporting higher Understandability and Actionability scores (66.7% and 75%, respectively) (20).

Therefore, the Understandability and Actionability scores of videos have a noticeable variation related to the topics addressed. It may be useful, for future *YouTube*<sup>TM</sup> video authors, to create new tools to guarantee a homogenous level of Understandability and Actionability among all the possible topics.

Third, according to the Misinformation tool, we recorded a high rate of misinformation of *YouTube*<sup>TM</sup> videos on DRE. Specifically, the lowest overall median score was recorded for Question 4, defined as "Does the video describe the next steps to be performed after the examination?", highlighting the incompleteness of *YouTube*<sup>TM</sup> information on DRE. Moreover, we highlight a remarkable statistically significant difference between videos targeted to healthcare workers vs patients in terms of misinformation. Specifically, for Question 2, defined as "Does the video clearly describe the difference between neoplastic disease and other prostate diseases?", we recorded a median of 4.0 (IQR:1.5-4.5) vs. 2.0 (IQR:1.0-3.0) ( $p = 0.02$ ), for healthcare workers vs patient, respectively. Indeed, despite PCa is the most common malignancy among elderly men 1, other non-neoplastic diseases can affect the prostate, such as prostatitis or benign prostatic hyperplasia (36-39). Therefore, *YouTube*<sup>TM</sup> videos on DRE should clearly describe all the different possible diagnostic scenarios, to reduce misinformation.

Fourth, we tested Pearson's correlation between Videographic characteristics and quality assessment tools scores. A mild positive statistically significant correlation between the video length and PEMAT A/V Actionability, Misinformation Question 1, Misinformation Question 2 was recorded. These findings, were consistent with *Morra et al.*, highlighting the importance of sufficient time to correctly describe a medical topic, such as DRE, to *YouTube*<sup>TM</sup> users (20). Therefore, video length may not be underestimated during the making video process.

Taken together, according to our results the quality of the information provided by *YouTube*<sup>TM</sup> videos on DRE is low. Moreover, according to our data a poor interaction between videos and *YouTube*<sup>TM</sup> users, testified by few thumbs-up, thumbs-down, and comments, was recorded. Authors of future videos on DRE should increase the quality of information and improve the appeal of the videos, to increase interaction with the users. Given the rising role of multimedia in the various healthcare services, a formal standardization of media contents addressed to medical and non-medical users would be desirable. Indeed, this will potentially decrease the risk of misinformation and will provide homogeneous content in the different paths of the healthcare process useful for the patient and family counseling.

Our study is not devoid of limitations. First, *YouTube*<sup>TM</sup> search algorithms show videos based on relevance. However, to ensure the most unbiased results, the research was conducted after logging out from any per-

sonal account (incognito status) and changing the location setting a VPN proxy to guarantee that the YouTube™ videos displayed were not geared toward healthcare professionals or to any previous research. Second, we only consider a sample of 100 videos. However, this sample is based on general population search strategy (40). Third, It is important to note that this study is limited by the ever-changing content of the Internet, which cannot be captured using a cross-sectional design.

In conclusion, based on our analyses, YouTube™ videos' quality on DRE resulted unsatisfactory according to the PEMAT A/V score and the Misinformation tool. Videos targeted to healthcare workers got higher quality scores if compared to videos targeted to patients. Therefore, YouTube™ videos' may not be considered a reliable source of information on DRE for patients.

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