

The quality of YouTube videos on radiotherapy and prostatectomy for prostate cancer

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ABSTRACT**Introduction:** Prostate cancer ranks as the third leading cause of death among Canadian men, and is primarily treated with radiotherapy and prostatectomy. Given YouTube's significant global traffic, patients often turn to it for information on treatment and side effects. This study assessed YouTube videos for prostate cancer patients, focusing on radiotherapy, prostatectomy, and side effect management.**Methods:** The study analyzed 50 YouTube videos, comparing their accuracy and coverage against the National Comprehensive Cancer Network (NCCN), UpToDate, and *cancer.ca*. Two raters were involved in the review of the videos to ensure inter-rater reliability.**Results:** Video lengths ranged from 1–60 minutes (mean 11 minutes), and creation dates ranged from 2012–2021. Videos were presented by physicians, patients, or allied health professionals (75%, 16%, and 8%, respectively). Results showed physician presenters had a Video Power Index (video popularity) of 23.45, while patient presenters had an average of 61.36 (almost three times as popular as physician-led videos). The overall accuracy of videos showed that 82%**KEY MESSAGES**

- YouTube is becoming increasingly used as an information source for prostate cancer patients.
- This study analyzed the quality of YouTube videos available to prostate cancer patients, specifically focusing on radiotherapy and prostatectomy.
- Results demonstrated accurate coverage of treatment side effects, with more information needed on quality of life after treatment and management of side effects.

demonstrated completely accurate and detailed information, 18% showed partially complete information, and 76% showed no biased information. No false information was found in any videos.

Conclusions: This study showed that while the YouTube informational videos included good coverage of treatment side effects, there were gaps in information regarding quality of life after treatment or management of side effects. Information from this study can benefit the provider-patient interaction, with the hope that healthcare providers create more videos on quality of life after treatment and management of side effects to satisfy patient needs.

INTRODUCTION

Prostate cancer stands as the third most common cause of mortality among Canadian men, with an alarming average of 64 new diagnoses each day in 2020 alone¹. Radiotherapy and prostatectomy, either alone or in combination, are the primary treatment approaches for prostate cancer².

Despite healthcare professionals' efforts to offer thorough guidance on treatment options and potential side effects, a significant proportion (74%) of patients still experience unmet needs in terms of psychological, sexual, and post-therapy patient care support³. In response, patients increasingly turn to online platforms, especially YouTube, to independently seek medical information and clarify post-clinical encounter details^{4,5,6}. With YouTube being the second most utilized resource for health information (an estimated 21.9 billion visits to YouTube for general entertainment and information gathering as of June 2021)^{7,8}, evaluating the quality and reliability of these videos is crucial, considering concerns about misinformation and misleading content⁹. A meta-analysis by Madathil, et al (2015) found that YouTube contained several major safety concerns for consumers on health care information. These include 1) the promotion of unscientific and unapproved therapies, 2) contradicting information on practices and standards, 3) increasing amounts of product advertising for businesses that may circumvent government regulations, and 4) increasing numbers of YouTube influencers expressing anecdotal and controversial opinions on healthcare topics⁷.

Given the prevalence of prostate cancer among Canadian men, unmet post-treatment care needs, and the use of YouTube as a source of health-related information, this study aims to assess the quality of YouTube videos addressing prostatectomy and radiotherapy for prostate cancer patients, focusing on accuracy, potential bias, and guidelines for managing post-treatment side effects and quality of life. By meeting patients' supportive care needs, healthcare providers can greatly impact patient decisions on treatments, perspectives on care, and quality of life after treatment.

METHODS

Video selection

The research team selected three topics through a search of relevant literature and discussion. These topics were: “Prostate radiotherapy side effects”, “Prostatectomy side effects”, and “Prostate radiation versus Prostatectomy side effects”. For each topic, two to three phrases (Figure 1) were used to search for relevant videos. Each phrase was sequentially entered into the YouTube search engine to generate a list of videos and URLs. The first 50 videos from each search phrase were then recorded, as it was felt this would likely represent the maximum number of videos a patient may view.

Three lists were created for each topic, and URLs were recorded in the rank order provided by YouTube as top-viewed videos. Videos were excluded if they were not in English and/or if they did not have any likes or dislikes to allow for Video Power Index (VPI) calculation. The lists were then combined by average video rank order appearance to make up a final list of 50 videos to be analyzed. With rank-ordering, duplicated videos found between search phrases entered were prioritized for inclusion, followed by the top appearing unique videos from all three lists, filling up the remaining slots in our final list of 50 videos.

Video characteristics

To date, there are no pre-existing, comprehensive standardized tools for assessing online videos for patient health education. However, prior work using Paris Ingledew’s design-based research tool (Navigating the internet in Patient Physician Collaboration, 2015) has iteratively been improved through application to topics including breast cancer, lung cancer, and COVID-19 and cancer. This systematic approach to evaluating objective video parameter information is now the third iteration of this tool used for this purpose^{10,11,12}. Videos were reviewed in four broad domains (Figure 2): General Parameters, Video Source/Presentation, Coverage, and Accuracy/Biases. This evaluation tool was used by the PI (an oncologist with experience treating genitourinary cancers) and a research assistant (medical student) to independently score ten random videos from the final 50 videos. Inter-rater consistency was evaluated using kappa value or intraclass correlation coefficient (ICC) for continuous variables with a predetermined goal of >0.70. It was decided, a priori, that if there were major discrepancies with ICC or kappa (<0.70), the scoring tool may require revision, and an additional random sample would be analyzed. In the case of minor discrepancies (kappa >0.70), there would be iterative discussion, and the remaining videos could be assessed by one researcher independently.

Under general parameters, each video was assessed for its number of views, date of creation, number of likes and dislikes, video length, and VPI. VPI was calculated by taking the like ratio (the number of likes divided by the total number of likes and dislikes) multiplied by the view ratio (the number of views divided by the number of days since the video was last posted) and

divided by 100. A higher VPI may correspond to greater popularity and the likelihood of the video showing up as the first hit, but it holds no bearing on the quality of the video^{10,13}.

Under video sources/presentation, the number of external links and accessibility was further analyzed to determine whether they brought the viewer more information or provided additional educational support such as workshops, modules, or surveys to test viewers' knowledge. Each category was scored either zero (not present), or one (present). Videos were also reviewed for sources of information (citations) and were scored as zero if there were no citations or one if citations were present. Citation sources were considered "reliable" if they included scholarly, peer-reviewed manuscripts or trade/professional articles that contained similar information found from the National Comprehensive Cancer Network (NCCN), UpToDate (point of care tool), and the Canadian Cancer Society (cancer.ca). The reliability of these citations was scored as zero (not reliable), one (one reliable source), and two (two or more reliable sources). Presentation and format were analyzed and coded for type of presenter (physician, allied health professional, patient, or other), media type (lecture style, interview, live video), and target audience (targeted for the patient, health care provider, or both).

A consensus document was developed to evaluate the coverage of information and the accuracy of videos. Prostate cancer information from videos was compared to information from NCCN, UpToDate, and Cancer.ca. The consensus document developed by the research assistant summarized the basics of prostate cancer, treatment types, treatment side effects, risk and benefits of treatment, post-treatment care, and quality of life, as reflected in these sources. The PI and research assistant co-reviewed the consensus document and pre-determined the "facts" required for scoring coverage and accuracy.

Coverage was scored as zero (not present) or one (present) for the following topics: treatment, side effects, risk/benefits, quality of life, post-treatment management, and special considerations. The special considerations subcategory included the relationship between comorbidities and side effects of interventions, new technology/techniques, and the quality or experience of the physician providing the service.

Under accuracy, information was scored on a scale of zero to two based on the categories listed under "coverage" as follows:

- 0: The video did not contain accurate information or significant information was missing.
- 1: Information was mostly accurate – the information contained partially listed, partially defined, and less elaborated information than the compiled health sources consensus document.
- 2: All information is accurate and complete – information contains fully listed, well-defined, and elaborated information consistent with compiled health sources from the consensus document.

Scores were tallied for each topic, and an “overall” accuracy score was calculated.

Finally, videos were assessed for any biased opinions expressed when interpreting, analyzing, and presenting facts to the viewers. For example, if the presenter clearly stated that one therapy was better than the other, or the presenter expressed only the negative outcomes of one therapy and only the benefits of the opposing therapy, the objectivity of that video was considered biased. A score of zero indicated the presence of biased information, and one represented no significant biased language.

Statistical analysis

An Excel program was used to manage all our data and calculations, and average values were calculated in categories: Presenters and Sources, Coverage, and Accuracy and Biases, which allowed us to interpret and compare results. Additionally, the mean, median, and mode of video lengths, and the correlation coefficient were calculated to get the relationships between Video Power Index and date of creation, video length, and global accuracy.

RESULTS

Video selection and inter-rater reliability

A total of 83 videos were identified when all phrases were entered into YouTube. After an initial review of videos, three videos were excluded (not in English or had no “likes”), which left 80 viable videos for the research. Videos were not excluded by date as the team wanted to choose the first 50 unique videos that YouTube would compile based on their popularity algorithm. Search phrases for prostatectomy generated videos involving both simple prostatectomy and transurethral resection of the prostate (TURP). Similarly, phrases for radiation generated simple radiation, brachytherapy, and external beam radiation therapy (EBRT). Generated videos were lumped into the category of either Prostatectomy or Radiotherapy treatments since they had no distinction in side effects or management between simple therapy versus specialized therapy. 35 videos were found using the prostatectomy group phrases, 29 for radiotherapy, and 16 for prostatectomy vs radiotherapy (Figure 1). With a 50 video sample limit, 15 videos were found to be duplicates between all three phrase groupings, leaving 35 spots open for unique videos to be included. 20 and 14 videos unique to prostatectomy and radiotherapy phrase groupings were included, and one video unique to the phrase grouping “Prostatectomy vs radiotherapy” was included (Figure 1).

Co-coding of ten videos demonstrated good ICC (>0.70) when using the consensus document. Therefore, the remaining 40 videos were coded independently by the medical student.

General parameters

Video creation dates ranged from 2012 to 2021, and the length of videos ranged from one to sixty minutes, with an average of eleven minutes and a right-skewed distribution (median =

6.28min, mode = 2.16min). Correlations were calculated between VPI and date of creation $r = -0.198$, VPI and video length $r = 0.052$, and VPI and global accuracy of the videos $r = 0.041$.

Video presenters and sources

90% of videos showed the credentials of the presenters and authors, 60% disclosed sponsorship or advertising, and 78% showed author affiliations. Among affiliations, 40% were affiliated with non-profit organizations, 22% with teaching hospitals and schools of medicine, 14% with commercial health care institutes, and zero videos were found to be affiliated with government organizations.

Regarding presentation results (Figure 3), 75% of videos had physician presenters, 16% were patients discussing their experiences, and 8% were from Allied health professionals such as nurses and physical therapists. As for VPI, physician videos had an index of 23 compared to patient videos with 61.

Under target audience, 48 of the 50 videos were directed toward health consumers, while two videos were directed at physicians and other healthcare providers. 42% of videos provided two or more links to additional information, 58% of videos had the comments sections enabled, and 14% of videos had educational support links to evaluate whether patients understood the information.

Regarding citations, 76% of presenters did not cite any sources to back up their information, 4% cited one reliable source, and 20% cited two or more sources. All presented citations were observed to be peer-reviewed published data or textbooks.

Coverage

Of the 31 videos that contained radiotherapy information ($n=31$), ten videos (32%) described both the procedure and risks/benefits of the therapy, 17 videos (55%) described either the procedure or the risks/benefits of the therapy, and four videos (13%) did not mention either. Of the 37 videos that contained prostatectomy information ($n=37$), 12 videos (32%) described both the procedure and risk/benefits of therapy, 19 videos (51%) described either the procedure or the risks/benefits of the surgery, and 6 videos (16%) did not mention either.

When considering coverage of side effects, quality of life, and special considerations in videos containing radiotherapy information ($n=31$), 25 videos (81%) covered side effect symptoms, 18 videos (58%) covered quality of life post-therapy, and 21 videos (68%) covered special considerations. In comparison, videos containing prostatectomy information ($n=37$), 32 videos (86%) covered side effect symptoms, 27 videos (73%) covered quality of life, and 28 videos (76%) covered special considerations.

Of the overall 50 videos, 24 videos (48%) covered how to manage the side effects of post-radiotherapy and/or prostatectomy.

Accuracy and biases

Accuracy used the same subcategories as Coverage, and the results are seen in Figure 4. Of the videos that mentioned managing side effects (n=24), 16 videos (67%) provided full detail and completely accurate management information. In comparison, eight videos (33%) provided accurate information but needed more details on the subject matter (Figure 5).

Overall, the accuracy of all 50 videos showed that 82% had completely accurate and detailed information, while 18% had accurate but not detailed information. No videos were found to have false information. The number of videos presenting completely accurate information regarding radiotherapy, prostatectomy, or both procedures was similar across domains (n=13, 14, and 14 videos, respectively). In comparison, six prostatectomy videos presented accurate but not detailed information, while radiotherapy and videos discussing both procedures had one video each showing accurate but not detailed information. Finally, 76% of the 50 videos presented no biases, while 24% showed biases.

DISCUSSION

Because prostate cancer is prevalent among men, and YouTube being the second largest source of health information for patients, this study aimed to characterize and evaluate YouTube videos available to prostate cancer patients. The results of this study showed variable results with room for improvement.

From the perspective of patients and their caregivers, being well-informed of all possible treatments, side effects, and post-treatment care methods may improve coping skills^{6,14}, however, many patients feel that it is difficult to get information about the impact of cancer treatments on their quality of life, such as family life, loss of financial support, and careers⁶. This study revealed that radiotherapy videos provided more complete information regarding therapy procedures and benefits with complete accuracy and full detail, as compared to prostatectomy videos which provided better information in covering risks, quality of life, special considerations, and side effects with complete accuracy and full detail (Figure 4). Concerning the management of side effects, only 24 of 50 videos covered this information, and 16 (67%) of those videos gave completely accurate information with full detail. As such, even if patients were given a list of accurate side effects, they may need more information on how to manage them effectively on their own. Additionally, with only 35% radiotherapy and 46% prostatectomy videos providing completely accurate and fully detailed information on the quality of life (Figure 4), there is a need for more videos to include discussions on the quality of life issues pre and post-therapy, along with the management of these side effects.

Studies have also demonstrated that patients may prefer to obtain medical information from other patients with similar stages of illnesses or who have undergone similar treatments; this can reduce fear and isolation and increase assurance¹⁵. As such, there may be a preference for patient-led videos. However, a study done by Kuru and Erken (2020) suggests that videos presented by healthcare providers may be of higher quality in terms of information delivered and accuracy¹⁶. In this study, most of the videos were presented by physicians (75%) versus patient

presenters (16%). Yet, patient-led videos showed a higher VPI of 61, almost three times the VPI of physician-led videos (VPI = 23) (Figure 3). This suggests that even though healthcare providers may have higher quality videos, patient-led videos are still more popular than physician-led videos, thus propelling these videos up in the queue for viewership. A recommendation is for healthcare provider videos to incorporate patient presenters and their experiences on treatments, side effects, and anecdotal methods on managing side effects while maintaining high-quality information delivered through monitoring and/or clarifying what patients are presenting.

Patients also prefer information connected to centers with established reputations, such as universities, medical centers, and government-appointed departments of health^{6,15}. Of the 50 videos viewed, 40% were affiliated with non-profit organizations, 22% were affiliated with teaching hospitals and schools of medicine (Universities), and government-appointed health departments produced no videos. This study also found that 24% of the videos were observed as biased by emphasizing the positive outcomes of certain procedures while giving an incomplete representation of the side effects or emphasizing the negative aspects of a different procedure. Where possible, health videos should place a disclaimer recommending that patients speak to their specialist for the best available therapy for their needs.

There are some limitations to this study. Given that this study was done using a personal computer and was not set to incognito mode on Chrome, there may be selection and search biases based on geographic location, and previous searches may have influenced YouTube's algorithm in selecting videos. Furthermore, since the search was done in a single session, new videos may have been uploaded, and viewership along with likes and dislikes may have changed over time, causing the VPI to shift and YouTube algorithms to change the order of videos in subsequent searches. While reviewing 50 videos simulates an average number of videos viewed by a consumer, future research may include a larger sampling of videos to increase reliability and accuracy of data. To reiterate, there is no gold standard tool for evaluation, however, the tool used in this study, along with additional future studies, has been iteratively refined using principles of design-based research. Lastly, although the co-coding of videos demonstrated good ICC between the medical student and principal investigator, having only one outcome assessor can still introduce high levels of variability. To avoid this inconsistency, two outcome assessors could be used in future studies, with a third assessor to resolve any disagreements.

Future research studies could include analyzing patient-led health videos to determine factors that lead to a higher VPI, and qualitative studies could be done, including a review of video comments to assess their impact on patients and if misinformation appears through patient-to-patient dialogue.

By understanding what information is accessible to prostate cancer patients on YouTube, healthcare providers can effectively discuss and clarify any misinformation or biases and provide additional necessary information.

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DRAFT

FIGURES AND TABLES

Figure 1. Results of YouTube selection process.

Radiotherapy phrase grouping:

1. Prostate cancer radiotherapy side effects
2. Prostate cancer radiation therapy side effects management
3. Managing side effects of prostate cancer radiotherapy

Total videos generated by YouTube : 29

Unique videos: 14

Prostatectomy phrase grouping:

1. Prostate cancer prostatectomy side effects
2. Prostate cancer surgery side effects

Total videos generated by YouTube : 35

Unique videos: 20

Prostatectomy vs Radiotherapy phrase grouping:

1. Prostatectomy versus radiation side effects
2. Prostate surgery vs radiation side effects
3. Prostate surgery vs radiation side effects management

Total videos generated by YouTube : 16

Unique videos: 1

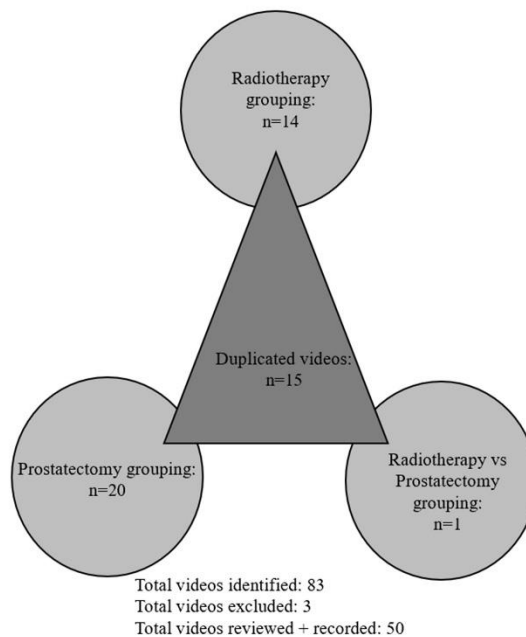
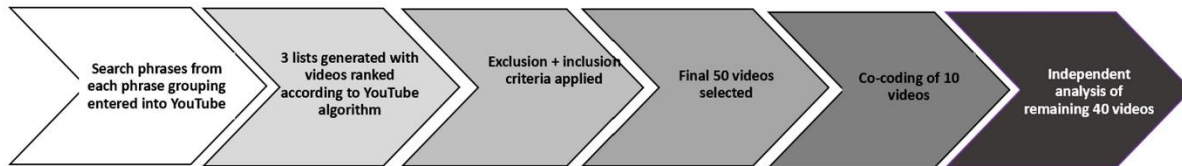


Figure 2. Flow diagram for video analysis.



Analysis Categories	
General parameters	Video length, Date of creation, # of likes/dislikes, Popularity (aka VPI)
Sources	Creator, Affiliations and disclosures, Sources used/Citations, Number of external links
Presentation	Presenters, Media type, Target audience
Coverage, Accuracy, and Overall accuracy	Consensus scoring document tool
	Evaluation of videos based on its descriptions of: Treatment, Side effects, Quality of life, Management, Special considerations
Objectivity	Presence or absence of bias

Figure 3. Percentage of videos by presenter type and popularity (VPI).

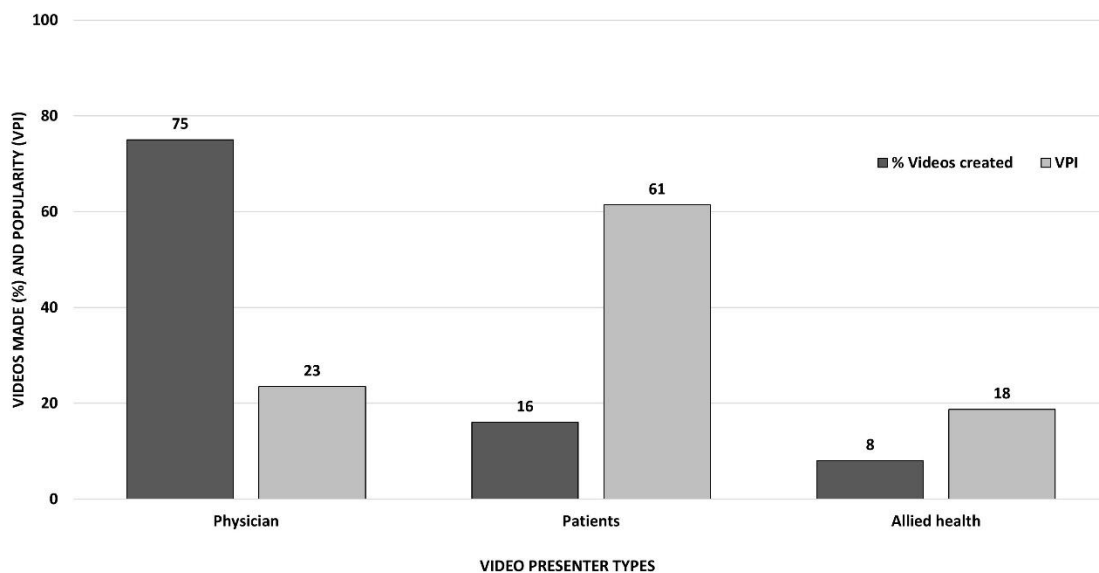


Figure 4. Accuracy of radiotherapy and prostatectomy information.

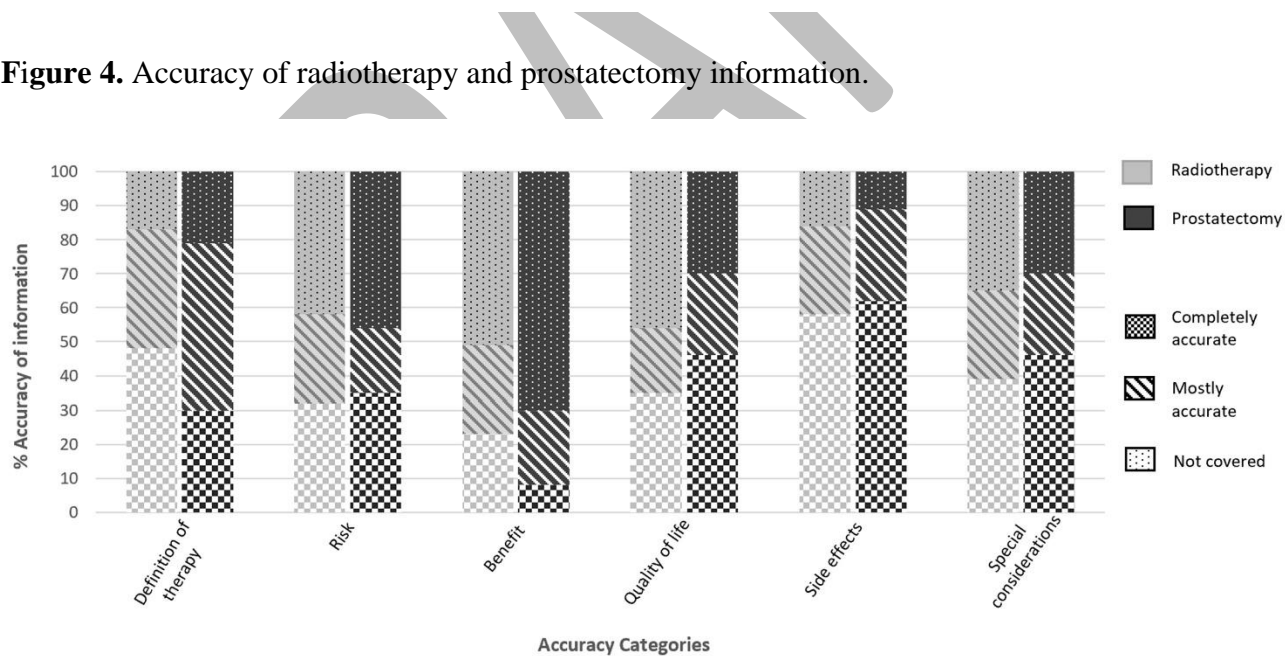
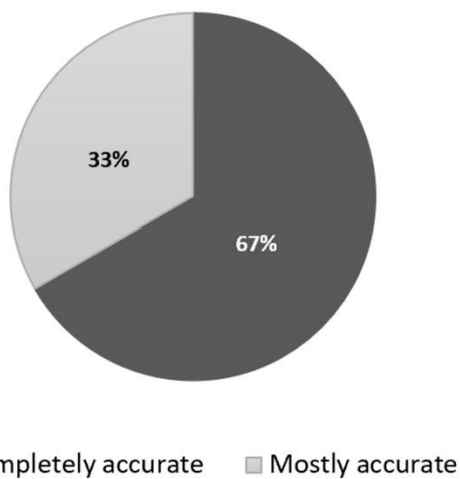


Figure 5. Accuracy of radiotherapy and prostatectomy videos containing information on managements of side effects.



DKA