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ORIGINAL ARTICLE

Analysis of Videos on Intrauterine Device Insertion and Lumbar Puncture Hosted on Youtube

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Highlights

The analyzed videos did not demonstrate the correct sequence for executing the techniques.
Students need to exercise caution when searching for educational video resources.
Faculty and educational institutions should support students in selecting videos.

ABSTRACT

Information and Communication Technologies (ICT) encompass technical tools that facilitate the sharing of information and communication processes through resources such as computers, the internet, and social media. One significant tool provided by ICT is videos hosted on virtual platforms like YouTube®, which are increasingly adopted in health education as Active Methodologies replace the traditional Cartesian approach. This study aimed to analyze the content of videos on Intrauterine Device (IUD) insertion and lumbar puncture available on the YouTube® site, assessing the quality of the material published regarding the demonstration/execution of the aforementioned procedures. This is an exploratory-descriptive, documentary-type study. For the search on the IUD insertion procedure, the following descriptor was used: "IUD insertion". For the second search, regarding the lumbar puncture procedure, the descriptor "lumbar puncture" was used in the YouTube® search field. In each search, the first 100 results were displayed After the initial search and data collection, a full viewing of all the videos selected for analysis was conducted. After applying the eligibility criteria, the final sample consisted of 45 videos, with 30 related to the IUD insertion procedure and 15 to the lumbar puncture procedure. Regarding the person responsible for producing the videos, for both procedures, the majority for both procedures were created by individuals in Brazil, typically in an outpatient setting using simulator-type resources. Based on the theoretical framework adopted in this study, it was found that 100% of the videos analyzed for both procedures did not follow the correct execution sequence. It is recommended that medical undergraduate students exercise greater caution and prudence when searching for and selecting audiovisual materials on digital platforms.

Keywords: Educational Technology; Educational Films and Videos; Medical Education.

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INTRODUCTION

Medical education has been consistently evolving with the rise of innovative approaches, the use of Active Methodologies (AM), curriculum reforms, and academic production. This shift is driven by the need to address the limitations of the traditional, Cartesian-based model, which segments areas of knowledge and emphasizes biological aspects over humanistic ones.[1-2] In this context, and in alignment with the principles established by the Unified Health System (SUS), AMs aim to correct the deficiencies of the traditional model by promoting reflective, humanized, and multiprofessional work. These methodologies empower students with autonomy and critical thinking regarding their educational journey. Methods such as Problem-Based Learning (PBL) and Team-Based Learning (TBL) facilitate the natural integration of research, teaching, and community outreach.[3]

In this context, AMs also facilitate the integration of Information and Communication Technologies (ICTs) into teaching practices. ICTs encompass technical tools that enable the sharing of information and communication processes through resources like computers, the internet, and social media.[4] They have become increasingly prevalent in everyday life and, importantly, in education, as they aim to enhance the learning process by providing digital resources that enable new forms of interaction and access to information. Moreover, ICTs are increasingly being integrated into health education, fostering autonomy in the pursuit of knowledge, content comprehension, clinical decision--making, and the quality of care delivery.[3] This underscores the significance of these new resources in society, particularly in the educational environment, where they aim to provide easier and more practical access to materials, content, and information sources that were previously limited to select individuals.

One of the teaching tools offered by ICTs is videos hosted on virtual platforms like YouTube®, which serve as valuable educational instruments by combining various linguistic resources, such as illustrations, audio, and animations, to facilitate content sharing. Students using AMs frequently consume academic content in the form of videos, given the widespread access to virtual media and the convenience of accessing them at their free time.[5] Although their use in medical education is increasing, evidence of their effectiveness is still scarce.[5]

YouTube® search results are based on relevance, popularity, and viewing history, not content quality. Thus, users of the platform may be exposed to videos containing unverified content and partially false information.[6] Consequently, some of these videos may rely on obscure references and include content inconsistent with scientific evidence, as they are not subjected to validation processes. This lack of verification can pose a significant risk to patient safety when these procedures are replicated in real-world settings.[7]

Among the various techniques and procedures typically taught in medical school are intrauterine device (IUD) insertion, a key contraceptive method offered by the Unified Health System (SUS), and lumbar puncture, a procedure frequently used to diagnose neurological conditions.

In this sense, according to Bill No. 9263/1996, family planning was approved to ensure that the Unified Health System (SUS), at all its levels and spheres, provides assistance regarding contraception and conception.[8] Consequently, the intrauterine device (IUD) stands out as a highly satisfactory contraceptive method due to its low complication rates and the product longevity[9], offering the health system an accessible and cost-effective solution. The IUD is a reversible, safe, and effective method that supports women's autonomy in protected sexual activity, family planning, and reducing unwanted pregnancies. However, obstacles to its widespread use include a shortage of qualified doctors to perform the procedure and persistent errors in the application technique.[10]

Moreover, the lumbar puncture procedure involves the removal of cerebrospinal fluid (CSF). To obtain a sample of cerebrospinal fluid from the lumbar cistern, a lumbar puncture needle with a stylet

is inserted into the subarachnoid space. Under aseptic conditions, the needle is introduced into the midline between the spinous processes of the L3 and L4 vertebrae (or L4 and L5). At these levels in adults, there is a lower risk of injuring the spinal cord, as it terminates at the L2 level.[11] The puncture e is crucialfor monitoring and diagnosing various diseases, such as meningitis, by analyzing cerebrospinal fluid (CSF) samples through microbiological studies. This helps identify specific pathogens and guides antimicrobial treatment. Additionally, the analysis of cytological characteristics, appearance, and color of the fluid provides valuable information for detecting intracranial hemorrhages. However, several complications can arise, influenced by the operator's knowledge of the technique, including post-puncture headaches and paresthesia resulting from nerve injury.[12]

Given the frequent use of these procedures in clinical practice, it is essential for students and health care professionals to be well-prepared to perform them, using learning methods that thoroughly cover the content and align with current scientific evidence. "Therefore, it is crucial to conduct a critical analysis of educational resources, both for initial learning and for review, with the goal of professional training and ongoing updating

From this perspective, this research was designed to review the content of videos on IUD insertion and lumbar puncture available on YouTube® to evaluate the quality of the material regarding the demonstration and execution of these procedures.

METHOD

Type of study

This is an exploratory-descriptive, documentary-type study, conducted based on the analysis of audiovisual sources. This documentary analysis aims to obtain information from the researched sources in order to understand the phenomena contained within them.[13]

Study setting

The study setting is the video-sharing site YouTube®, which can be accessed at the following virtual address: www.youtube.com. This platform was selected due to its extensive collection of freely available audiovisual content.

Methodological procedures

To collect the data, two searches were performed on YouTube®, as follows: the first, concerning the IUD insertion procedure, was conducted in December 2022; the second, concerning the lumbar puncture procedure, was conducted in February 2023. For the search on the IUD insertion procedure, the following descriptor was used: "IUD insertion". For the second search, regarding the lumbar puncture procedure, the descriptor "lumbar puncture" was used in the YouTube® search field. In each search, the first 100 results were displayed.

The following inclusion criteria were used: videos aiming to demonstrate the IUD insertion procedure of any type (whether copper or hormonal) or lumbar puncture; available in Portuguese or subtitled in Portuguese; and publicly accessible videos featuring either verbal or non-verbal communication. Videos were excluded if they did not directly reference the IUD insertion/lumbar puncture procedure in their title and description; were duplicates; included multiple unrelated procedures; were lectures or classes about the procedure without demonstrating the technique or included personal accounts; or were in languages other than Portuguese without Portuguese subtitles.

After the initial search and data collection, a full viewing of all the videos selected for analysis was conducted. After applying the eligibility criteria, the final sample consisted of 45 videos, with 30

related to the IUD insertion procedure and 15 to the lumbar puncture procedure. From the selected sample, a database was created for the subsequent analysis of the study variables. Data collection was conducted in a single day due to the high dynamism of the data available online. The links to the selected videos were transcribed into a Microsoft Word table for future reference. Figure 1 shows the flowchart of the video selection process.

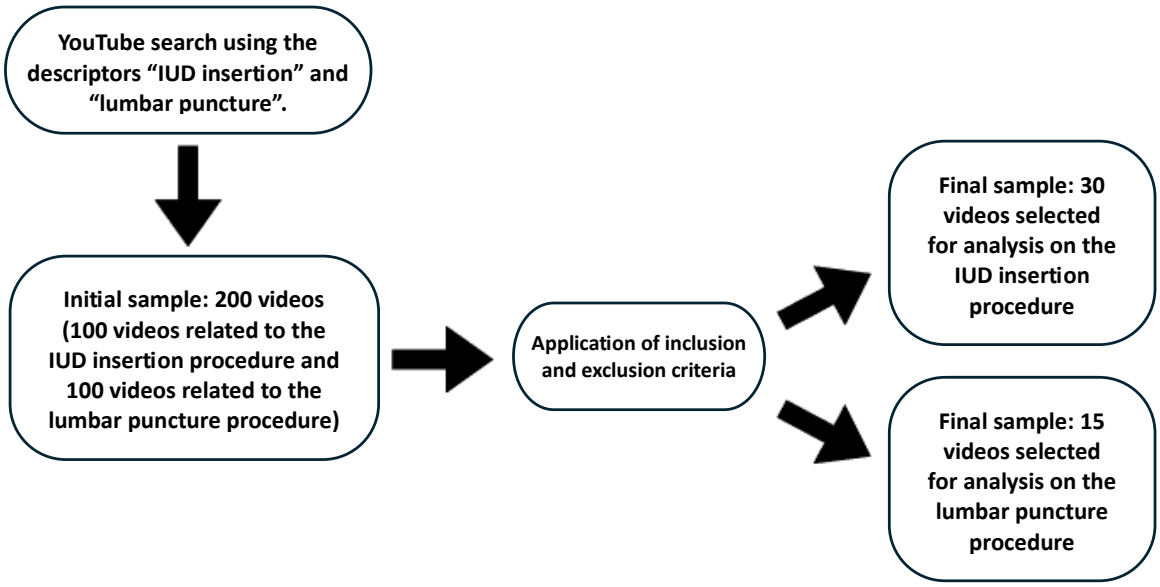

Figure 1 – Video selection flowchart

Source: Prepared by the authors (2023).

Data analysis

Video searches on the YouTube® platform were conducted without a defined location, as the site does not restrict access to freely available videos. Thus, the selected videos were viewed multiple times, and necessary data were extracted for a more detailed analysis of the information provided. This process was conducted in a standardized manner and in pairs.

The collected data included: Duration (indicated on the video timeline d in minutes and seconds); Poster (individual, legal entity, blogs); Year of posting; Country of origin; Procedure environment identified in the video; Educational resources used in the video; Use of human subjects for demonstration; Total views; Procedure execution (correct or incorrect); and Number of "likes" on the video. These indicators were chosen based on the research planning and by consulting other studies with similar methodologies that also aimed to analyze YouTube® videos.[14-15]

To verify whether the procedure execution was correct or incorrect, the adequacy of the procedural steps (Chart 1) was assessed. These steps were defined through a literature review conducted using the Technical Manual for Health Professionals – Copper T Cu 380 A IUD and the Adult Lumbar Puncture Protocol, available on the Brazilian Hospital Services Company portal, with these documents accessible online.[16] Thus, videos that covered all items listed in the procedure checklists described in chart 1 were considered adequate.

Data normality was assessed by examining skewness, kurtosis, and the standard deviation of the outcomes. Normality tests (*Kolmogorov-Smirnov*) were also used. *Mann-Whitney* and *Kruskal-Wallis* tests were employed to compare two or more groups, respectively. Values of p less than or equal to 0.05 were considered significant.

IUD insertion	Lumbar puncture
1. Does the environment simulate an outpatient room? 2. Reports the prescription of the technique, checking indications and contraindications? 3. Presents (both verbally and non-verbally) the materials necessary for IUD insertion? 4. Performs the surgical scrub and donning of protective clothing? 5. Alerts about the need for a consent form? 6. The professional explains the procedure to the patient (if present), answers questions, and clarifies doubts? 7. The professional performs a bimanual pelvic examination? 8. The professional inserts the speculum and performs an ectoscopy of the uterine cervix? 9. The professional adopts infection prevention procedures? 10. Gently pinches the anterior lip of the uterine cervix with a Pozzi clamp? 11. Performs hysteroscopy? 12. Asks the assistant for help to open the IUD package while maintaining asepsis? 13. Inserts the IUD stems into the insertion guide? 14. During insertion, keeps the IUD stems in the horizontal position, aligned with the lateral diameter of the uterus? (adopts a careful technique); 15. Places the IUD at the uterine fundus? 16. Follows the manufacturer's instructions? 17. Cuts the threads, leaving about 2 to 3 centimeters in length from the cervix? 18. Records the length of the IUD threads in the medical record?	1. Does the environment simulate a hospital setting? 2. Reports the prescription of the technique, checking indications and contraindications? 3. Presents the materials necessary for IUD insertion? 4. Performs the surgical scrub and donning of protective clothing? 5. Alerts about the need for a consent form? 6. Alerts about the possible need for sedation of pediatric or very agitated patients? 7. Ensures the patient is in the appropriate position, either lateral decubitus or sitting? 8. Demonstrates the proper location for the puncture and how to locate it according to anatomy? 9. Performs asepsis of the puncture site? 10. Administers local anesthesia? 11. Inserts the needle correctly? 12. Teaches how to recognize entry into the subarachnoid space? 13. Measures the pressure of the CSF with a manometer at the beginning and end of the puncture? 14. Differentiates between hemorrhage and bleeding from the puncture? 15. Informs the amount of CSF to be withdrawn? 16. Identifies the patient's sample? 17. Replaces the stylet before removing the needle? 18. Applies a compressive dressing after needle removal? 19. Discusses possible complications of the procedure?[7] 20. Documents the procedure in the medical record?

Chart 1 – Checklist for IUD Insertion and Lumbar Puncture Procedures

Source: Prepared by the authors (2023).

RESULTS

Regarding the video producers, for both procedures, the majority were produced by individuals in Brazil, within an outpatient setting, using simulation resources. Concerning the correct execution of the procedures, which is the focus of this study, it was identified that 100.0% of the videos, both for IUD insertion and lumbar puncture, did not follow the correct procedural sequence. Table 1 presents the stratified sample characterization.

Table 1 – Characterization of the Sample for IUD Insertion and Lumbar Puncture Procedures Concerning Production, Origin, Resources, and Techniques

IUD insertion			**Lumbar Puncture**	
	n	%	n	%
Video Producer				
Individual	21	70.0	9	60.0
Legal Entity	4	13.3	4	26.7
Blog	4	13.3	1	6.7
Teaching Project	1	3.3	1	6.7
Country of origin				
Brazil	30	100	12	80.0
Germany	-	-	1	6.7
England	-	-	1	6.7
Not Identified/Not Described	-	-	1	6.7
Video recording environment				
Classroom	3	10.0	1	6.7
Outpatient room	14	46.7	3	20.0
Unidentified Environment	11	36.7	3	20.0
Surgical Center	2	6.7	1	6.7
Hospital	-	-	7	46.7
Additional Educational Resources				
Simulator	21	70.0	4	26.7
Animation	4	13.3	3	20.0
Ultrasound Images	1	3.3	-	-
Human Beings	3	10.0	3	20.0
Mixed	1	3.3	2	13.3
Class with active participation	-	-	3	20.0
Correct Technique				
Yes	-	-	-	-
No	30	100.0	15	100.0
Total	**30**	**100.0**	**15**	**100.0**

Source: Prepared by the authors (2023).

Regarding the duration of the videos, the average length was five minutes and fifty-three seconds for IUD insertion videos and nine minutes and twenty-three seconds for lumbar puncture videos. As for the year of posting, these videos were uploaded between 2001 and 2022. In terms of total views, it was observed that IUD insertion videos have a higher average of views and likes compared to lumbar puncture videos. Table 2 details and stratifies the secondary characterization of the sample.

Table 2 – Characterization of the sample regarding video duration, year of posting, total views and total likes

Procedures	**Lumbar Puncture**			**IUD insertion**		
Variables	Mean	Min	Max	Mean	Min	Max
Video Duration (in minutes)	9.23	0.31	31.40	5.53	1.00	24.29
Year of Posting	2017	2009	2022	2018	2001	2022
Total Views	23,250.00	27.0	11,9259,00	303,839.00	50.0	426,3994,00
Number of Likes	197.66	0.00	1,400.00	1,462	0.00	1400.00

Source: Prepared by the authors (2023).

The duration of the video, educational resources, environments, and producers of the videos did not influence the total number of views and likes for both procedures (p>0.005).

It was identified that the number of views and likes attributed to the analyzed videos are not associated with the correct technique for the IUD insertion and lumbar puncture procedures, as 100% of the procedures were incorrect.

Regarding the year of publication, videos related to lumbar puncture procedures posted before 2019 had a higher number of views (p=0.021); however, no statistical significance was found regarding the number of likes. Within the same video category, it was observed that audiovisual materials using humans as the subject of the procedure received a higher number of views compared to those using other resources (p=0.034). No statistical significance was found regarding the number of likes. Table 3 presents the associations and statistical significance of the other study variables.

Table 3 – Associations between the total number of views and the number of likes of the videos and the duration, year of publication, use of humans, educational resources, environment, and producer

Variables	IUD insertion				Lumbar Puncture			
	TV	p-value	NL	p-value	TV	p-value	NL	p-value
Video Duration (in minutes)	97.000*	0.533	86.00*	0.280	16.000*	0.165	24.000*	0.683
Year of Publication	67.000*	0.059	83.000*	0.221	8.000*	**0.021**	21.500*	0.048
Use of Humans	85.000*	0.509	92.000*	0.725	9.000*	**0.034**	25.000*	0.858
Educational Resources	5.024**	0.285	5.379**	0.251	4.067**	0.397	0.298**	0.990
Video Environment	1.588**	0.662	2.529**	0.470	5.033**	0.284	5.752**	0.218
Video Producer	3.804**	0.283	1.382**	0.710	0.918**	0.821	2.151**	0.542

*U-Mann Whitney Test
**Kruskal-Wallis Test
TV – Total Number of Views
NL – Number of Likes

Source: Prepared by the authors (2023).

DISCUSSION

Videos are valuable tools for equipping medical students across various fields.[17-18] When used effectively, they have the potential to engage students and help them retain information over time.[19] They can be utilized at different stages of the teaching-learning process, whether before, during, or after classes. Additionally, they offer greater flexibility for students regarding access and interaction with instructors and classmates.[20]

The literature indicates that medical students who use videos as active learning methodologies show greater initiative and motivation for self-study.[17] It is also noted that using YouTube® as a study resource improves knowledge levels, satisfaction, and confidence.[21]

It is well-known that YouTube® is the largest media-sharing site in the world, with hundreds of millions of hours of video watched daily by over 1 billion users, reaching 95% of the global population with internet access. YouTube® is also likely the largest global repository of educational medical videos, with dedicated medical education channels attracting hundreds of thousands of thousands of subscribers and millions of video views.[22]

The literature reports that adults seem to learn better when images are accompanied by narration. Additionally, using video resources as a teaching tool in medical education is increasingly

common among institutions and appears to be well-received by students.[23] In the context of medical education, the platform is used to disseminate guidelines, improve surgical skills, teach cardiovascular mechanisms, cardiac anatomy, nephrology topics, nervous system examination, auscultation, pharmacokinetics, and prepare for procedures, among other things. Studies indicate that YouTube®, is the primary and preferred source for final-year medical students.[24]

The criteria for recognizing proper procedures were based on the "Technical Manual for Health Professionals – DIU with Copper T Cu 380 A," from 2018, by the Ministry of Health[5]; and the "Protocol for Lumbar Puncture in Adults," from the *Hospital de Doenças Tropicais* of the *Universidade Federal do Tocantins* (UFTO), from 2021, available on the portal of the Brazilian Hospital Services Company.[16]

In this study, it was found that 100.0% of the analyzed videos on the procedures of DIU insertion and lumbar puncture did not present the correct sequence of execution; that is, they did not follow the standard procedures for the assessed techniques. Previous studies from other health fields also highlight the dichotomy between standardized protocols and what can be found on video sharing sites.[14] Additionally, a study conducted in 2018 also points to a lack of sufficient information.[15,24] Regarding this finding, the literature suggests that videos are useful when they demonstrate medical procedures in a standardized manner, avoiding interpersonal technique differences that could confuse students.[25]

Moreover, it was found that, for both procedures, the number of views and the number of likes assigned to the sample were not associated with the correct technique since all procedures did not follow the steps outlined in the selected protocols for this study. Furthermore, it was observed that the duration of the video, educational resources, environments, and the producers of the videos did not influence the total number of views and likes.

Regarding this aspect, it is known that students are not very selective when choosing the videos to watch, opting for ease of access over the quality of the material. Many of the videos available online lack reliable content, as they can be produced by individuals with no expertise in the subject matter, facilitating the spread of inaccurate information.[26]

The popularity of a video, and thus its accessibility, can be determined by various factors, such as the author, who might be an individual self-declaring as a health professional, or the presence of personal accounts in the video, especially in the shorter ones, even if they offer incomplete content or low-quality information. [27] In this context, it was found that most video producers were indeed individuals, both for IUD (70%) and lumbar puncture (60.0%) videos.

For educational videos to be effective in building knowledge, they should be well-planned, with clear learning objectives aligned with the institution's curriculum, and developed by professionals with scientific knowledge and experience in the topic being taught.[20] In this study, regarding the lumbar puncture procedure, only 6.7% of the videos were produced from educational projects. This percentage is even lower for the IUD insertion procedure, with 3.3% of the sample.

Students should investigate the academic background of the person presenting the videos before watching them. They should check if the author has publications on the topic or is affiliated with an educational institution, and ensure that the information aligns with current practices and knowledge.[20] From this perspective, educators can assist students in the process of searching for and selecting valid and reliable educational resources.

Considering that there are few guidelines for educators and students regarding the choice of videos for medical education, a study provided tips on how to select and use videos from an educational perspective. These tips relate to video selection, technical considerations, segmentation of learning, and necessary requirements.[19] In general, videos available on the platform in question lack peer review, which undermines the validity, trust, and accuracy of the information.[21]

Regarding video selection, recommendations focus on the following aspects: videos that evoke connections/emotions for students, as well as seeking reliable sources (good evidence), short duration, and good sound and image quality. For technical considerations, access location, file size, compatibility, accessibility, and internet speed are extremely important. Regarding learning segmentation, it is essential that the video aligns with pedagogical needs, allows for prior study, and includes space for discussion about the content provided. Finally, when produced, it is important to record the content and ensure that the production is accessible to the public.[19]

These recommendations are highly relevant since YouTube®, can expand the impact of video programs created by the teaching staff. A study indicates that in one report, 15 videos of clinical case procedures received only 200 views in over 6 months on a personalized video hosting site, but when shared on YouTube®, these same videos garnered 1.7 million views in 33 months.

Additionally, YouTube® viewing habits can inform the, diagnosis of medical education needs and guide curricular and assessment improvements.[22]

In this study, it was possible to identify that, concerning educational resources, the use of simulators was prominent in both procedures analyzed. It is known that simulators offer a viable alternative for teaching procedures.[25,28-29] However, they can be quite costly. Alternatively, particularly in the context of Latin America, there is an interesting movement towards the development of low-cost simulators. Low-cost simulators are models with characteristics similar to commercial ones, built with alternative materials and at a lower cost compared to those available from the industry.[25,29]

Regarding the use and development of low-cost simulators, it is important to highlight the provision of academic projects at universities, which are fundamental for creating and providing educational resources based on scientific evidence. These projects contribute to improving the quality of health education by promoting access to materials created for both academic use and for the community seeking reliable knowledge on the topics explored by these projects.[30]

At the same time, it was observed that a significant number of videos featured the presence of human beings as a resource/object in the procedure. Regarding the lumbar puncture procedure, this data is even more concerning, as these videos, in addition to being performed on humans, had a higher number of views compared to videos that used other resources (p=0.034). It is worth noting that it was not possible to determine whether the patients involved had signed the Informed Consent Form (ICF), which limits the discussion of other ethical aspects.

Additionally, it was found that most of the videos were recorded in outpatient settings and/or other health equipment sectors, prompting reflection on the need for proper planning and adaptation of these educational resources. It is known that producing a video resource requires planning, a controlled environment, and equipment for capturing images and audio. Therefore, a simulation and skills laboratory may be a suitable environment for these needs. Videos can also be created by students themselves, under the supervision of a specialist tutor. This process can be valued as teamwork and promotes interaction among the participants.[31]

In this study, the total views of videos published before 2019 were higher than those of videos made available on YouTube® from that date onwards. This trend was more evident in relation to the lumbar puncture procedure (p=0.021). This is due to the onset of the Covid-19 pandemic in 2019, which led to the suspension of in-person classes and the transition to Distance Education (EaD) in Brazil. Many universities, still adapting to this format, suspended classes for indefinite periods for health science students. [32-34] Consequently, the creation of new educational audiovisual content was impacted, as in-person training in health techniques and procedures for medical students became a challenge. The most viewed references remained those published before the pandemic, which were based on outdated protocols compared to existing updates.[35-36]

During the Covid-19 pandemic, educational videos were used to help more students learn in remote environments. [37] In this context, the role of YouTube® was enhanced as the platform became an increasingly important source of medical information about the pandemic. In the current context, the platform has also been used as a tool to disseminate information about other medical topics, such as vaccines and best health practices.[38]

Regarding students' interest in producing educational content in a remote format during the pandemic, a study highlighted the scarcity of quality in the productions developed from 2019. This led to a lack of interest from medical students in consuming audiovisual productions created during that period.[39]

As for the limitations of this study, it is noteworthy that it was not possible to identify which audiences (students/medical professionals or laypersons) viewed the videos in the sample, making it impossible to characterize/stratify the profile of the viewers. Additionally, the platform's algorithm does not limit the number of samples per search, presenting results that tend toward infinity, including videos that do not cover the analyzed procedures; similar difficulties were noted by other authors.[40] For this reason, the authors limited the search to the analysis of the first 100 results for each search conducted.

Another limitation pertains to the limited filters available on YouTube®, as the platform does not allow precise sample delimitation by publication date, with only options such as "Last minute", "Today", "This week", "This month" and "This year". Finally, it is important to note that the classification of the videos as "correct" or "incorrect" in terms of the procedure was dependent on the protocol used. Additionally, it was not possible to find more studies with a similar methodological approach in the field of medicine for comparison purposes.

CONCLUSIONS

Based on the theoretical framework adopted in this study, it was found that 100.0% of the analyzed videos on IUD insertion and lumbar puncture did not demonstrate the correct execution sequence. In both procedures, the number of views and the amount of likes assigned to the sample were not associated with the correct technique. Furthermore, the duration, educational resources, environments, and producers of the videos did not affect the total number of views or likes ($p>0,005$). However, videos related to the lumbar puncture procedure, published before 2019, and featuring human subjects, demonstrated a higher number of views and statistical significance ($p < 0.005$).

It is recommended that medical students exercise greater attention and caution when searching for and selecting audiovisual materials, such as videos, on digital platforms. In this regard, Higher Education Institutions are encouraged to expand quality improvement initiatives, including strengthening academic monitoring programs, encouraging faculty to create institutional videos related to medical techniques and procedures, and providing mentorship and support to students in selecting educational materials and resources.

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