

## ORIGINAL ARTICLE

# Development and validation of an educational video for clean intermittent bladder catheterization

*Desenvolvimento e validação de vídeo educativo para autocateterismo vesical intermitente limpo*

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## ABSTRACT

The purpose of this study was to develop and validate an educational video on clean intermittent self-catheterization. It was a methodological study, carried out in three stages: pre-production (elaboration and validation of the script and storyboard), video production, and post-production (validation of the video by expert judges working in the field of rehabilitation and/or health). The script for video production was developed and validated by 18 judges, with 91.1% agreement. The video, with a duration time of 10 minutes and five seconds, was also validated and reached 97.4% of agreement among the 17 participating judges regarding functionality, usability, efficiency, audiovisual technique, environment and procedures. The final version of the video developed and validated can be viewed at the NEUROREHAB Research Center Portal, <https://demaisinformacao.com.br/autocateterismourinario/>. This tool can contribute to the training of people with neurogenic bladder, as well as health professionals and nursing students, to perform self-catheterization, and methodologically support the development of other educational videos in the health area.

**Descriptors:** Neurogenic Bladder; Self-catheterization; Rehabilitation; Instructional Films and Videos; Nursing.

## RESUMO

Trata-se do desenvolvimento e valida  o de um v  deo educativo sobre autocateterismo vesical intermitente limpo. Estudo metodol  gico, realizado em tr  s etapas: pr  -produ  o (elabora  o e valida  o do roteiro e *storyboard*), produ  o do v  deo, e p  s-produ  o (valida  o do v  deo por ju  zes experts em reabilita  o e/ou sa  de). O roteiro para produ  o do v  deo foi desenvolvido e validado por 18 ju  zes, com 91,1% de concord  ncia. O v  deo, com 10 minutos e cinco segundos, tamb  m foi validado e atingiu 97,4% de concord  ncia entre os 17 ju  zes participantes nos quesitos funcionalidade, usabilidade, efici  ncia, t  cnica audiovisual, ambiente e procedimentos. A vers  o final do v  deo desenvolvido e validado pode ser visualizada no Portal do N  cleo de Pesquisa NEUROREHAB, [www.demaisinformacao.com.br](http://www.demaisinformacao.com.br). Essa ferramenta pode contribuir para a capacita  o de pessoas com bexiga neurog  nica a realizar o autocateterismo urin  rio, bem como profissionais de sa  de e estudantes de enfermagem, e apoiar metodologicamente o desenvolvimento de outros v  deos educativos na   rea da sa  de.

**Descritores:** Bexiga Urin  ria Neurog  nica; Cateterismo Urin  rio; Reabilita  o; Filmes e V  deos Educativos; Enfermagem.

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## INTRODUCTION

The main complications of neurogenic bladder (NB) are urinary incontinence, urinary tract infection, vesicoureteral reflux and hydronephrosis, which, when not prevented and treated, can lead to renal deterioration and even death<sup>(1,2)</sup>. When the condition of NB is confirmed, intermittent bladder catheterization should be performed four to six times a day, throughout life, to protect the upper urinary tract<sup>(3,4)</sup>.

Intermittent self-catheterization (ISC) is essential for the preservation of intimacy, privacy, sexuality, acquisition of autonomy, inclusion and participation in society. However, training for intermittent catheterization (IC), especially for self-catheterization, is a challenge faced by people with NB, their families and also by health professionals<sup>(5,6)</sup>.

In view of these challenges, it is essential to promote the training, support and motivation of people with NB and their families to perform ISC<sup>(5)</sup>. This includes encouraging intermittent self-catheterization; promoting the availability of caregivers or nurses to perform the technique regularly during the day in the case of dependent people; improving public policies for the accessibility to the toilet facilities to perform IC; encouraging the correct choice of the catheter, of higher quality and adapted to the needs and experiences of each individual; preventing complications during IC; and developing strategies that help the teaching-learning process of intermittent self-catheterization<sup>(3-6)</sup>.

In this regard, nursing has advanced in the development of educational tools and sought in the virtual environment (VE) a means of knowledge socialization, collaboration to improve the promotion of empirical knowledge structured in scientific research and creation of a more comprehensive bridge between nurse-patient interaction<sup>(7-10)</sup>. VE strengthens the individual's autonomous action in the production of knowledge, providing support and collective learning, while remaining in the family environment, overcoming geographical, physical and environmental barriers<sup>(7-10)</sup>.

An educational video (EV) is a teaching-learning tool that approximates the educational environment to daily relationships, languages and codes commonly used in society<sup>(11)</sup>. Despite this, there are few videos available on the internet to learn self-catheterization in the Brazilian context, which take into account the available urinary catheters and techniques used in Brazil<sup>(12)</sup>.

Therefore, the objective of this study was to develop and validate an educational video on the technique for female and male clean intermittent bladder self-catheterization, using 3D technology and avatars.

## METHODS

This is a methodological study that encompasses the process of development and validation of an EV for intermittent

clean self-catheterization, including the development and validation of the EV script, creation of the storyboard, the production of the video and the validation of the EV<sup>(9,10)</sup>.

This study was authorized and approved by the Ethics Committee of the Ribeirão Preto Nursing School of the University of São Paulo under the number CAAE nº 35095214.8.0000.5393. All participants signed the Free and Informed Consent Form (ICF) for participation in the scientific research.

Initially, a survey of the production of EVs aimed at teaching intermittent self-catheterization was made available on the free video sharing website, Youtube®, the most commonly used in Brazil<sup>(13)</sup>. The descriptor used was "self-catheterization", only in Portuguese, in Brazil, since the study sought the content aimed at the Brazilian public. The inclusion criteria for the selection of the videos evaluated were: videos about ISC, with the clean technique and in Portuguese.

The videos were analyzed by three judges with experience<sup>(13)</sup> in training to perform the technique, using a questionnaire adapted from the evaluation of videos validated by Ferreira<sup>(14,15)</sup>.

For the evaluation of the Youtube® videos and for the development of the video, the technique of clean intermittent self-catheterization was considered, based on guidelines of the international society (Brazilian Society of Urology, European Association of Urology and American Urological Association), adapted to the Brazilian context and recommended by Faleiros et al.<sup>(3,5,11,12)</sup>. Thus, this reference was used to create the video, considering that the materials analyzed from Youtube® did not meet the quality criteria, as described in the Results section.

Next, the script and the storyboard of the EV were developed for the previsualization of the video, the planning of the animation scenes and experimentation of several techniques<sup>(16,17)</sup>, in addition to enabling the recording of dialogues and the reformulation of scenes. In the conception phase, Photoshop®, the image editing program, was used.

For the selection of the judges of this study, the following classification system was considered based on the criteria of experts adopted by Fehring and researchers<sup>(18-20)</sup>, considering *experts* only those participants who achieved a minimum score of five points, following the scoring system: Doctorate degree = 4 points, Master's degree = 3 points, publication in an indexed journal on the theme of interest of the study = 2 points, Specialization in the theme of interest of the study = 2 points, Clinical practice in the area of interest of at least five years in the area of rehabilitation = 2 points, Participation in a scientific event in the last two years on the theme of interest of the study = 1 point. For both script validation and EV validation, the same 34 judges selected by intentional and snowball sampling were invited.

However, 18 judges agreed to participate in the validation of the script and 17 accepted to validate the EV.

For the analysis of the educational script with the experts, a questionnaire validated in previous studies and adapted to the theme of intermittent self-catheterization<sup>(8,16,17)</sup> was used. The content validation of the EV script was performed by 18 experts, who were contacted by e-mail. The choice of these experts was made through intentional sampling, which allows the voluntary choice of specialists in the study theme to act as judges of validation. We opted for the selection of rehabilitation network professionals and researchers from different universities and having practical or academic experience of at least five years in the research theme.

The validation instrument of the educational video script was divided into the following requirements: objectives (purposes of the EV), content (presentation, shape and structure of the EV), relevance (characteristics of images and scenes proposed in the EV script), environment (assessment of the EV scenario), verbal language (assessment of the language used) and inclusion of topics (in this question the judges could suggest the inclusion in the script), consisting of 19 questions, 16 multiple choice questions with an open field for suggestions and three open questions. The five-point Likert scale<sup>(14,15)</sup> was used, where judges choose the option that corresponds to their opinion. The validation questionnaires were designed and answered virtually, using the Survey Monkey<sup>®</sup> platform.

For the EV production, a company specialized in 3D video production and educational media was hired, and included a graphic designer, a motion designer, a 3D modeler, two 3D animators, two narrators, a video producer and a video editor.

Afterwards, the judges previously selected for the EV validation were invited again by email, taking into consideration the same selection criteria used in the selection of judges for the EV script validation. The email contained the link to the EV validation questionnaire and the video available for download, files with the validated EV script and the ICF, and a message of estimated completion in 30 to 50 minutes. The EV validation questionnaire included the following sessions: characterization of the judges, functionality, usability, efficiency, audiovisual technique, environment and procedure.

For the descriptive statistical analysis, the frequency and percentage, the mean and standard deviation ( $\pm$ ) were calculated. The final versions of the script and EV were only considered validated when 70% of the judges attributed the category "totally agree" and/or "agree" to each item evaluated, according to criteria adopted in previous studies<sup>(7,8,21)</sup>. The items evaluated by the judges who did not reach 70% agreement of the answers in the categories "totally agree" and/or "agree" were analyzed and reformulated<sup>(7,8,21)</sup>.

## RESULTS

The results are described according to chronological order used for the development and validation of the EV, as reported in the method.

### Development

The development of a new video was necessary when a gap was identified during the review of other media available on YouTube<sup>®</sup>. In the search, 174 videos appeared, which after application of the inclusion criteria culminated in only six.

The videos evaluated did not present all the necessary information regarding the pathophysiology of NB and/or demonstrated an incorrect, incomplete or outdated technique, sometimes due to the lack of materials available in rehabilitation services in Brazil, other times incompatible with the technique used in the Brazilian context. Considering the gap and the risk of not correctly informing the target population, the need to produce educational materials for learning ISC, based on scientific evidence and without advertising purposes, was proven.

The EV production lasted three months and resulted in a video lasting 10 minutes and five seconds, covering the following topics: presentation of the characters; anatomy and physiology of the urinary system; pathophysiology of NB; complications of NB; description of the materials and the technique of clean intermittent self-catheterization of the male and female bladder.

The narration was recorded in a studio specialized in voice-over and later transferred to the Audacity<sup>®</sup> application where the narration was inserted into the video and edited. The final edition of the EV was done using Adobe Premiere. During the entire video development process, the team of researchers worked in coordination with the contracted company.

For the conception of the characters and scenarios the traditional technique of drawing and coloring was used in Photoshop<sup>®</sup> using the digital table Cintiq<sup>®</sup> 12WX. Then they were transformed into three-dimensional images, through the 3D programs Max<sup>®</sup> and Z-Brush<sup>®</sup> (Figures 1, 2 and 3). The virtual characters developed were: Francisco, 21 years old with complete traumatic paraplegia and Luíza, 18 years old with incomplete paraplegia. The characters, environment and objects were graphically rendered through 3D Studio Max<sup>®</sup>. This process consists of creating three-dimensional images and animations in order to achieve a greater degree of realism. Adobe Photoshop<sup>®</sup> was used to create the illustrations, color the objects and treat the images. For the motion design of the video, i.e. the creation of moving images, Adobe<sup>®</sup> Flash and Adobe<sup>®</sup> After Effects programs were used.

### Validation of the script

The eighteen judges who participated in the script content validation process came from different Brazilian reference

centers in bladder rehabilitation, in addition to universities with studies focused on this theme and/or production of hypermedia and educational technologies. Among the states of origin were: São Paulo, Santa Catarina, Rio de Janeiro, Minas Gerais, Bahia, Ceará, Maranhão, Mato Grosso do Sul and the Federal District.

Regarding the gender of the judges, there was a predominance of women, with 17 women (94.4%). The age of the sample varied from 30 to 60 years, with a mean of 38.7 years ( $\pm 8.3$ ). Of the participants, 15 (83.3%) were nurses.

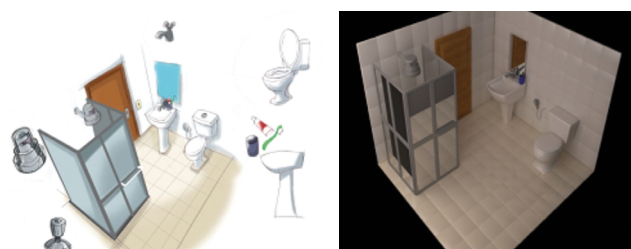
The amount of time of education ranged from five to 39 years, with an average of 15.2 years of education ( $\pm 9.2$ ). There were 14 participants (77.8%) and four participants (22.2%) who worked in the area of hypermedia and educational technologies.



**Figure 1.** Steps to create the character Francisco, modeling version and rendered version.



**Figure 2.** Steps to create the character Luísa, modeling version and rendered version.



**Figure 3.** Creation steps of the bathroom of Francisco's house, modeling version and rendered version.

Regarding academic degrees, 14 participants (77.8%) had specializations, 13 (72.2%) master's degrees, eight (44.4%) doctoral degrees and two (11.1%) post-doctoral degrees. Of these, nine (50.0%) had worked for more than five years in the field of rehabilitation. All evaluators stated that they had participated in some scientific event in the last two years related to their area of expertise.

In Table 1 below, the data is presented according to each section of the instrument. Although the index of agreement of all the assessed questions was above 70.0%, the suggestions made by the judges were analyzed and most of them were followed, especially those related to the need for verbal language improvement.

### Validation of the educational video

The same judges who participated in the validation of the script for the validation of the educational video were invited to participate in this second phase of the research and 17 of these professionals agreed.

There was a greater number of women 14 (82.3%) and three (17.6%) male participants. The age variation among the participants was from 31 to 60 years, with a mean of 39.1 years ( $\pm 7.5$ ). Most participants (88.2%) were nurses, an occupational therapist (5.9%) and a physician (5.9%).

The amount of time of education varied from four to 40 years, with a mean of 15.8 years of education ( $\pm 8.7$ ). Thirteen participants (76.5%) worked in the area of rehabilitation and four (23.5%) worked in the area of hypermedia and educational technologies.

Regarding academic degrees, 14 participants (82.3%) had specializations, 10 (58.8%) had master's degrees, eight (47.1%) had doctorates and one (5.9%) had a post-doctorate degree. Of these, nine (47.0%) had worked for more than five

**Table 1.** Distribution of the judges' answers to the questions present in the validation of the educational video script.

| Issues          | Totally agree/agree (%) | Neither agree/nor disagree (%) | Totally disagree/disagree (%) |
|-----------------|-------------------------|--------------------------------|-------------------------------|
| Objectives      | 96.2                    | -                              | 3.71                          |
| Content         | 91.0                    | 3.9                            | 5.5                           |
| Relevance       | 98.1                    | -                              | 1.8                           |
| Environment     | 75.0                    | 19.4                           | 5.5                           |
| Verbal language | 71.1                    | 17.7                           | 11.1                          |
| Included topics | 97.6                    | 0.79                           | 01.5                          |

years in the area of rehabilitation and all the judges stated that they had participated in some scientific event in the last two years related to their area of work.

The validation of the educational video (Table 2) reached a total of 97.4% agreement among the judges in the questions evaluated (84.09% agreement in the attribute “I totally agree”, 13.3% in the attribute “I agree”), seven answers (2.3%) as “Neither agree nor disagree” and only one answer (0.3%) as “disagree”. The issue of “I totally disagree” was not raised.

Despite the agreement of the judges on the assessed questions, the suggestions for the modification of the script were mostly aimed at language adequacy for the target audience, the inclusion of information related to the technique of female intermittent self-catheterization and the differentiation between hydrophilic and plastic catheters. There were also suggestions regarding the conceptual reformulation of the anatomy of the urinary system and the pathophysiology of NB.

## DISCUSSION

The development of an EV for the teaching of intermittent self-catheterization, aimed at people with NB, seeks to fill a gap in relation to the scarcity of educational videos for the teaching of this technique in the Brazilian context, as verified in the evaluation of videos available on the internet on the study theme.

The final and validated version of the EV in this study lasts 11 minutes and 19 seconds, following the recommendation of other authors who suggest that a video should not exceed 15 minutes, and may become tiring and lose the viewer's attention<sup>(8,10,22)</sup>.

The script validation obtained the majority (91.1%) of answers in the attributes “totally agree” and “agree”,

presenting a result similar to studies of elaboration and validation of virtual educational videos<sup>(8,21)</sup>. In this sense, as well as previous studies, this study reinforces the need for the validation process of the script and the EV, with the participation of experts, aiming at improving the concepts addressed in the scenes, observations to improve the points of difficult understanding to the target audience and suggestions regarding the inclusion or exclusion of information.

Despite the general agreement of the judges on the assessed questions, the suggestions to modify the script aiming at greater language adequacy were followed. Language adaptation includes the replacement of technical terms used by health professionals and the understanding of cultural aspects of the language of a given population, making communication between peers effective<sup>(14,15)</sup>. Thus, language adequacy in the production of educational material, necessary in this study as in previous ones, aims to improve the understanding of the theme and is widely recommended in the production of materials for health education<sup>(15,23,24)</sup>.

Another suggestion was the inclusion of information regarding the measurement of urine volume to calculate intake. This suggestion was accepted, with the justification that the measurement of urinary volume is necessary to evaluate and adapt the frequency of intermittent self-catheterization to the needs of each person<sup>(25)</sup>. In addition, the measurement of urine allows the individual to evaluate the possible signs of infection through the evaluation of color, smell, presence of residues and drained volume<sup>(26)</sup>.

Regarding the insertion of the catheter, some judges pointed to the need to describe the positioning of men during the procedure, to avoid complications. Although the storyboard included information on the positioning of the penis for the execution of the technical procedure, the script did not include the narration that represented this stage. In view of this suggestion, a figure was added to the video that clearly shows the position of the penis at 90° during catheter insertion, to prevent urethral lesions<sup>(27)</sup>.

Some suggestions on the sequence of feminine hygiene, which should be initiated by the *labia majora*, *labia minora* and finally the *urethral meatus*, were also presented by the experts. However, current references were consulted and no such inverted sequence was found to perform the technique of clean intermittent self-catheterization<sup>(28,29)</sup>. Thus, the sequence was maintained, initiating the feminine cleaning of the *urethral meatus* for the *labia majora*, considering the basic principle of always starting hygiene from the least contaminated area to the most contaminated area, aiming at reducing the number of microorganisms and avoiding bringing them into the *urethral meatus*<sup>(28,29)</sup>.

The evaluation of usability pointed out questions about the ease of use of the video by the population and the evaluators

**Table 2.** Distribution of the judges' answers according to the requirements of the script for validation of the educational video.

| Issues                | Totally agree/ agree (%) | Neither agree nor disagree (%) | Totally disagree/ disagree (%) |
|-----------------------|--------------------------|--------------------------------|--------------------------------|
| Functionality         | 100.0                    | –                              | –                              |
| Usability             | 96.0                     | 3.9                            | –                              |
| Efficiency            | 97.0                     | 2.9                            | –                              |
| Audiovisual Technique | 100.0                    | –                              | –                              |
| Environment           | 94.1                     | 5.8                            | –                              |
| Procedures            | 97.0                     | 1.9                            | 0.9                            |

stated that the use of the educational tool will be beneficial only for people who have access to computers and the internet. However, it is known that an increasing number of people have access to the internet in Brazil, according to the Brazilian Institute of Geography and Statistics (IBGE), with coverage in 69.3% of Brazilian households<sup>(30)</sup>. Consequently, this EV may have a reach in all Brazilian regions and not only in the southeast region where it was developed and, accompanying the growing popularization of mobile devices and Internet access, has potential for wide dissemination online.

Currently, virtual educational tools aim to transform the learning of only a simple transfer of information and skills for the construction of knowledge based on experiences, experiences and personal demands. Despite this, the use of the EV should be validated by professionals specialized in the theme to be addressed, since these materials are facilitating tools for communication and guidance of the population, enabling the standardization of teaching of a given theme<sup>(31)</sup>.

The judges also suggested emphasizing the differentiation of the hydrophilic catheter and the plastic catheter, allowing the person to discuss the choice of the device with the health team. Hydrophilic catheters have properties that allow lubrication after contact with aqueous, and this technology makes such catheters slide more easily through the urethra and prevents trauma, although such devices are more expensive<sup>(3,32)</sup>. Plastic catheters require the use of lubricants before insertion into the *urethral meatus*, in addition, some patients reuse them for a period of up to one week<sup>(12,32,33)</sup>. The lubricant can be applied to the catheter or, in the case of men, it can be applied directly to the *urethra*<sup>(3,32)</sup>. In this aspect, the use of pre-lubricated catheters is practical and saves time during the performance of the ISC. In Brazil, the use of plastic catheters is more common, because they are available in health services for free and due to the socioeconomic conditions of the general population<sup>(12)</sup>. However, the presentation of different options of catheters to users allows them to understand the differences and the benefits of each, and they can choose the catheter that suits them best. Thus, although the EV already had this content, another figure was inserted showing the difference between the two types of catheters.

The development of this study had some limitations, including the dependence on third party service for the development of 3D technology for video animation and audio, which limited the richness of details due to the challenge of knowledge exchange and communication between the professionals involved. One suggestion to overcome this limitation would be to have technology professionals with knowledge also in the health area, such as biomedical informatics professionals. Despite the limitations of the study, the video produced was positively evaluated during the validation process and may contribute to the achievement of the objective for which it was proposed.

## CONCLUSION

The construction of an educational video is a long and systematized process that requires effort on the part of researchers in the search for the best scientific literature on the subject, in the selection of expertise in the theme and in methodological rigor. This study highlights the need for prior validation of the EV script and the EV by expert judges to achieve a product with satisfactory agreement and that meets the needs of the target audience. In addition, the development of educational videos with the use of 3D technology demands financial support.

It is expected that this EV, the result of this study, will contribute to the training of people with NB for ISC, including health professionals and nursing students, through the democratization of knowledge on the internet. The availability of this EV in a virtual environment intends to promote free access in the different regions of Brazil. It will also encourage and provide a methodological base for the development of other educational videos in the area of health. The final version of the video will be available on the health and inclusion information portal for people with disabilities: [www.demaisinformacao.com.br](http://www.demaisinformacao.com.br) and on the e-lessons website USP's video classes portal: <http://eaulas.us.br/portal/video.action?idItem=8753>.

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