RBEM Revista Brasileira de Educação Médica

ORIGINAL ARTICLE

DOI: https://doi.org/10.1590/1981-5271v49.1-2024-0075.ING

Report on the development of a digital educational tool for teaching the urodynamic test

Relato do desenvolvimento de uma ferramenta educacional digital para o ensino do exame urodinâmico

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ABSTRACT

Introduction: The urodynamic test is a diagnostic tool that evaluates bladder storage and emptying functions. The test is complex, has precise indications, and requires interpretation and critical analysis of its results. Knowledge of urodynamics and lower urinary tract disorders is among the skills desired for gynecology and obstetrics residents; however, there is no standardization of the teaching of this topic in many medical residency services. Technology-mediated education is an ally in the development of qualified training for health professionals with an impact on improving the services offered. In medical residency programs, this educational strategy offers opportunities to reinforce the learned concepts and explore others not covered during the training period.

Objective: To develop a digital educational tool for the teaching of urodynamic examination within gynecology and obstetrics medical residency programs.

Methods: This is a descriptive study of the development of a digital educational tool, in which Contextualized Instructional Design was used to guide the process of building digital content.

Results: Between March 2023 and February 2024, an open and free educational module on urodynamics was developed in the Virtual Learning Environment of the Unified Health System (AVASUS). The module has a total course load of 30 hours and is aimed at resident doctors in gynecology and obstetrics. The educational resources used by the proposed instructional design consisted of videos, graphics, images, illustrative clinical cases, complementary texts, targeted questionnaires, and glossaries.

Conclusions: The tool seems to be practical, easy to access, and appropriate for learning, with the possibility of expanding teaching about urodynamics in medical residency programs and promoting continuing education in health professions.

Keywords: Educational Technology; Urodynamics; Internship and Residency; Education, Distance; Education, Continuing.

RESUMO

Introdução: *O exame urodinâmico é uma ferramenta diagnóstica que avalia as funções de armazenamento e esvaziamento da bexiga. O exame é complexo, apresenta indicações precisas e exige interpretação e análise crítica dos seus resultados. O conhecimento em urodinâmica e das disfunções do trato urinário inferior está entre as competências almejadas para os médicos residentes em ginecologia e obstetrícia; todavia, não existe padronização do ensino dessa temática em muitos serviços de residência médica. A educação mediada por tecnologia é uma aliada no desenvolvimento de capacitação qualificada para profissionais de saúde com impacto na melhoria dos serviços ofertados. Nos programas de residência médica, essa estratégia educacional oferece oportunidades para reforçar os conceitos aprendidos e explorar outros não contemplados no período de formação.*

Objetivo: *Este estudo teve como objetivo desenvolver uma ferramenta educacional digital para ensino do exame urodinâmico dentro dos programas de residência médica em ginecologia e obstetrícia.*

Método: *Trata-se de um estudo descritivo do desenvolvimento de uma ferramenta educacional, em que se utilizou o design instrucional contextualizado para nortear o processo de construção do conteúdo digital.*

Resultado: *Entre março de 2023 e fevereiro de 2024, desenvolveu-se um módulo educacional em urodinâmica, aberto e gratuito, no Ambiente Virtual de Aprendizagem do Sistema Único de Saúde (Avasus). O módulo apresenta carga horária total de 30 horas e tem como público-alvo médicos residentes em ginecologia e obstetrícia. Os recursos educacionais utilizados de acordo com o design instrucional proposto constituíram-se de vídeos, gráficos, imagens, casos clínicos ilustrativos, textos complementares, questionários direcionados e glossários.*

Conclusão: *A ferramenta mostra-se prática, de fácil acesso, oportuna ao aprendizado, com possibilidade de ampliar o ensino sobre urodinâmica nos programas de residência médica e promover a educação continuada nas profissões de saúde.*

Palavras-chaves: *Tecnologia Educacional; Urodinâmica; Residência Médica; Educação a Distância; Educação Continuada.*

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Chief Editor: Rosiane Viana Zuza Diniz.
Associate Editor: Fernando Almeida.

Received on 03/24/24; Accepted on 12/02/24.

Evaluated by double blind review.

DOI: https://doi.org/10.1590/1981-5271v49.1-2024-0075.ING

INTRODUCTION

The urodynamic examination is a diagnostic tool that evaluates the storage and emptying functions of the bladder. Its objective is to reproduce urinary symptoms aiming to identify the underlying causes for such symptoms and to quantify the related pathophysiological processes. The examination is complex, has precise indications and requires interpretation and critical analysis of its results.[1]

It is known that training in urogynecology is insufficient in several residency programs, especially in gynecology and obstetrics programs.[2-5] Many newly graduated professionals end up choosing to undergo additional training in urogynecology because they do not feel able to treat this patient profile. Certainly, the lack of knowledge about indications, technique and interpretation of the urodynamic test, which should be learned during residency, contributes to this scenario.

Knowledge of urodynamics and lower urinary tract dysfunctions is among the competencies desired for gynecology and obstetrics residents, well established by the Brazilian Federation of Gynecology and Obstetrics Associations (Febrasgo, *Federação Brasileira de Associações de Ginecologia e Obstetrícia*) in the Competency Matrix for Medical Residency Programs in Gynecology and Obstetrics in Brazil, which had its first version approved in 2017.[6] However, urodynamic teaching in these programs faces some difficulties. Residency programs do not offer a specific curriculum and sufficient practical opportunities for residents to attain skills in this area. Equipment to conduct the test can be expensive, and educational institutions may face financial constraints to invest in this technology, thus affecting the residents' exposure to it. Finally, the preceptors' lack of training and experience on the topic limits discussions and exchanges of experiences, making it difficult to create a collaborative learning environment.[3,4]

Access to health care does not necessarily depend on the availability of the health workforce, but also on ensuring that this workforce remains qualified and able to reason clinically and make decisions that provide the accurate diagnosis and appropriate treatment. Enabling continuing education for professionals who carry out their work activities from urban centers to the most remote areas is, in fact, strategic to offer quality and equitable access to health care to all users of the Brazilian Unified Health System (SUS, *Sistema Único de Saúde*).[7] In fact, the scalability of education for a health workforce, comprising millions of professionals, represents a challenge that can be overcome with digital technological mediation, based on educational offers designed to address the epidemiological challenges in the territories and at each specific moment.[8,9]

Technology-mediated education has proven to be an ally in the development of training and the quality of services.[7,8] Distance education (DE) uses the means of communication and interactive technologies to bring health professionals closer, at lower costs and more efficiently for the institutions. DE can be an alternative for teaching the urodynamic test, as it allows the student to make the course compatible with their schedule possibilities, to be carried out at the desired pace and in any available space, in addition to the development of skills and attitudes such as independence, proactive behavior and self-discipline in the search for their development.[9] In DE, Virtual Learning Environments (VLEs) are conceptualized as computational platforms with the possibility of integrating functionalities and tools that allow the construction of a teaching-learning process with interactivity and in the online modality.[10]

The reasons that led us to carry out this study is the lack of standardization of teaching in urodynamics in many medical residency services, not only in Brazil, but also worldwide[11], and there is no consensual curriculum for teaching and evaluating the test-related competencies. The lack of knowledge about the indications, technique and interpretation of the test is identified, which can impact the care costs of health systems and patient treatment. Based on this problem, we sought to develop a digital educational tool for the teaching of the urodynamic examination in medical residency programs, capable of contributing to the training of these professionals.

METHODS

This is a descriptive study of the development of a digital educational tool aimed at teaching the urodynamic test having as the target audience resident physicians of gynecology and obstetrics programs.[12] The study was approved by the Research Ethics Committee of Hospital Universitário Onofre Lopes (HUOL), under Certificate of Presentation for Ethical Appreciation number 53894321.5.0000.5292.

The teaching tool consisted in the creation of an educational module in the Virtual Learning Environment in the Unified Health System (AVASUS, *Ambiente Virtual de Aprendizagem no Sistema Único de Saúde*) of the Ministry of Health. The module composition was carried out by a single content creator, under the guidance and supervision of the team of the Laboratory of Technological Innovation in Health (LAIS, *Laboratório de Inovação Tecnológica em Saúde*), in partnership with the Distance Education Secretariat (SEDIS, *Secretaria de Educação a Distância*) of Universidade Federal do Rio Grande do Norte (UFRN), with the support of two technical-scientific reviewers, professors of urology at UFRN and with experience in performing the test and in the area of health education. It also had the support of two pedagogical reviewers, from LAIS and Hospital Universitário Onofre Lopes (HUOL).

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Contextualized Instructional Design (CID) was used to guide the process of module construction. According to Filatro[13], CID is defined as an intentional and systematic teaching action that involves the planning, development and use of methods, techniques, activities, materials, events and educational products in specific didactic situations, aiming to facilitate human learning based on the known principles of learning and instruction. The VLE instructional design is essential for the construction of the teaching-learning process, making it more effective, since the interactions and the ability to understand the content by the learner are influenced by the support the student receives and the available administration and communication resources.[14]

The construction of the educational module occurred in five interdependent stages, namely: Analysis, Design, Development, Implementation and Evaluation (Figure 1).

Analysis – it consisted of identifying the learning needs, delimiting the topic and the target audience, and defining the educational objectives, taking into account the environmental, economic, administrative, technical and time limitations available for the course. The survey of the learning needs was carried out through bibliographic materials of scientific relevance and applicability in professional practice, based on the cognitive domain of Bloom's taxonomy.[15]

A literature review on the subject was carried out between December 2022 and March 2023, through an active search of publications in the main databases: PubMed, Scopus, Web of Science, Google Scholar, Lilacs, SciELO; and in gray literature: dissertation and thesis database of the portal of the Coordination for the Improvement of Higher Education Personnel (CAPES, *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*). There were no limits as to the year of publication. The keywords used were: *Urodinâmica*/Urodynamics; *Residência Médica*/Internship and Residency; *Tecnologia Educacional*/Educational Technology; and *Educação a Distância*/Education.

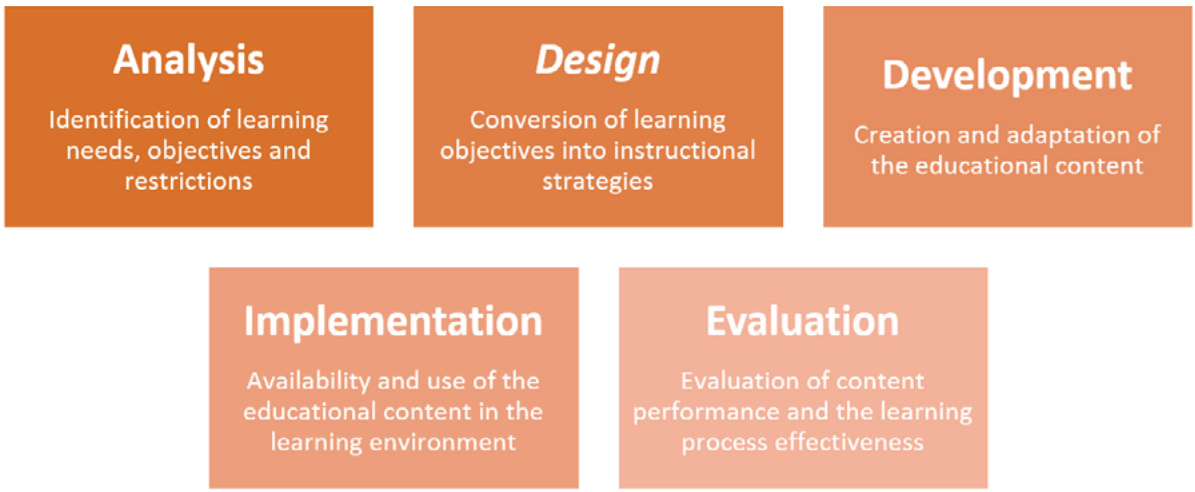
Design – in this stage, the educational resources and strategies to be used to expose the content were defined, with the purpose of achieving the learning objectives. The pedagogical project was mapped, structured and sequenced, creating an organizational template that served as the basis for the development of the module on the AVASUS platform. In the design stage, the chosen elements must adapt to the character of dynamism and recursion of the CID. Thus, the educational material in the virtual environment can be constantly and promptly modified and updated, being adapted, even during the offer of the module, to the students' needs and objectives.[14]

Development – at this stage, the creation and adaptation of the educational content took place, with the organization in the virtual learning environment and pedagogical and technological definitions. The production of materials determines the degree of user interaction and the desired interactivity in the VLE, the way the material will be presented, the technical support and the type of tutoring to the student.[16,17]

The development and production of the module audiovisual content, specifically the production of the videos, occurred over a period of nine months and took place in three phases: pre-production, production and post-production.[16] During pre-production, the actors participating in the videos were also trained by the SEDIS team, with the signing of the terms of authorization for the image use. The infrastructure for the filming was verified, with the preparation of the sets and testing of the studio equipment.

During the production phase, the scenes that comprise the videos were filmed by the SEDIS technical team (Figure 2).

Figure 1. Stages of the construction of the Virtual Learning Environment.



Source: Prepared by the authors.

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Figure 2. Video footage during the VLE production process.

Source: Prepared by the authors.

The team provided guidance on aspects related to the framing of the visual plane, language, recording time, visual presentation of the actors, sound and light; in addition to having followed the pre-produced script. The following equipment was used in the filming: Canon 80D Camera, DJI Osmo Pocket Camera, Canon EF 50mm f/1.8 STM Lens and Canon EF-s 18-200mm f/3.5-5.6 Lens, for image capture; Ht-81 Unidirectional Ultra Cardioid Condenser Microphone, Zoom H1 Digital Recorder and lavalier microphone, for audio capture; Tripod For Ring Light and Led Yongnuo Yn 300 III for lighting; in addition to resources such as chroma key and teleprompter.

In the post-production phase, the editing and organization of the filmed shots were carried out for the composition of the video scenes. In this stage, the creation of graphics for the videos was carried out, with the insertion of images, music and animations in line with the content and pedagogical proposal of the course, using Adobe® Premiere Pro and Adobe® After Effects software.

Implementation – in this phase, it was defined how the training of students would occur for the use of the developed materials, the setting of users in the VLE and the execution of the didactic event, that is, the verification of the cognitive process, the formation of social relationships in the group, the evaluation process and the feedback that will be carried out by the teacher. During the implementation, the instructional materials were launched and used in the learning environment, that is, the content was made available in AVASUS. It is important to note that, before the implementation, the module was adapted into a test platform, allowing the content creator to make the necessary adjustments and correct non-conformities.

Evaluation – it corresponds to the last stage of the production process, in which the content is reviewed to identify and correct errors. During this stage, it is also defined how the design will be evaluated throughout the course for its continuous improvement.

RESULTS

Between March 2023 and February 2024, an educational module in urodynamics was developed, which was made available on the Ministry of Health's AVASUS platform on 02/09/2024. The module was entitled "Urodynamic examination in gynecological clinical practice" and is available at the https://avasus.ufrn.br/local/avasplugin/cursos/curso.php?id=668 (Figure 3). To access the AVASUS content, first, the student must register with the Open Health System for Interactivity and Learning (Sabiá, *Saúde Aberta à Interatividade e à Aprendizagem*). When logging *in to* AVASUS, the student must click on the "Courses" tab and search for the module "Urodynamic examination in gynecological clinical practice".

The module has a total workload of 30 hours and its content is presented in an integrated and structured way, promoting a systemic and non-fragmented view of the proposed topic, while stimulating the construction of clinical reasoning and critical-reflective thinking. For this purpose, it allows a self-instructional and interactive learning process, based on the use of visual and auditory elements and evaluations[14]. The educational resources used according to the proposed CID consisted of videos, graphs, illustrations, illustrative clinical cases, complementary texts, targeted questionnaires and glossary.

The material produced was aimed at resident physicians of the gynecology and obstetrics programs of the state of Rio Grande do Norte, Brazil, available as an optional teaching tool, being also accessible to health professionals who work in the area of urogynecology and who wish to improve their knowledge about urodynamics.

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Figure 3. Initial screen of the educational module "Urodynamic examination in gynecological clinical practice" on the AVASUS platform.

Source: available at https://avasus.ufrn.br/local/avasplugin/cursos/curso.php?id=668

The learning objectives were defined considering the recommendations of the International Continence Society (ICS), the Febrasgo competency matrices for the Medical Residency Programs in Gynecology and Obstetrics and the Entrustable Professional Activities (EPA) in the training of the specialist in Gynecology and Obstetrics, also proposed by Febrasgo; and consisted of: reviewing basic concepts about anatomy, physiology and pathophysiology of the lower urinary tract; understand the importance of non-invasive urodynamic evaluation in the workup of lower urinary tract dysfunctions; know the operation of the urodynamics equipment and the technique for performing the test; discriminate the phases of the conventional urodynamic examination and the main parameters evaluated according to the ICS recommendations; understand the indications of the urodynamic examination in female patients; interpret the urodynamic findings in specific situations of urogynecological clinical practice.[1, 6, 18]

After defining the learning objectives, the topics to be addressed in the teaching process were chosen. The choice of topics by the module content creator was approved by two technical-scientific reviewers. In case of disagreement regarding the content of the topics between the reviewers, it would be excluded from the material. In the end, all the topics proposed by the content creator were approved by both reviewers, who considered them essential for the work proposal.

The intention to extend the produced content to other health professionals is based on the United Nations (UN) Sustainable Development Goals and Targets (SDGs), specifically target 3.8 of SDG 3, "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all."; and target 4.3 of SDG 4, "By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university".[19]

The virtual classroom was planned and implemented to facilitate the relationship between the user and the platform. The environment has a friendly interface, modern layout and simple visualization, with the utilization of usability and accessibility resources and concepts. In the VLE, all resources are available in units, duly identified through icons. Each icon represents what is most significant in the class (Figure 4).

The course content was divided into three units. In Unit 1 the student will review the anatomy, physiology and pathophysiology of the lower urinary tract; they will learn about the main non-invasive urodynamic modalities; and will understand basic concepts about the operation of the urodynamics equipment and the technique for performing the test. In Unit 2, the student will study the phases of the conventional urodynamic exam and the main parameters that must be evaluated during the exam; and will learn about the main recommendations in urodynamics recommended by ICS. Finally, in Unit 3, the student will be introduced to a series of clinical cases in which the conventional urodynamic test can be used as a complementary diagnostic tool, understanding the indications of the urodynamic test in female patients and how to interpret the results of the test in specific situations of urogynecological practice.

Considering the teaching proposal of AVASUS, and aiming to achieve the defined learning objectives, it was also sought to create a database of questions according to the contents presented in the module. The objective of the

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Figure 4. Navigation panel of the educational module in AVASUS.

Source: available at https://avasus.ufrn.br/local/avasplugin/cursos/curso.php?id=668

questions was to serve as an instrument to evaluate learning, serving as stimuli whose function is to prompt responses that express learning, manifestations of knowledge, in the form of skills and competencies. With this perspective, a database was prepared with 50 questions including all the topics covered in the educational module. From a set of 50 questions, the content creator and the technical-scientific reviewers selected 10 general questions that would be used in a pre- and post-test for the purposes of initial diagnosis and final evaluation. Eighteen questions were also selected to be answered by the student throughout the module, for reflection and retention of the studied content. Due to the self-assessment features, all the questions in the module provide feedback, a justification for the student to know why they made a mistake or got it right. Therefore, we seek to foster assessment for learning, providing immediate and continuous feedback that helps the student understand and improve their skills and knowledge during the course, which makes the environment more adaptable and responsive.[20]

In a future where vast amounts of information are continuously available, issues of self-regulated learning and cognitive load are ubiquitous and have become inseparable. Self-regulated learning is a process where the learner takes the initiative to control and adjust their learning strategies based on their own assessments and needs. This includes the ability to set goals, monitor one's progress, adjust study strategies, and stay motivated. Cognitive load refers to the amount of mental resources needed to process and understand information during learning, aiming to optimize the efficiency of information processing in the student's mind. Students who practice self-regulated learning can better manage their cognitive load by applying effective strategies to deal with the material complexity and adapt their learning style as needed.[21]

At the end of the last unit of the module, the student must also answer a post-test and a questionnaire to evaluate satisfaction in relation to the course content and development, also evaluating the contribution of the course to their clinical practice.

After completing the module, the student is invited to contribute to AVASUS, by giving evaluation stars for the course, and can also leave their opinion or suggestions for improvements. These suggestions will serve as basis for changes in the virtual learning environment as a whole and not just in content. Upon completing 100% of the module, the student can also obtain (save) the certificate, according to the defined workload.

The last stage of the process of building this educational tool, the evaluation, will take place in the near future. During this stage, the usability validation of the module will be carried out by the course participants. Validation, as a scientific instrument, is important to verify, in the community that will be the target audience of the research, its feasibility, applicability and understanding, with the objective of ascertaining the satisfaction, understanding and reliability of the produced material.[22]

DISCUSSION

This is a pioneering study, which brings as a product an open and free digital educational module, aimed at teaching the urodynamics exam to resident physicians in the health area. The availability of an online course on this topic makes knowledge accessible to all, allowing the standardization of teaching in residency programs.

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In this sense, it is essential to integrate the teaching of urodynamic examination in a more robust way into the curricula of medical residencies, offering access to equipment, relevant clinical cases, specialized supervision and practical opportunities. The support of distance education programs can help fill these gaps, ensuring more comprehensive and up-to-date training for residents.

Febrasgo, in its Matrix of Competencies in Gynecology and Obstetrics, seeks to ensure more consistency and coherence in the orientation of Medical Residency Programs. In this document, the 6th axis of competencies, related to Health Care and Assistance in Pelvic Floor Disorders, recommends that first-year gynecology and obstetrics residents must demonstrate basic knowledge about the physiology and functional anatomy of the pelvic floor; understand the pathophysiology, signs and symptoms, and risk factors of these disorders; and have the skills to formulate differential diagnoses. Second-year residents must be able to properly assess and interpret the urodynamic exam; and establish initial clinical treatment plans for patients with uncomplicated pelvic floor disorders. Finally, third-year residents must properly perform the urodynamic exam; establish initial treatment plans for patients with complex pelvic floor disorders; and to identify new care plans for conditions of therapeutic failure.[6]

Further training in urogynecology can increase confidence in the performance of the urodynamic testing. Christakis et al.[3] show that 88% of gynecologists who carried out a subspecialization in female pelvic reconstructive surgery felt moderately or very comfortable in performing the urodynamic examination in their practice, unlike 24% of generalist gynecologists, a difference that was not observed when compared to subspecialist gynecologists and urologists.

In a study carried out in the University of Texas, newly graduated gynecologists were interviewed about their experience in urogynecology during postgraduate school and in their current practice. Most of the interviewees (81.7%) revealed that additional training in urogynecology during residency was necessary, and 61.2% indicated that their practice in urodynamics was not satisfactory, and that 60% of the participants did not undergo any examination during their training.[2]

Yune et al.[4] interviewed 262 gynecologists who did not have a subspecialty in urogynecology, of which 70.5% reported using urodynamic examination routinely or frequently in the evaluation of women with urinary incontinence. On the other hand, in another survey with 1312 generalist gynecologists, 12.7% of the interviewees said they were able to perform and interpret the urodynamic exam; 11.4% were able to interpret the exam, but did not perform it; 47.3% were only able to understand the exam report; and 24.5% were unable to understand the exam report.[5]

The ICS recommends that beginners in urodynamics take a theoretical course with at least 18 hours of instruction, where theoretical and practical aspects of the exam are presented. This recommendation, however, is based only on expert opinion.[23]

It is well established that active learning fosters the critical thinking skills essential for the transfer and use of knowledge acquired in the classroom to the clinical setting.[8] From this perspective, the use of a VLE seems to be related to greater student satisfaction and involvement when compared to traditional teaching.[24]

Reis et al.[25] compared the use of an interactive electronic library accessible through a Moodle (Modular-object-oriented dynamic learning environment) platform with lectures in the teaching of urology to medical students, showing that the offer of learning courses on the Moodle platform was considered superior to lectures by 86% of the students.

Distance education in medical residency programs provides opportunities to reinforce learned concepts and explore unaddressed topics during training. The VLE fosters critical thinking skills essential for the transfer and use of knowledge acquired in the classroom to the clinical setting.[26-28] Cunha et al.[28] evaluated pediatric residents' effectiveness and satisfaction rates after the use of VLE in pediatric rheumatology. The tool showed to be effective and was considered adequate for the teaching of the topic by 91% of the users, and 75% agreed that good learning ensued through the methodology.

The goal of the AVASUS platform is to contribute to lifelong learning in health by providing scientifically sound information and resources to build a skilled health workforce.[29] This improves their ability to share knowledge in their workplace and incorporate it into decision-making processes. Hence, its application is motivated by the demand for qualified health professionals working at the primary, secondary and tertiary levels of health.[8-9]

Continuing education and professional improvement are crucial elements in the health area, considering the constant innovations and scientific advances. In this context, AVASUS has solidified itself as a dynamic and effective tool for the training and updating of health professionals, providing tangible benefits to clinical practice and the quality of the services provided. The platform offers an innovative approach by eliminating geographical and temporal barriers.[30]

Valentim et al.[30] emphasize AVASUS ability to provide broad access and flexibility of schedules, allowing health professionals to participate in courses and training in an accessible way and adapted to their routines. Professionals trained through this tool demonstrate more effectiveness in

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care, basing their decisions on up-to-date knowledge and practices aligned with the best scientific evidence. It is also necessary to highlight the correlation between the use of AVASUS and the reduction of inequalities in the provision of health services. The equitable access to education offered by the platform contributes to reducing knowledge disparities between different regions of the country.[31]

Moreover, the technological mediation offered by the Massive Online Open Courses (MOOC) encourages the adoption of innovative technologies in the continuous process of improving the individual and collective capacities of the Brazilian health workforce.[32] It is clear that AVASUS courses promote changes in work processes and contribute positively to the development of new health services.[8-9]

Gomes et al.[33] demonstrated that conducting a 24-hour urodynamics course for urology residents attending the 4th and 5th years of postgraduate school can promote lasting improvements in the perceptions, competencies, and attitudes related to the test. The participants felt more confident in various urodynamic competencies after the course, including patient preparation, indication and examination technique, terminology, tracing interpretation, and patient treatment. In addition, most residents adopted the exam indication more rigorously, which is an important step to reduce the number of unnecessary tests, both in terms of patient safety and health management.

In this regard, Shamout et al.[34] evaluated the impact of two different instructional methods on urodynamic examination interpretation skills in urology residents. They showed that residents who attended a 45-minute webinar from the European Urological Association (EUA) had better scores on exam interpretation skills when compared to residents who studied exclusively through the didactic material from the ICS Standardization Committee. The authors proposed a more widespread use of multimedia-based technology as a method of teaching urodynamics.

The development of this educational tool allows filling the gap of the lack of equipment, training and educational resources to train health professionals on the indications, technique and interpretation of the test, which can impact the care costs of health systems and patient treatment.

It is known that the simple construction of this educational module does not guarantee its effectiveness or pedagogical relevance, requiring an in-depth analysis of its impact on the teaching and learning process.[22] Failure to perform this analysis can result in a waste of resources and time, in addition to compromising the quality of the education offered. The evaluation stage of the module construction process will have this purpose, and the tool usability must be validated by the course participants. Therefore, this course will only be disseminated in the medical residency programs of gynecology and obstetrics after its validation, which will contribute to the performance of additional research on the subject.

Finally, it is important to recognize that the produced educational tool does not completely replace in-person training and clinical practice. Human interaction, practical training, and direct experience continue to be essential components of professional education in health. VLEs should be seen as a complementary tool, integrated into a broader education and professional development ecosystem.

CONCLUSION

The study allowed mapping and creating a systematized and technology-mediated educational content on the use of urodynamic examination in urogynecological clinical practice. The availability of an educational module within the AVASUS platform can expand the teaching of urodynamics in medical residency programs and contribute to continuing education in the health professions. This modality is currently on the rise, capable of allowing greater access to learning and democratization of knowledge. Moreover, it contributes to and stimulates the exercise of autonomy, the interaction of the subjects involved, favoring production, the exchange of knowledge for the scientific dissemination of innovative practices and the improvement in the production of new studies in different research contexts.

ACKNOWLEDGEMENTS

The authors would like to thank the Laboratory of Technological Innovation in Health (Lais), and the Distance Education Secretariat (Sedis) of UFRN for the support provided during the performance of this research. The authors would also like to thank the collaborators Jane Francinete Dantas and Beethoven Padilha who were fundamental in the process of building the educational module in Avasus.

AUTHORS' CONTRIBUTIONS

Rodolfo Alves da Silva, Paulo José de Medeiros, Cesar Araújo Britto and Jane Francinete Dantas collaborated in the writing, formatting and organization of the manuscript. Ana Cristina Pinheiro Fernandes de Araújo collaborated with the review and editing of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

SOURCES OF FUNDING

The authors declare no sources of funding.

DOI: https://doi.org/10.1590/1981-5271v49.1-2024-0075.ING

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