TEXTO & CONTEXTO ENFERMAGEM
TEXT & CONTEXT NURSING TEXTO & CONTEXTO ENFERMERÍA

ANTIMICROBIAL STEWARDSHIP FOR NURSING GRADUATES: DEVELOPMENT AND EVALUATION OF EDUCATIONAL TECHNOLOGY

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ABSTRACT

Objective: to develop and evaluate an online course using WebQuests on antimicrobial stewardship for nursing students, based on international consensus.
Method: this is a methodological study to develop and validate an educational strategy, as well as quantitative and descriptive to evaluate its practicability. The study was conducted from March 2021 to April 2022. After development, there was validation of the appearance and content of the material by judges, adopting a content validity index greater than 0.80 for each item. The four validated WebQuests were made available in course format on the Open Courses Portal of the Federal University of São Carlos. An instrument was developed in electronic format to evaluate the practicality of the educational strategy according to the views of 73 nursing students. The results were stored in Excel spreadsheets and analyzed using descriptive statistics.
Results: the educational strategy was validated by 10 expert judges, with a total content validity index greater than 0.90 for appearance and content. Its practicality was evaluated by 73 nursing students, and it was considered easy to understand and implement, with participants expressing interest in using this type of educational strategy.
Conclusion: the developed, validated and evaluated course is a useful tool and is available free of charge to contribute to the training of future nurses on the topic of antimicrobial stewardship.

DESCRIPTORS: Antimicrobial stewardship. Educational technology. Validation study. Nursing. Methods.

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GERENCIAMENTO DE ANTIMICROBIANOS PARA GRADUANDOS EM ENFERMAGEM: DESENVOLVIMENTO E AVALIAÇÃO DE TECNOLOGIA EDUCACIONAL

RESUMO

Objetivo: desenvolver e avaliar um curso online utilizando *WebQuests* sobre gerenciamento de antimicrobianos para graduandos em enfermagem, baseado em consenso internacional.
Método: pesquisa metodológica para o desenvolvimento e a validação de estratégia educativa, e pesquisa quantitativa e descritiva, para se avaliar sua praticabilidade, realizada no período de março de 2021 a abril de 2022. Após o desenvolvimento, houve a validação de aparência e conteúdo do material por juízes, adotando-se o índice de validade de conteúdo superior a 0,80 para cada item. As quatro *WebQuests* validadas foram disponibilizadas em formato de curso no Portal de Cursos Abertos da Universidade Federal de São Carlos. Foi elaborado um instrumento em formato eletrônico para avaliar a praticabilidade da estratégia educativa segundo a visão de 73 graduandos em enfermagem. Os resultados foram armazenados em planilhas Excel e analisados por meio de estatística descritiva.
Resultados: a estratégia educativa foi validada por 10 juízes especialistas, com índice de validade de conteúdo total maior de 0,90 para aparência e conteúdo. Quanto à praticabilidade, avaliada por 73 graduandos de enfermagem, foi considerada de fácil entendimento e realização, sendo que os participantes manifestaram interesse em utilizar este tipo de estratégia educativa.
Conclusão: o curso desenvolvido, validado e avaliado é uma ferramenta útil e está disponível gratuitamente para contribuir com a formação de futuros enfermeiros na temática do gerenciamento de antimicrobianos.

DESCRITORES: Gestão de antimicrobianos. Tecnologia educacional. Estudo de validação. Enfermagem. Métodos.

MANEJO ANTIMICROBIANO PARA LICENCIADOS EN ENFERMERÍA: DESARROLLO Y EVALUACIÓN DE TECNOLOGÍA EDUCATIVA

RESUMEN

Objetivo: desarrollar y evaluar un curso en línea mediante WebQuests sobre manejo de antimicrobianos para estudiantes de enfermería, basado en consenso internacional.
Método: investigación metodológica para el desarrollo y validación de una estrategia educativa, e investigación cuantitativa y descriptiva, para evaluar su viabilidad, realizada de marzo de 2021 a abril de 2022. Luego del desarrollo, se realizó la validación de la apariencia y contenido del material por parte de jueces, adoptando un índice de validez de contenido superior a 0,80 para cada ítem. Las cuatro WebQuests validadas estuvieron disponibles en formato curso en el Portal de Cursos Abiertos de la Universidad Federal de São Carlos. Se desarrolló un instrumento en formato electrónico para evaluar la practicidad de la estrategia educativa según la visión de 73 estudiantes de enfermería. Los resultados se almacenaron en hojas de cálculo de Excel y se analizaron mediante estadística descriptiva.
Resultados: la estrategia educativa fue validada por 10 jueces expertos, con un índice de validez de contenido total mayor a 0,90 para apariencia y contenido. En cuanto a la practicidad, evaluada por 73 estudiantes de enfermería, se consideró de fácil comprensión y realización, manifestando los participantes interés en utilizar este tipo de estrategia educativa.
Conclusión: el curso desarrollado, validado y evaluado es una herramienta útil y está disponible de forma gratuita para contribuir a la formación de futuros enfermeros en el tema de manejo antimicrobiano.

DESCRIPTORES: Manejo antimicrobiano. Tecnología Educacional. Estudio de validación. Enfermería. Métodos.

INTRODUCTION

Antimicrobial resistance consists of the ability of a microorganism to overcome the action of an antimicrobial, and is a serious threat to public health worldwide. Among the measures which aim to minimize antimicrobial resistance, a problem which became even more exacerbated after the start of the coronavirus pandemic (SARS-CoV-2), is the (PGA)-Antimicrobial Stewardship Management Program[1–2].

The PGA involves a set of actions aimed at the rational use of Antimicrobials (ATM) in health services and foresees participation of an interprofessional team, including nurses. The nurse is the health professional who spends the longest time at the patient's side and performs essential functions for the success of the PGA, such as preparing and timely administration of ATM, implementing good practices to control and prevent Healthcare-Associated Infections (HAIs), venous network assessment, historical collection of recent ATM use and allergies. Due to their proximity in providing direct care to the patient, they may be the first to notice signs of a possible infection; adverse effects of ATM; or swallowing difficulties, among others[3,4,5,6].

However, there are still many doubts regarding the role of nurses in the PGA, what they are about and what their planned actions are in an interprofessional team in the PGA, in addition to concepts of microbiology and pharmacology; a fact which is corroborated by the incipient training of nurses on the PGA theme[7].

In order to help nurses to deepen their knowledge in PGA and collaborate so that they have compatible performance with their relevance and their potential to work in PGA, it was proposed to develop an educational strategy for nursing graduates with the aim of the future professionals already being prepared to meet this need upon graduating.

It is also worth highlighting the limited literature available on the subject, mainly national, and its originality as an educational technology.

Active methodologies have been recognized for professional education as being more effective for incorporating knowledge or changing behavior[8]. In particular, activities involving Information and Communication Technologies (ICTs) have become popular reinforced by the current pandemic, and increasingly facilitate this process by taking into account the student's previous knowledge and experiences, leading to an innovative teaching-learning process[9].

Among the educational strategies with active methodologies and which use ICTs, WebQuests (WQ) was chosen to develop the educational strategy on the PGA for nursing students. The WQ is a simple teaching tool, easily accessible and with educational resources from the internet[10] used very effectively in teaching topics in the nursing area[11].

In a study which conducted nursing training on their role in the PGA in an e-learning format, meaning using ICTs, it was concluded that this method can facilitate learning on the subject by providing the basis for nurses to join the interprofessional team of PGA effectively[12].

Therefore, this study aimed to develop and evaluate an online course using WQ on antimicrobial stewardship for nursing students.

METHOD

This study was conducted in two stages: methodological research to develop and validate an educational strategy; and quantitative and descriptive research to evaluate its practicability[13], carried out from March 2021 to April 2022.

First, the WQ educational strategy on the PGA for nursing undergraduates was developed and validated in appearance and content.

Next, the conceptual structure used to prepare the WQ was based on the "International Competencies for Antimicrobial Stewardship for Undergraduate Nursing"[14], which were organized into four domains: infection prevention and control, infection diagnosis and use of antimicrobials, clinical nursing practice and person-centered care and interprofessional practice. A curricular matrix was created for each of the course domains with contents, general objective and syllabus, discussed and refined in discussions with members of a research group in the area.

The four WQs were made available in course format on the Open Courses Portal (PoCA) of the Federal University of São Carlos (UFSCar). PoCA consists of a platform made available by the Modular Object-Oriented Dynamic Learning Environment (MOODLE), which is administered by the General Secretariat of Distance Education (SEaD) at UFSCar and has a pedAuggical, information technology and audiovisual team.

The courses available at PoCA are online, distance learning, open, free and massive (MOOC), certified by the Pro-Rector of Extension at UFSCar.

The structure of the WQ followed the six stages recommended for its implementation[15]: introduction, which is the moment in which participants are prepared and motivated, providing course presentation information; task, where information about the activities is specified; process, in which explanations about activities are more detailed; resources, with support materials, including the internet, that the student can use to establish content and carry out the assessment; evaluation, for which there must be some activity to evaluate the participant, who in this case had clinical cases for resolution and conclusion, which consists of the end of the WQ and reinforcement to participants on the topic addressed. It should be noted that instructional design recommendations were followed[16].

After development, the appearance and content of the material was validated by 10 judges. The agreement value between judges for satisfactory evidence of content validity is greater than 0.78[17]. A Content Validity Index (CVI) greater than 0.80 was adopted for each item in this study.

An instrument was created to validate the appearance and content of the WQ and was sent via email to the judges using a link generated by Google Forms®, in which an Informed Consent Form (ICF) was also inserted. In this same email, specific instructions on filling out the instrument were also sent and the WQs that were developed for validation were attached.

The criteria for choosing the judges were: – Clinical or teaching experience in the area of infection control related to healthcare; – Experience with developing and validating questionnaires; – Clinical or teaching/research experience in the area of Antimicrobial Stewardship. It should be noted that all the judges invited to participate were Nurses and that CVs registered on the Lattes Platform of the National Council for Scientific and Technological Development (CNPq) were consulted for choice and access.

After developing and validating the educational strategy, 106 nursing students from a private University Center in the interior of the state of São Paulo, selected through a convenience sample, were invited to evaluate the practicality of the educational strategy, of which 73 accepted. The invitation to participate was made via the Whatsapp® application. The inclusion criteria were: Nursing undergraduates, regularly enrolled from the 4th semester of graduation at the time of data collection. Exclusion criteria were students who were not available to participate in the research in full.

As the term itself suggests, practicability evaluates the practical aspects of using instruments through the opinion of those who used them[18].

An instrument was developed and applied in electronic format to evaluate the practicality of the educational strategy from the perspective of the participating nursing students through three Likert-type questions, with the following answer options: 1 – completely disagree; 2 – partially disagree; 3 – I have no opinion; 4 – I partially agree; 5 – I totally agree[19].

These results were tabulated and stored in Excel spreadsheets and their analysis was carried out using descriptive statistics (mean and relative and absolute frequencies).

The study respected all ethical precepts for research with human beings in resolution 466/2012 of the National Health Council (CNS).

Participants in all stages of the study registered their agreement by reading and signing the ICF and data collection was performed after approval by the Research Ethics Committee.

RESULTS

The first stage was divided into two moments: the development of the educational strategy, and subsequently its appearance and content validation by expert judges.

The four WQs were arranged in PoCA in the format of the open and untutored course "Educational strategy for teaching about the Antimicrobial Stewardship Program" and registered with the Dean of Extension at UFSCar under process no. 23112.002203/2018-14. The license used was the Creative Commons CC-BY SA 4.0 international license. It can be accessed through electronic devices which provide access to the internet. It should be noted that all images used in the course are freely accessible. Figure 1 presents the course units or domains.

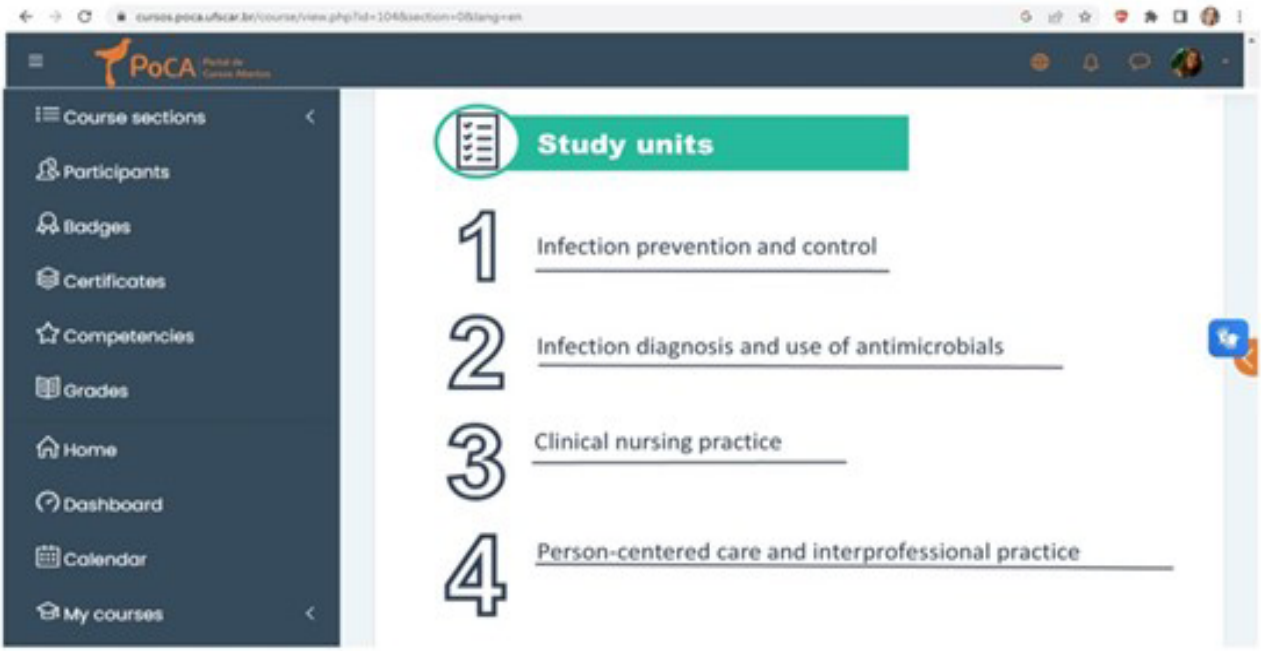

Figure 1 – Course presentation: study units. São Carlos, SP, Brazil, 2022.

All four domains have two cases within the assessment, one question with five alternatives for each of them. There is only one correct answer, and you can only advance to the next domain after getting it right. If the chosen option is incorrect, there is an explanation about the fact and a new opportunity to get it right is given, favoring learning.

For validating the appearance and content of the WQ, 80% (n=8) of the expert judges were women with ages ranging from 31 to 54 years, and the shortest total time working as a Nurse was 6 years and the longest time was 33 years; 30% (n=3) of the judges have been working for 9 years.

In relation to postgraduate studies, 60% (n=6) of the judges have Doctorates, 20% (n=2) have Master's degrees, and 20% (n=2) are Specialists. When asked about their current area of activity, 60% (n=6) reported having clinical or teaching experience in the area of infection control related to

healthcare ranging from 3 to 25 years of experience, and 40% (n=4) reported having experience with developing and validating questionnaires, ranging from 4 to 10 years of experience.

It should be noted that no judge mentioned having clinical or teaching/research experience in the area of Antimicrobial Stewardship, which may be due to the topic still being incipient in the country, particularly among Nurses, despite the topic being part of the area of infection control. The appearance assessment was performed once for all four WQs and the content assessment was carried out individually for each of the WQs. Chart 1 shows the CVI of the appearance of the WQ set.

It should be noted that all items which evaluated the appearance of the WQ presented a CVI greater than 0.90, with the minimum value considered for validation in this study being 0.8017. The total CVI of the WQ set in relation to appearance was 0.98.

However, even with all the items validated and with very impressive results, it was decided to accept a suggestion from the judges, as described below.

Unlike the other domains, Domain 2 “Infection diagnosis and use of antimicrobials” and Domain 3 “Clinical nursing practice” had a synthesis for each of the two cases presented. It was suggested by two judges that the word “synthesis” be duplicated for each of the two cases in the WQ navigation menu for these two domains, and this suggestion was accepted in order to facilitate the participant’s experience in the course. Chart 2 shows the CVI of the WQ of each domain in relation to the content.

Chart 1 – Content Validity Index values referring to the appearance of the set of WebQuests. São Carlos, SP, Brazil, 2022.

Questions	CVI*
The tools are appropriate for nursing graduates.	0.90
The WQs are clear and explanatory.	1
The WQs are scientifically based.	1
The WQs are offered in logical sequence.	1
The design of the WQ (text style and images) is appropriate and coherent.	1
The aesthetic presentation of the material is generally pleasant.	1
WQ total CVI* in relation to appearance.**	**0.98**

Note: CVI*: Content Validity Index; WQ**: WebQuests.

Chart 2 – Content Validity Index of WebQuests in relation to content. São Carlos, SP, Brazil, 2022.

Questions	CVI*			
	IPC†	IDUA‡	CNP‖	PCCIP§
The WQ** is consistent with the learning needs of nursing students on the topic.	1	0.90	1	1
The WQ** has the potential to support the future clinical practice of nursing students on the topic.	1	0.90	1	1
Case 1 provides the necessary reflection on the concepts that we wish to convey in professional practice situations.	1	0.70	1	1
Case 2 provides the necessary reflection on the concepts that we wish to convey in professional practice situations.	0.80	1	1	1
WQ** portrays important aspects on the topic.	1	1	1	1
WQ** favors knowledge acquisition on the topic.	1	1	1	1
This WQ** is suitable for use as an educational strategy for nursing graduates.	0.90	1	1	1
Total CVI* of WQ** **in relation to content.**	**0.95**	**0.92**	**1**	**1**

Note: CVI*: Content Validity Index; WQ**: WebQuests; IPC†: Infection prevention and control; IDUA‡: Infection diagnosis and use of antimicrobials; CNP‖: Clinical nursing practice; PCCIP§: Person-centered care and interprofessional practice.

The four domains were evaluated and validated regarding content in relation to the total CVI of the WQ, presenting a CVI above 0.90 as follows: Domain 1 “Infection prevention and control” validated with a total CVI of 0.95; Domain 2 “Infection diagnosis and use of antimicrobials” validated with a total CVI of 0.92; Domain 3 “Clinical nursing practice” validated with a total CVI of 1; and Domain 4 “Person-centered care and interprofessional practice” also validated with a CVI of 1.

Only one isolated item did not reach the minimum CVI of 0.80: “Case 1 provides the necessary reflection on the concepts that one wishes to convey in professional practice situations” in Domain 2, with 0.70.

The judges suggested that the WQ address the classes of antimicrobials and should relate them to infections and examples of available antimicrobials, considering that Case 1 addresses the topic. Thus, a table was created in order to meet this suggestion and validate the item, and added to Domain 2 containing the main classes of antimicrobials, main examples of drugs from each of them and for which infections they should be used.

Despite the item in Domain 1 “Case 2 provides the necessary reflection on the concepts that one wishes to convey in professional practice situations” having been validated with 0.80, spelling corrections and the use of abbreviations were suggested in order to avoid make the content repetitive. Therefore, a review of the Portuguese language was performed in the 4 Domains. The end of this stage resulted in the 4 WQ domains being validated in appearance and content by judges and completed for use.

Among the 73 participants in the educational strategy practicality stage, 91.78% (n=67) were female. The average age was 23.74 years, with a median of 21 and standard deviation of 6.84.

Regarding the Nursing Undergraduate module that the participant was studying at the time of data collection, 38.36% (n=28) were in the 5th module, 35.62% (n=26) in the 7th module, 12.33% (n=9) in the 6th module, 8.22% (n=6) in the 4th module and 5.48% (n=4) in the 8th module.

When asked if they found it easy to perform the WQ, 67.12% (n=49) completely agreed and 27.40% (n=20) partially agreed; then regarding the ease of understanding the topics covered in the WQ, 80.82% (n=59) completely agreed and 17.81% (n=13) partially agreed; and finally, if they would like to use WQ for learning purposes, 89.04% (n= 65) totally agreed and 10.96% (n= 8) partially agreed.

DISCUSSION

Active methodologies, including ICTs, are already a reality in the nursing training process. These tools support safe clinical practice for future nurses in health services[20–21]. WQ are one of the innovative ways of using ICTs, boosting and facilitating the learning process, also favoring critical thinking[22]. Among the factors which stand out for the success of a distance educational strategy that uses ICTs, including WQ, are the planning of actions to be proposed, which can be performed through instructional design, as was used in this study[16].

The use of instructional design in conducting remote activities that complement face-to-face teaching in undergraduate nursing provides interactive, effective, autonomous, reflective, motivating and flexible learning[21]. It is noteworthy that the course developed and made available on PoCA was open, without tutoring, in accordance with the principles of andrAuggy, in which the student is an active subject in their learning process[23].

The validation process is fundamental so that the educational strategy, including using ICTs, is coherent with the needs of the population that will be applied, reliable and achieves its educational objectives[24]. The present study obtained a CVI of 0.98 as a total of the WQ in relation to appearance. In addition, the total CVI of the WQ in relation to content for domains 3 (“Clinical nursing practice”) and 4 (“Person-centered care and interprofessional practice”) had a CVI of 1, the maximum score. Domains 1 (“Infection prevention and control”) and 2 (“Infection diagnosis and use of antimicrobials”)

had a total CVI of 0.95 and 0.92, respectively. Other studies which developed educational strategies and validated them also obtained CVI values >0.90[24–25].

Despite the very impressive results which demonstrate the quality of the material developed, some observations were suggested by the judges, such as spelling review and the use of abbreviations, so that the content would be clearer and less repetitive[24]. It was also suggested to add content with the main classes of antimicrobials, main examples of drugs from each of them and for which infections they should be used. The recommendation was accepted. The judges' suggestions consist of a way of obtaining an external view of the material developed and without researcher bias, allowing adjustments to make the final product more effective[25].

The use of ICTs for nursing education was already a reality worldwide. However, especially since the beginning of 2020 with the advent of the SARS-CoV-2 pandemic, it has transformed from a complementary tool to something essential. In order to guarantee its quality, it is essential to evaluate its practicality considering aspects such as ease of implementation and understanding and personal willingness to use this type of strategy for learning[26].

In Nepal, 53.5% (n=232) of health students were satisfied with online learning during the SARS-CoV-227 pandemic, which is less significant data than in a study carried out in India which aimed to measure the satisfaction level of nursing students with online learning; this study showed that 67.57% (n=148) among the 219 participants were extremely satisfied, and 32.42% (n=71) satisfied[28].

When asked about the impact of a multimedia strategy on their knowledge, 68% (n=165) of nursing graduates in Canada were satisfied, 77% (n=187) reported that they had learned, and 75% (n= 182) reported that there were benefits for their future practice[29].

The data obtained in the aforementioned studies[27–29] were less significant than the present study, in which 89.04% (n=65) were completely satisfied with the WQ, highlighting that they would like to use this strategy again for learning purposes, which highlights the practicality of the material produced.

Nursing professionals in Brazil participated in an educational strategy about standard and specific precautions using WQ. As a result, 78% (n=76) completely agreed about the ease of implementing them, and 90% (n=99) completely agreed regarding the ease of understanding the themes, constituting findings which are similar to the present study, in which 67.12 % (n=49) completely agreed that they found it easy to complete the WQ and 80.82% (n=59) completely agreed that it was easy to understand the topics covered in the WQ[30].

As a limitation of the present study, it is noteworthy that the practicality stage was restricted to students from just one institution, with a recommendation for future studies to analyze the internal structure with students from other organizations.

CONCLUSION

It is concluded that the educational strategy developed in the format of a WQ on PGA for nursing graduates with the following domains: infection prevention and control; infection diagnosis and use of antimicrobials; clinical nursing practice; and person-centered care and interprofessional practice has been validated in appearance and content by judges and is available as an open course, without tutoring. It was considered easy to understand and carry out (being practical), with participants demonstrating a personal desire to use this type of educational strategy. It is noteworthy that the course developed, validated and evaluated is a useful tool and is available free of charge to contribute to the training of future nurses on the PGA theme.

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NOTES

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CONFLICT OF INTEREST

There is no conflict of interest.

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