Technological Educational Products: Teaching Surgical Site Infection Epidemiological Surveillance in Undergraduate Nursing

Produtos Educacionais Tecnológicos: Ensino da Vigilância Epidemiológica de Infecção de Sítio Cirúrgico na Graduação em Enfermagem

Productos Educativos Tecnológicos: Enseñanza de la Vigilancia Epidemiológica de Infección en el Sitio Quirúrgico en la Carrera de Enfermería

RESUMO
Esta pesquisa tem como objetivo analisar quais produtos educacionais tecnológicos são utilizados no processo de ensino-aprendizagem na graduação em Enfermagem para o ensino de vigilância epidemiológica de infecção de sítio cirúrgico, foi escolhida a Revisão Integrativa de Literatura (RIL) como método de pesquisa. Com base nos artigos encontrados, percebe-se que as tecnologias educacionais, de forma geral, têm ganhado espaço e contribuído significativamente para o aprendizado dos estudantes de enfermagem. A adoção de tecnologias educacionais no ensino de enfermagem tem sido amplamente discutida como uma estratégia eficaz para aprimorar o aprendizado dos futuros profissionais. Apesar de a literatura abordar diversos aspectos do uso dessas tecnologias no ensino e na prática clínica, observa-se uma lacuna em estudos que analisem especificamente o impacto dessas ferramentas no ensino da vigilância epidemiológica de infecção de sítio cirúrgico (ISC).
PALAVRAS-CHAVE: Infecção Hospitalar; Ensino de Enfermagem; Tecnologias Educacionais

ABSTRACT
This research aims to analyze which technological educational products are used in the teaching-learning process in undergraduate Nursing for teaching epidemiological surveillance of surgical site infections. The Integrative Literature Review (RIL) was chosen as the research method. Based on the articles found, it is clear that educational technologies, in general, have gained space and contributed significantly to the learning of nursing students. The adoption of educational technologies in nursing education has been widely discussed as an effective strategy to improve the learning of future professionals. Although the literature addresses various aspects of the use of these technologies in teaching and clinical practice, there is a gap in studies that specifically analyze the impact of these tools on teaching epidemiological surveillance of surgical site infections (SSI).
KEYWORDS: Cross Infection ; Education, Nursing; Educational Technology.

RESUMEN
Esta investigación tiene como objetivo analizar qué productos educativos tecnológicos se utilizan en el proceso de enseñanza-aprendizaje en la graduación de Enfermería para la enseñanza de la vigilancia epidemiológica de las infecciones del sitio quirúrgico. Se eligió como método de investigación la Revisión Integrativa de la Literatura (RIL). De los artículos encontrados se desprende que las tecnologías educativas, en general, han ganado espacio y contribuido significativamente al aprendizaje de los estudiantes de enfermería. La adopción de tecnologías educativas en la formación de enfermería ha sido ampliamente discutida como una estrategia eficaz para mejorar el aprendizaje de los futuros profesionales. Si bien la literatura aborda diversos aspectos del uso de estas tecnologías en la enseñanza y la práctica clínica, existe un vacío en los estudios que analizan específicamente el impacto de estas herramientas en la enseñanza de la vigilancia epidemiológica de las infecciones del sitio quirúrgico (ISQ).
PALABRAS CLAVE: Infección Hospitalaria; Educación en Enfermería; Tecnología Educacional.

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INTRODUCTION

According to Ordinance No. 2616, of May 12, 1998, Hospital Infection (HI) is that acquired after the patient's admission and that manifests itself during hospitalization or after discharge, when it can be related to hospitalization or hospital procedures. [1]

With the historical evolution of health, it became necessary to replace the term IH with Healthcare-Related Infections (HAIs), since infections are largely characterized by healthcare, and many of these adverse events put patient safety at risk. HAIs have a direct impact on the length of hospital stay, patient severity, costs during the period, morbidity and mortality. Among HAIs, Surgical Site Infection remains today as one of the main risks to patient safety in health services in Brazil. According to national studies, the occurrence of SSIs ranks 3rd among HAIs, comprising 14% to 16% of those found in hospitalized patients. [2]

Preventing hospital-acquired infections requires a coordinated effort by healthcare teams, with rigorous implementation of evidence-based protocols, education and monitoring. Investing in advanced technologies and training programs is vital to ensure adherence to best practices and minimize the adverse impacts of HAIs. [3]

It is essential to have a nursing curriculum that continuously incorporates the prevention and control of HAIs into its scope of discussions throughout the academic cycles. In 2001, the National Curricular Guidelines for Education (DCN) were created for undergraduate nursing courses, to train a generalist, humanist, critical and reflective nursing professional who knows how to dialogue with different knowledge. [4]

In this context, Pissaia et al. (2018) introduce to the discussion the need to insert digital technologies in the classroom, which become important to the current development of nursing education. Digital technologies assume a role of innovation and qualification of nursing education, inserting a new field of action and development of practices in the area. [5]

Pedagogical technology consists of a set of knowledge that enables the creation, implementation and monitoring of educational methods, facilitating health teaching activities by promoting interaction between individuals and the acquisition of knowledge. [6]

In the context of undergraduate nursing, this integration is especially relevant, since health care practices have become increasingly digitalized. Teaching and learning require continuous innovation to respond to social, technological, cultural and historical changes in society, and educational institutions, as central spaces in this process, need to adapt and rethink their pedagogical methods. [7]

In recent years, the use of educational technologies has gained prominence due to their proven benefits in educational practice, allowing learning to occur anytime and anywhere. The introduction of Information and Communication Technologies (ICT) in higher education,

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including Nursing courses, offers an opportunity to enhance the teaching and learning process, providing students with tools that facilitate learning and promote their autonomy.[8]

Given this scenario, this research aims to analyze which technological educational products are used in the teaching-learning process in undergraduate Nursing courses for teaching epidemiological surveillance of surgical site infections.

METHOD

The Integrative Literature Review (ILR) was chosen as the research method. This approach aims to gather and synthesize relevant publications on a specific topic in a systematic and organized manner, favoring a deeper understanding of the area studied and allowing the formulation of conclusions about the field of research.

The research was carried out in the following scientific databases: SCIELO (Scientific Electronic Library Online), Health Sciences such as the Virtual Health Library (VHL), and National Library of Medicine (PubMed). The descriptors were crossed within each database using the Boolean operators AND and OR, these being the descriptors: Hospital Infection, Nursing Education, Educational Technologies. With a time frame of the last 5 years (2019 to 2024), in the languages: Portuguese and English, available in full for online access, portraying the theme of the study.

The following guiding question was used: What is the evidence in the literature on the use of educational technologies for teaching epidemiological surveillance of surgical site infection in undergraduate nursing courses? This literature search was conducted from January to June 2024, with a time frame of the last 5 years (2019 to 2024), in Portuguese and English, available in full for online access, portraying the theme of the study, including publications focusing on the use of educational technologies in nursing education and on surgical site infection control.

The exclusion criteria were: duplicate articles, systematic reviews with meta-analysis or meta-synthesis (secondary studies), articles that dealt with the teaching of other approaches outside the context of undergraduate nursing courses, case-control studies, among other types of observational studies; articles in which only the abstracts were available, and course completion papers.

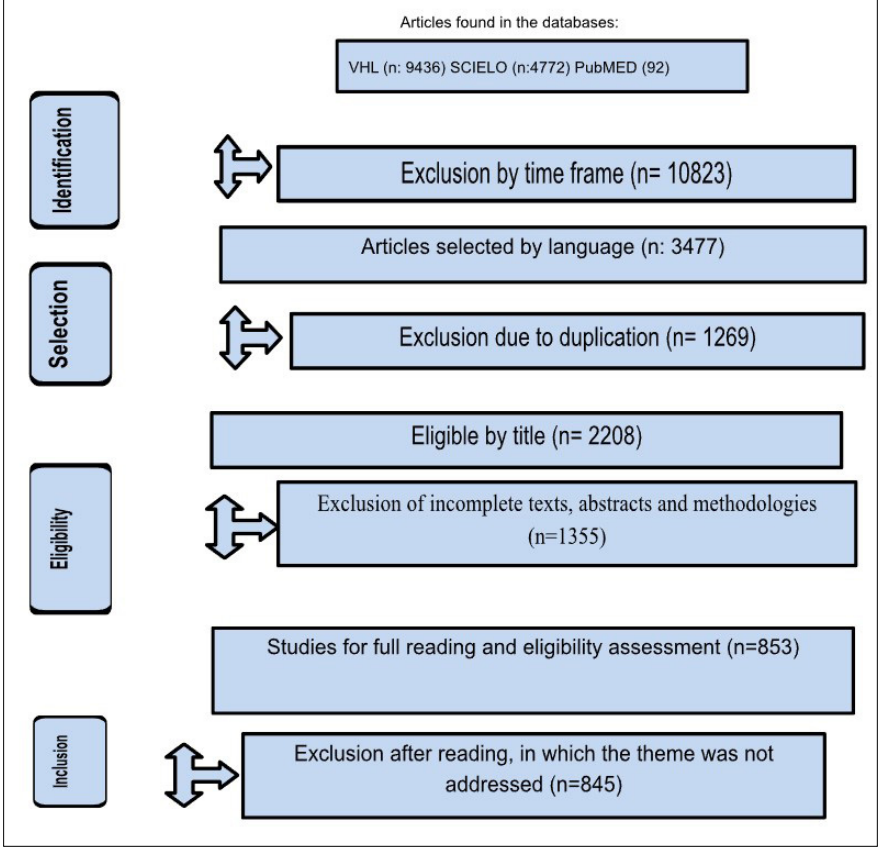
The data were analyzed based on Bardin's (2016) content analysis method, which offers a methodological approach focused on analytical description and presentation of relevant applications. Content analysis, as a classification method, allows data to be specified and organized in a systematic manner. This process is divided into three stages: a) Pre-analysis, referring to the organization and systematization of data; b) Exploration of documents to better understand the data; and c) Treatment of results, seeking to organize as much information as possible to reflect and interpret the data. 9

The extracted data were presented in an article eligibility flowchart, according to the PRISMA structure. In addition, they were tabulated according to the following characteristics: authors, year of publication, article title, method, objective and main results.

RESULTS AND DISCUSSION

The literature search resulted in a total of 14,300 publications. After the initial selection of 3,477 articles, only 853 studies were screened based on titles, abstracts and methodologies. Then, after reading the texts in full, 8 articles were included for the preparation of the Integrative Literature Review (ILR), as illustrated in Figure 1.

Figure 1 - PRISMA flowchart for article selection.



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The data were organized according to the article number, author/year, article title, method, objective and results. All scientific findings were preserved in their entirety, and characterizing tables were created to facilitate the visualization and underWstanding of each study, as shown in Table 1 below.

Tabela 1 - Percepções do usuário sobre o uso dos serviços de saúde reportadas pela amostra do estudo (n=396)

N	Author/Year	Title of the article	Method	Objective	Results
1	Costa et al., (2021)	Health technology and its influence on nursing education	This is an integrative review conducted in January 2018.	Analyze the influence of technological innovation in nursing education	The categories "Information and Communication Technology in teaching; "Virtual Learning Environments and Objects and their impact on the teaching-learning process" emerged
2	Alves et al., (2020)	Information and communication technology in nursing education	Qualitative study with a Straussian Grounded Theory approach	Analyze the use of Information and Communication Technologies (ICT) in the teaching and learning process by nursing professors.	Axial coding resulted in categories (fragility of teacher training; use of social media as a teaching procedure) and subcategories (knowledge; ongoing qualification; tools) that represent the phenomenon studied.
3	Nascimento et al., (2024)	Development and validation of a serious game for teaching and learning about surgical site infection prevention	Methodological study conducted in stages: development and validation of the game content, based on virtual simulation	Develop and validate a serious game for teaching and learning regarding the prevention of surgical site infection	Regarding the evaluation of gameplay by the heuristics evaluated, all statements present in the game script were considered adequate and adjustments were implemented regarding feedback, access to the theoretical framework on surgical site infection prevention, the inclusion of images in the study material and directing the player to the debriefing session.
4	Siqueira et al., (2022)	The relevance of using active methodologies in the process of constructing learning for undergraduate nursing students: difficulties in their application by teachers	This is a simple systematic bibliographic review research in an exploratory manner	Analyze the relevance of using active methodologies in the learning process of nursing undergraduates.	Even with the difficulties of implementation by teachers, it was identified that active teaching methodologies contribute significantly to the professional training of undergraduate nursing students, with the development of critical-reflective reasoning, decision-making, leadership and humanization that are fundamental for training.
5	Madureira & Takashi (2023)	Nursing care technologies in intensive care units in the context of surgical site infection	Integrative literature review with a descriptive exploratory approach and qualitative nature	Explain the care technologies used by intensive care nurses in the prevention of SSI and in the treatment of infected surgical wounds	After analysis, twelve articles were selected. The relevance of the safe surgery checklist, classified as soft-hard health technology, to be followed by nursing professionals in order to prevent SSIs was highlighted.
6	Gonçalves et al., (2022)	Digital information and communication technologies in nursing education	Descriptive and exploratory study, with a qualitative approach	To understand the process of integrating digital information and communication technologies (ICT), facilities and limitations perceived by professors of an undergraduate nursing course	Furthermore, the integration of these technologies expands the creation of strategies that promote the active participation of students, offering spaces for reflection, autonomy, as well as the development of creativity.

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7	Carvalho et al., (2021)	Educational technology: nursing and educational games in health education	This study is based on bibliographic research based on the integrative review with the aim of obtaining a critical evaluation of the production as a strategy for the synthesis of data for the study	The objective of this study was to analyze the scientific productions focused on educational games that are used for patients and family members in health education.	With this study, it was concluded that although games are very useful tools in the area of health education, there is still a need for further in-depth studies on the subject.
8	Aranha & Brum (2024)	Mapping of educational technologies and teaching-learning strategies applied to higher education in nursing in Brazil: an integrative review on patient safety	Integrative literature review in the MEDLINE, LILACS and BDENF databases, with qualitative analyses of full texts in Portuguese	To identify the educational methodologies and technologies applied to health, with regard to teaching about safety culture between 2017 and 2021.	The Review points to the use of active methodologies with simulated practice techniques in expanding health education, more specifically with regard to undergraduate Nursing courses in Brazil, as well as to a less fragmented, interdisciplinary, formal and equitable approach to teaching about patient safety in higher education institutions (HEIs) in Brazil.

Source: Matias et al., 2024.

The adoption of educational technologies in nursing education has been widely discussed as an effective strategy to improve the learning of future professionals. Although the literature addresses various aspects of the use of these technologies in teaching and clinical practice, there is a gap in studies that specifically analyze the impact of these tools on teaching epidemiological surveillance of surgical site infections (SSI).

Healthcare-associated infections (HAIs) represent a public health problem in Brazil, especially surgical site infections (SSIs), which are directly associated with the quality of care provided to patients. Nursing practice plays a key role in preventing SSIs, since nursing professionals are closer to patients and, therefore, need to appropriate health technologies to improve care. [10]

In higher education institutions (HEIs), the use of technological tools has proven to be essential for improving teaching and professional training. Realistic simulation, for example, has been a widely used strategy, especially with regard to patient safety, motivating students and teachers and enriching the teaching-learning process. [11]

Furthermore, Siqueira (2022) highlights the importance of teachers understanding the relevance of information technologies for improving learning. This not only encourages the development of a more humanized perspective, but also requires teachers to be able to reflect on the content already taught in the classroom and transmit it effectively to the social and professional context. [12]

Studies such as that by Nascimento et al. (2024) show that virtual simulation is a robust tool for undergraduate education, promoting decision-making and the development of critical knowledge. This method provides realistic immersion in the clinical environment, better preparing students for the challenges of professional practice, including the prevention of hospital infections. [13]

For Carvalho et al. (2021) the nurse acts as a mediator in the educational process, using the educational game as a facilitating technology for the exchange of knowledge, creating a space for the use of active and sensitive listening, favoring the strengthening of bonds, in addition to the structuring of knowledge to achieve changes in attitudes and habits for recovery. [14]

In the field of health sciences, Information and Communication Technologies (ICT) are implemented at various stages of care, from diagnosis to patient monitoring and infection control, also extending to health management (Costa et al., 2021). These tools are particularly useful in monitoring hospital infections, such as those associated with surgical procedures, which are essential to reduce morbidity, mortality and costs in the health system. [15]

Alves et al. (2020) reinforce that educational technologies have the potential to adequately train future nurses, allowing them to play a crucial role in infection prevention and control, improving both the quality of care and patient protection. The incorporation of ICTs also promotes the creation of strategies that encourage active student involvement, providing spaces for reflection, independence, creativity, and cooperation among students. [16-17]

Analyzing the scientific evidence on teaching and learning about epidemiological surveillance of surgical site infections among nursing students and professionals is essential to organize and contextualize the training process for this class. The results of this study contribute to a reflection on learning through educational technologies for higher education institutions and health services. The findings can add knowledge by showing that surveillance of surgical site infections is a relevant topic, since these infections still occur as adverse events in hospital settings.

CONCLUSION

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The analysis of the results reveals that there are still gaps in the use of educational technologies aimed at teaching surveillance of infections associated with care, especially with regard to surgical site infections. In other words, there is a shortage of approaches disseminated in colleges and universities, highlighting gaps in professional training.

Based on the articles found, it is clear that educational technologies, in general, have gained ground and contributed significantly to the learning of nursing students. However, important topics, such as monitoring hospital infections and surgical site infections, are still not widely addressed during the training of these professionals, generating knowledge gaps and, consequently, impairing the quality of care for surgical patients.

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