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EDUCATIONAL TECHNOLOGIES IN PATIENT SAFETY IN A POST-ANESTHESIA CARE UNIT: INTEGRATIVE REVIEW

Tecnologias educativas na segurança do paciente em unidade de recuperação pós-anestésica: revisão integrativa

Tecnologías educativas en seguridad del paciente en una unidad de cuidados postanestésicos: revisión integradora

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RESUMO

OBJETIVO: identificar as principais tecnologias educativas e os seus aspectos acerca da segurança do paciente utilizadas na unidade de recuperação pós-anestésica. **Método:** revisão de literatura, realizada entre janeiro e fevereiro de 2021. Bases de dados: *Cummulative Index to Nursin gand Alied Health Literature*; Literatura Latino-Americana e do Caribe em Ciências da Saúde; Biblioteca Nacional de Medicina dos Estados Unidos e Web of Science. A revisão seguiu os preceitos orientados pelos "Principais Itens para Relatar Revisões sistemáticas e Meta-análises" e foi realizado uma análise minuciosa, guiados pelos níveis de evidências e rigor metodológico proposto pelo *Joanna Briggs Institute*. **Resultados:** Incluídos 10 artigos. As principais tecnologias educativas foram: protocolos, manuais, aplicativos, checklist, criação de instrumentos e ferramentas clínicas. **Considerações:** as tecnologias educativas possuem um papel de significância, objetividade e cuidado ao ofício da enfermagem, contribuindo para que medidas de segurança ao paciente.

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DESCRITORES: Segurança do paciente; Tecnologia educacional; Enfermagem perioperatória.

ABSTRACT

OBJECTIVE: to identify the main educational technologies and their aspects regarding patient safety used in the post-anesthesia care unit. **Method**: literature review, carried out between January and February 2021. Databases: Cummulative Index to Nursin gand Alied Health Literature; Latin American and Caribbean Literature in Health Sciences; United States National Library of Medicine and Web of Science. The review followed the precepts guided by the "Key Items for Reporting Systematic Reviews and Meta-analyses" and a thorough analysis was carried out, guided by the levels of evidence and methodological rigor proposed by the Joanna Briggs Institute. **Results**: Included 10 articles. The main educational technologies were: protocols, manuals, applications, checklist, creation of instruments and clinical tools. **Considerations**: educational technologies play a role of significance, objectivity and care in the nursing profession, contributing to patient safety measures.

DESCRIPTORS: Patient safety; Educational technology; Perioperative nursing.

RESUMEN

OBJETIVO: identificar las principales tecnologías educativas y sus aspectos relacionados con la seguridad del paciente utilizadas en la unidad de cuidados postanestésicos. **Método**: revisión de la literatura, realizada entre enero y febrero de 2021. Bases de datos: Cummulative Index to Nursin gand Alied Health Literature; Literatura Latinoamericana y del Caribe en Ciencias de la Salud; Biblioteca Nacional de Medicina y Web of Science de los Estados Unidos. La revisión siguió los preceptos guiados por los "Key Items for Reporting Systematic Reviews and Meta-analyses" y se realizó un análisis exhaustivo, guiado por los niveles de evidencia y rigor metodológico propuestos por el Instituto Joanna Briggs. **Resultados**: Incluidos 10 artículos. Las principales tecnologías educativas fueron: protocolos, manuales, aplicaciones, checklist, creación de instrumentos y herramientas clínicas. **Consideraciones**: las tecnologías educativas juegan un papel de significación, objetividad y cuidado en la profesión de enfermería, contribuyendo a las medidas de seguridad del paciente.

DESCRIPTORES: Seguridad del paciente; Tecnologia Educacional; Enfermería perioperatoria.

INTRODUCTION

Technological advances have allowed the number of surgical procedures to increase within the hospital environment, thus increasing the number of interventions. In this context, patients can be susceptible to various scenarios in the moments that make up this process: the preoperative period, the surgery itself and the postoperative period.[1]

A Global Alliance for Patient Safety was created in 2004 by the World Health Organization (WHO), involving the "Safe Surgeries Save Lives" program, with the aim of improving the care provided to patients undergoing surgery, contributing to the prevention of events that could compromise patient safety.[2]

Continuously, the safe surgery program advocates that the team be prudent when it comes to large procedures that require qualified care, making sure that they are carried out correctly. When the surgical process is completed, the patient can be transported to an Intensive Care Unit (ICU) or Post Anesthetic Recovery Unit (PACU). The PACU is responsible for immediate post-operative care, in which appropriate care will be provided until vital signs stabilize and the patient's basic functions recover.[3]

The Recovery Unit allows the nursing team to provide care that focuses on preventing complications and providing specific care for each patient's needs after the surgical procedure. The organization of the unit needs to be agreed between the Surgical Centre team, so that there is no overcrowding that could jeopardize post-operative care, so the nurse carries out meticulous care in order to provide effective and humanized assistance.[4]

Educational technology is conceived through experience and everyday knowledge, so professionals can make use of these technologies by sharing and socializing this knowledge. Printed and digital materials can have a positive effect on the decision-making process and the qualification of nurses' professional practice as a member of the health unit.[5] Educational technologies promote humanization, since they are implemented from the perspective of care, favoring education and guidance for professionals and patients.[6]

Educational technologies can be classified in three ways: light, light-hard and hard. Each one has a specific method and technology that enables it to be made and for this process to be carried out using the technology. They can be presented in the form of manuals, posters, albums, serials and folders. This method is used to strengthen the learning relationship between professionals and patients.[6]

This study is justified by the technological advances in various areas of health and their positive implications, so these technologies aimed at the post-anesthetic recovery unit can have an impact on patient safety. The aim of this study is to identify the use of educational technologies for patient safety in the post-anesthetic recovery unit.

METHOD

The study is presented as an integrative literature review, which used the sequence of recommended steps[7] in which the entire path taken by the researcher is carried out in some correlated and hierarchical stages, which involve: formulation of the research question; definition of inclusion criteria; search strategy; selection of studies; evaluation of studies and publication of results.

The search began between January and February 2021. The search for the studies was carried out through a careful selection of the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL); Latin American and Caribbean Health Sciences Literature (LILACS); US National Library of Medicine (PUBMED) and Web of Science. The Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) were used, with the Boolean operators AND and OR, according to the significant number of studies in the selected databases: Patient Safety; Educational technology; Nursing; Postoperative care nursin. In Portuguese, the descriptors were: Patient Safety; Educational Technology; Perioperative Nursing.

It is worth mentioning that in order to choose the descriptors, a careful simulation was carried out with the available possibilities of descriptors related to the theme, so the ones chosen were the most appropriate and obtained a satisfactory number for the research. In the meantime, the research question was summarized as follows: What is the national and international evidence related to educational technologies on patient safety in the post-anesthetic recovery unit?

The acronym PICO (Patient, Intervention, Control, Outcome) was used to improve the question and better search for data, where P corresponds to the patient or population, I is related to the intervention, C to the comparison or control and O refers to the primary outcome or results. For the integrative review in question, we used the following form: P - referring to the patient in the post-anesthetic recovery unit; I - educational technologies, C - not applicable, O - Identification of relevant studies related to educational technologies in the post-anesthetic recovery unit.[8]

The inclusion criteria imposed in this review were: articles from 2010 to 2020, which addressed educational technologies, patient safety and nursing in the post-anesthetic recovery unit, available in the databases, in Portuguese, English and Spanish, and which were in line with the research question. The exclusion criteria for the articles were: Those that did not address the subject of educational technologies or patient safety; integrative review articles; editorials; book chapters; abstracts; theses and dissertations. A collaborator was used to make the search process more reliable and reduce the possibility of errors. He was an expert on the subject in order to check for inadequacies.

The studies that met the inclusion requirements were extracted and arranged in an electronic spreadsheet containing the main information: Title, objective, method, results, year and (journal). Those that were included, i.e. after all the refinement of the selection of studies, were arranged in another spreadsheet with more in-depth information, generating a database for the research. The spreadsheets were built using the Microsoft Excel program. In addition, the review followed the guidelines of the "Main Items for Reporting Systematic Reviews and Meta-Analyses" (PRISMA), in its checklist which contains 27 methodological items.[9]

When reading and extracting the studies for the spreadsheets, a thorough analysis was carried out, in which they were read in full, assessing the presence of bias; methodological flaws and specifications of the subject studied, guided by the levels of evidence and methodological rigor proposed by the Joanna Briggs Institute,[10] which guides the requirements for quality and evidence in scientific studies in the health area. The scales proposed by Melnyk & Williamson,[11] were used to determine the levels of evidence for each study included.

No methodological flaws were found in the studies analyzed, given the GRADE risk assessment. The studies were organized into a figure and four tables, constructed using the Microsoft Excel program.

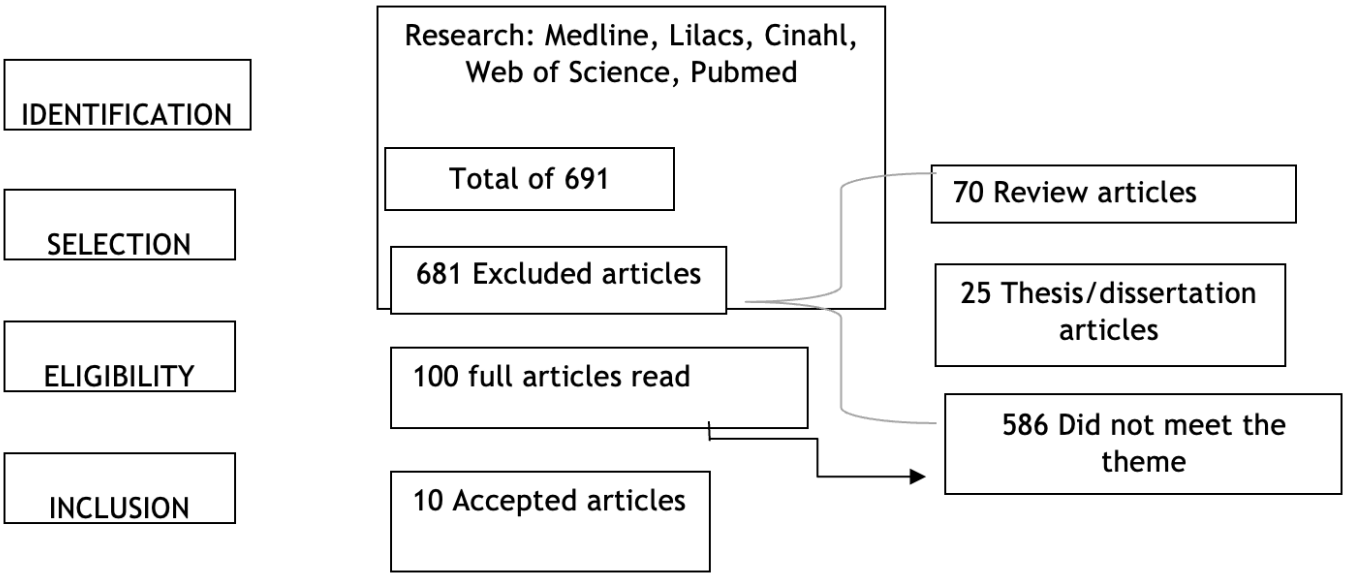
RESULTS

After carrying out different simulations with descriptors to find a satisfactory result in the article searches, the following

results were obtained: LILACS 52 articles, in which six articles were accepted, in CINAHAL 48 articles, totaling zero articles accepted, Web of Science 219 articles, with two articles accepted, PUBMED 373 articles, with three articles accepted.

After the search, a total of 691 articles were found. The titles and abstracts of these were then analyzed, in which 100 articles were in the thematic context and were read in full to identify whether they really answered the guiding question of the research, in addition to checking methodological aspects. After analyzing these articles, a total of 10 were chosen and accepted. Figure 1 shows a summary of the search results.

Figure 1 - Flowchart of the process of selecting and excluding studies from this review, João Pessoa, Paraíba, Brazil, 2021



Descriptively, four articles were published in 2018 (40%), followed by two in 2019 (20%). Regarding the language of origin of the articles, six articles were in Portuguese (60%) and four in English (40%). Regarding the education of the first authors of each article, eight were nurses (80%) (Table 1).

Table 1 - Levels of evidence of selected studies, João Pessoa, Paraíba, Brazil, 2021

Studies (N =10)	Year	Title	Level of evidence
1[12]	2015	Construction and validation of a surgical checklist for the prevention of surgical site infection.	VI
2[13]	2017	Construction of a manual on safe surgery for health professionals	VI

Studies (N =10)	Year	Title	Level of evidence
3[14]	2018	Perceptions of an instrument for assessment and discharge from the post-anesthetic recovery room	VI
4[15]	2019	Implementation of the thermoregulation protocol for newborns undergoing surgical procedures	VI
5[16]	2019	Transfer of care for patients with a low risk of mortality in the postoperative period: an experience report	VI
6[17]	2020	Elaboration, validation and reliability of the safety protocol for pediatric thirst management	VI
7[18]	2016	Patient experiences using an in-patient personal health record	VI
8[19]	2018	Usability evaluation and in-hospital feasibility of Panda, an application for pain management in children at home.	III
9[20]	2018	Refine nursing assessment and management with a new post-anesthetic care discharge tool to minimize surgical patient risk.	VI
10[21]	2018	STOPDVTs: Development and testing of a clinical assessment tool to guide the nursing assessment of patients in the postoperative period of Deep Vein Thrombosis.	VI

Source: study data.

The findings of the research showed that level VI stood out among the other studies with 90%, so this level of evidence refers to well-designed cohort and case-control studies, followed by 10% referring to level III, which refers to well-designed clinical trials, but without randomization.

Table 2 summarizes the relevant information about each study, identifying the study number, database, year, language, title and journal of each study included.

Chart 2 - Types of technologies used according to: database, year, language, title and journal, João Pessoa, Paraíba, Brazil, 2021

Studies (N =10)	Database	Year	Language	Title	Journal
1[12]	Lilacs	2015	Portuguese	Construction and validation of a surgical checklist for the prevention of surgical site infection.	Acta Paulista de Enfermagem
2[13]	Lilacs	2017	Portuguese	Construction of a manual on safe surgery for health professionals	Cogitare Enfermagem
3[14]	Lilacs	2018	Portuguese	Perceptions of an instrument for assessment and discharge from the post-anesthetic recovery room	Revista de Pesquisa Cuidado é fundamental (Online)

Studies (N =10)	Database	Year	Language	Title	Journal
4[15]	Lilacs	2019	Portuguese	Implementation of the thermoregulation protocol for newborns undergoing surgical procedures	Revista Gaúcha de enfermagem
5[16]	Lilacs	2019	Portuguese	Transfer of care for patients with a low risk of mortality in the postoperative period: an experience report	Revista Gaúcha de enfermagem
6[17]	Lilacs	2020	Portuguese	Elaboration, validation and reliability of the safety protocol for pediatric thirst management	Revista Latino-americana de Enfermagem
7[18]	*Web of science*	2016	English	Patient experiences using an in-patient personal health record	Applied clinical informatics
8[19]	Pubmed	2018	English	Usability evaluation and in-hospital feasibility of Panda, an application for pain management in children at home	Paediatr Anaesth
9[20]	Pubmed	2018	English	Refine nursing assessment and management with a new post-anesthetic care discharge tool to minimize surgical patient risk.	Journal of Advanced Nursing
10[21]	Pubmed	2018	English	STOPDVTs: Development and testing of a clinical assessment tool to guide the nursing assessment of patients in the postoperative period of Deep Vein Thrombosis.	Journal of Clinical Nursing

Source: research data.

Table 3 shows the characteristics of the educational technologies used to acquire knowledge among professionals and patients in various health sectors. These include the validation of instruments, the creation of applications and the application of specific protocols on the subject studied.

Table 3 - Summary of scientific productions whose strategies involved technologies aimed at patient safety in the surgical environment, João Pessoa, Paraíba, Brazil, 2021

First author	Aspects of educational Technologies
Alessandra Nazareth Cainé Pereira Roscani[12]	Construction and validation of a surgical safety checklist designed for patient safety and surgical site infection prevention.
Gisele Silva Lopes Souza[13]	Construction of a manual on safe surgery, involving aspects in the manual on the preoperative, operative and postoperative periods.
Márcia Cristina Pereira Dill[14]	To describe the perceptions of nursing professionals about an instrument for assessment and discharge from the Post-Anesthesia Recovery Room.

First author	Aspects of educational Technologies
Lucas Amaral Martins[15]	Construction, implementation and applicability of the protocol, guided by the PDCA (Plan, Do, Check, Action) cycle. With actions and recommendations/routines for implementing the protocol.
Kátia Bottega Moraes[16]	Implementation of a pilot project between the post-anesthetic recovery room and the surgical inpatient unit. To describe the perceptions of nursing professionals about an instrument for assessing and discharging patients from the post-anesthetic recovery room. Pilot project using the SAMPE risk model, a flowchart based on a post-operative mortality risk model.
Isadora Pierotti[17]	Elaboration, validation and reliability of the Safety Protocol for the Management of Pediatric Thirst
Janet Woollen[18]	Patient experiences using a Personal Health Record of post-operative patients. PHR inpatient application. Inpatient personal health record (PHR) on an Apple iPad tablet to increase involvement in your hospital care.
Terri Sun[19]	Evaluation of Panda's usability with nurses, parents and adolescents using simulated scenarios. The Panda app was configured for each child in the post-operative period individually
Maryann Street[20]	To evaluate the use of a high-quality evidence-based post-anesthetic care tool.
Alanna O'Brien[21]	STOPDVTs: Development and testing of a Clinical Tool to guide nurses' assessment of postoperative deep vein thrombosis patients.

Source: research data.

The studies found comprehensive information on patient safety, including technological means used to promote patient safety through validated materials and methodologically rigorous implementation in recovery units (Table 4).

Table 4 - Summary of scientific productions with an emphasis on the signs and symptoms evident in the PACU and aspects of patient safety, João Pessoa, Paraíba, Brazil, 2021

Signs and symptoms and patient safety characteristics	Studies - first author
Coughing	Isadora Pierotti[17]
Shortness of breath	Alanna O'Brien[21]
Respiratory rate / Breathing pattern	Isadora Pierotti[17] Maryann Street[20]
Oxygen saturation	Maryann Street[20]
Bradypnea	Márcia Cristina Pereira Dill[14]
Blood loss	Kátia Bottega Moraes[16]
Arrhythmias	
Vomit	Kátia Bottega Moraes[16] Isadora Pierotti[17] Maryann Street[20]

Signs and symptoms and patient safety characteristics	Studies - first author
Nausea	Kátia Bottega Moraes[16] Isadora Pierotti[17]
Bleeding	Maryann Street[20]
Skin lesions	Kátia Bottega Moraes[16]
Assessment and monitoring of urine output	Márcia Cristina Pereira Dill[14]
Fluid replacement	
Assessment of bleeding	
Temperature	Maryann Street[20]
Attention to thermoregulation during the perioperative period	
Reducing hypothermia	Lucas Amaral Martins[15]
Hyperthermia	
(DVT) Deep vein thrombosis	Alanna O'Brien[21]
Systolic blood pressure,	Maryann Street[20]
Heart rate	
SAH Systemic Arterial Hypertension	Márcia Cristina Pereira Dill[14]
Tachycardia	
General condition	
Crying	Isadora Pierotti[17]
Malaise	Janet Woollen[18]
State of consciousness	Maryann Street[20]
Level of consciousness	Isadora Pierotti[17]
Motricity	Márcia Cristina Pereira Dill[14]
Muscle cramps	Alanna O'Brien[21]
Pain	Kátia Bottega Moraes[16] Isadora Pierotti[17] Janet Woollen[18] Terri Sun[19] Maryann Street[20]
Pain scale	Márcia Cristina Pereira Dill[14] Terri Sun[19]
Falls	Kátia Bottega Moraes[16]
Regarding nursing professionals	Alanna O'Brien[21]

Signs and symptoms and patient safety characteristics	Studies - first author
Identification/Confirmation	Alessandra Nazareth Cainé Pereira Roscani[12]
Pre- and post-operative investigation	
Right procedure / Right place	
Prevention of surgical site infection	
Identification bracelet	
Are under specific precaution	
Skin lesions related to surgical positioning,	
Specific recommendations for the post-operative period.	
Safe Surgery	Gisele Silva Lopes Souza[13]
Clinic care and hospital discharge	
Notification of adverse events	
Infrastructure,	
Hygiene	
Food	
Discharge guidelines	
Use of catheters and drains	Márcia Cristina Pereira Dill[14]
Vital Signs	
Level of consciousness	
Medication scheduling	
Nasogastric/vesical tube	
Type of anesthesia	

Source: survey data

DISCUSSION

Studies have shown the need to monitor the patient's clinical situation, in connection with the construction of educational technologies to measure and monitor the health of those receiving care. The use of more educational technological means within the hospital environment allows the professional a more interactive moment with a greater response to patient care.[12-22] The hospital environment has a logistical nature of procedures that motivates the professional to work with health technologies to improve the provision of care, therefore, printed materials are configured as something positive for this environment.[20-21,23]

As well as the logistics of using educational health technologies, the scientific basis on which they are built is extremely important. It is pertinent to use scientific studies with good evidence in order to promote scientific advances in the field of nursing, combining scientific rigor with the requirements for a well-structured literature review. It is also necessary for the synthesis of these articles to have

favorable levels of evidence in order to maximize and qualify publications with a high scientific content, as seen in the results of this review.[13-24]

This study[12] idealizes the validation of a surgical safety checklist for the patient, promoting the prevention of surgical site infection. The study addresses the importance of using methods that improve the care offered to patients in the perioperative period, including technologies such as identification bracelets, patient confirmation, the checklist itself, as well as other means that facilitate professional practice, reducing errors and preventing complications during health care.

A study14 carried out in a hospital in the south of Brazil conducted interviews with nursing professionals, using a script containing open questions about PACU discharge assessment tools. Following this study, it was identified that professionals are concerned about methods of assessing patients in the post-operative environment. Therefore, instruments that can make specific records that aim to increase patient safety are welcomed, in order to qualify nursing care for patients in this scenario.[14]

Another study[17] looked at the construction and validation of an instrument to be used in the pediatric ward for patients who had undergone surgery, based on a literature review and interviews with professionals. After the completion of the study, it was possible to observe a level of agreement and effectiveness of the instrument, it was also verified, in this study, a gap in the literature regarding technologies in the post-anesthetic recovery unit in children, therefore, this theme of studies aimed at safety in the PACU needs to be further explored by the scientific community.[17]

A study was carried out with post-operative patients in Porto, Portugal, to implement a validated version of the QoR-40 over a three-month period, which assessed health status before surgery, up to 24 hours after surgery and three months after surgery, The authors wanted to identify how the quality of life of these patients was after undergoing anesthesia due to a surgical process. The authors concluded that this tool being applied before the surgical process offers a safety margin of how the post-anesthetic process will take place over time in patients. [25]

Identifying the relevance of making use of technological means in order to promote access to knowledge, promoting differentiated care for nursing professionals and students, the authors carried out the implementation and evaluation of a website in a post-operative unit, contemplating updated and safe information about the PACU, making use of means to improve the website such as: designer, architecture, implementation, after construction the PACU nurses carried out the evaluation in order to give feedback on the viability.[26]

A national study[27] depicted the design of an educational booklet entitled "Guidelines for people with diabetes in the post-surgical period", for patients undergoing various types of surgical procedures. The booklet was laid out in 15 pages, containing accessible language, images, information about the pathology already established and post-operative care, such as: management of the surgical wound, signs and symptoms of infection and care related to devices used by the patient. In this way, the wealth of information on educational technologies aimed at patient safety in the PACU can be offered in different ways, as demonstrated in this review.

CONCLUSION

The contribution of educational technologies to safe care is great, making it possible to achieve the results of this research. Safety measures offered through the use of technologies are effective and relevant in PACU care. The complexity of the post-anaesthetic recovery unit requires that nursing care be carried out in a clear, objective and humanized way, as well as being guided by validated instruments that allow professionals to be correctly oriented, as seen in the studies analyzed.

It is important to point out that the processes involving human care are always susceptible to errors, even if these are made unintentionally, so educational technologies come with this purpose, to favor care with an emphasis on patient safety in a succinct and systematized way, in which the patient and the nursing team are interconnected in care, making use of these methods.

The findings of this study enabled the identification of technologies used in the perioperative process that contributed to ensuring quality care for patients undergoing surgery and who are in a condition of special care. A limitation of this study is the number of studies on the subject, since in some databases it was not possible to find publications related to the objective of this study, highlighting the need for further research.

THERE IS NO CONFLICT OF INTEREST.

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