Review article

Teaching strategies for nursing care in stroke: an integrative review*

Estratégias de ensino voltadas à assistência de enfermagem no acidente vascular cerebral: revisão integrativa

Estrategias de enseñanza de la asistencia de enfermería en accidente cerebrovascular: una revisión integradora

Jussara da Cruz Jardim[I] [ID], Gustavo Correa de Amorim[I] [ID],
Fabiana Cristina Pires Bernardinelli[I] [ID], Sheila Aparecida da Silva[I] [ID],
Marisa Ferreira de Freitas[I] [ID], Suzel Regina Ribeiro Chavaglia[I] [ID]

[I] Federal University of the Triângulo Mineiro. Uberaba, Minas Gerais, Brazil

Abstract

Objective: to identify the pedagogical strategies used in teaching nursing care to stroke victims. **Method:** integrative review, carried out between September 2022 and March 2023 in seven sources of information. The Rayyan application was used for the selection and thematic analysis of the 485 manuscripts, of which seven constituted the sample. **Results:** Clinical simulation, interactive computer-assisted instruction, instructor-led videotape, vignettes, multimedia e-learning tool and workshop were identified as pedagogical strategies. **Conclusion:** Six strategies were identified, with clinical simulation standing out as the method most often mentioned in studies as the only one capable of developing cognitive, psychomotor, and affective skills in nursing students.
Descriptors: Students, Nursing; Teaching; Learning; Stroke; Education, Nursing

Resumo

Objetivo: identificar as estratégias pedagógicas utilizadas no ensino da assistência de enfermagem às vítimas de acidente vascular cerebral. **Método:** revisão integrativa, realizada entre setembro de 2022 e março de 2023 em sete fontes de informações. Utilizou-se o aplicativo Rayyan para a seleção e a análise temática dos 485 manuscritos, destes, sete compuseram a amostra. **Resultados:** evidenciou-se como estratégias pedagógicas a simulação clínica, instrução interativa assistida por computador, *videotape* conduzido por instrutor, vinhetas, ferramenta multimídia de *e-learning* e o *workshop*. **Conclusão:** identificaram-se seis estratégias, com destaque para a simulação clínica por ter sido o método mais abordado pelos estudos como

a única capaz de desenvolver, em conjunto, as habilidades cognitivas, psicomotoras e afetivas nos estudantes de enfermagem.

Descritores: Estudantes de Enfermagem; Ensino; Aprendizagem; Acidente Vascular Cerebral; Educação em Enfermagem

Resumen

Objetivo: identificar las estrategias pedagógicas utilizadas en la enseñanza de los cuidados de enfermería a las víctimas de accidentes cerebrovasculares. **Método:** revisión integradora, realizada entre septiembre de 2022 y marzo de 2023 sobre siete fuentes de información. Se utilizó la aplicación Rayyan para seleccionar y analizar temáticamente los 485 manuscritos, de los cuales siete constituyeron la muestra. **Resultados:** la simulación clínica, la enseñanza interactiva asistida por ordenador, los vídeos dirigidos por un instructor, las viñetas, las herramientas multimedia de aprendizaje electrónico y los talleres fueron las principales estrategias de enseñanza. **Conclusión:** Se identificaron seis estrategias, destacando la simulación clínica como el método más mencionado en los estudios como el único capaz de desarrollar habilidades cognitivas, psicomotoras y afectivas en los estudiantes de enfermería.

Descriptores: Estudiantes de Enfermería; Enseñanza; Aprendizaje; Accidente Cerebrovascular; Educación em Enfermería

Introduction

Cerebrovascular Accident (CVA), also known as Encephalic Vascular Accident (EVA) or stroke, is considered the second most prevalent and deadly neurological disease in adults worldwide.[1-3] It is characterized as a condition that occurs due to altered blood flow to the brain, which can cause the death of nerve cells in the affected region of the brain and, consequently, neurological sequelae for the patient.[1-3]

This condition can originate from an obstruction of blood vessels, known as an ischemic stroke, or from a ruptured vessel, known as a hemorrhagic stroke.[1-3] These strokes(CVAs) can cause sudden weakness, numbness of the face, arm or leg, affecting the whole body or just one side, difficulty speaking or understanding, decreased or loss of consciousness, severe headache, decreased hearing acuity, loss of coordination and balance, cognitive impairment, dizziness and mental confusion.[1-3]

Considering the high mortality and morbidity from this type of neurological disease, nurses should be involved in this type of care, both in pre-hospital and in-hospital settings. The nurse's role in identifying signs and symptoms, assessing clinical deterioration, and promoting the respective care are actions that contribute to a better prognosis. [4-5]

Thus, the training of nurses to provide direct assistance to stroke patients enables them to

provide quality care.[5-6] This training should take place intending to enhance the results of rehabilitation and promote functional independence, reducing the impact caused by changes in sensorimotor function and providing quality of life for survivors.[5-6]

To train higher education students and nursing professionals, it is necessary to delve deeper into theory using active pedagogical strategies that promote quality teaching about the care of stroke victims during the training process of this professional class. This will enable them to act in a preventive, curative, and rehabilitative manner, providing safe and effective care.[7]

In this sense, the use of active pedagogical strategies in the teaching process of stroke victim care in higher education institutions has been a valuable ally, as it promotes meaningful learning during nurse training and, above all, can stimulate the development of clinical skills.[7-8]

Given the importance of using teaching and learning strategies in the process of instructing stroke victim care, as well as the limited scientific evidence that synthesizes an overview of the active methods that enable learning about this subject, this study points to the need to structure a compilation of strategies that promote meaningful learning about stroke victim care.[7-8]

Considering the above, the aim was to identify the pedagogical strategies used in teaching nursing care to stroke victims.

Method

This is an integrative literature review, characterized as a type of research that identifies, synthesizes, and analyzes existing scientific evidence on a specific topic using an integrative and rigorous method of searching, selecting, and synthesizing the literature.[9]

To carry out this study, six stages were followed with methodological rigor: (1) identification of the topic and formulation of the review question; (2) establishment of eligibility criteria; (3) definition of the information to be extracted from the selected studies/categorization of the studies; (4) evaluation of the studies included in their entirety; (5) interpretation of the results obtained; (6) synthesis of the review/synthesis of knowledge.[10]

In the first stage, the review question was formulated using the Population-Intervention-Outcomes (PIO) strategy, a variation of the PICO strategy,[11] considering P (Population): higher education students and nursing professionals; I (Intervention): teaching strategies used for nursing care in CVA; and O (Outcome): learning about nursing care for CVA victims. Thus, the following review question was formulated: What teaching strategies aimed at nursing care in CVA can promote the learning of higher education students and nursing professionals?

In the second stage, primary studies were included that addressed pedagogical strategies aimed at teaching nursing care to CVA victims without delimiting language or time frames and that were published electronically in scientific journals. Secondary studies, letters to the editor, editorials, case reports, abstracts published in event proceedings, opinions, dissertations, theses, book chapters and institutional manuals were excluded.

The bibliographic survey was conducted using information sources: Medical Literature Analysis and Retrieval System Online (PubMed®/Medline), Scopus, Excerpta Medica Database (Embase), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, Education Resources Information Center (ERIC), and Latin American and Caribbean Health Sciences Literature (LILACS).

The search took place in September 2022, based on the structural elements of the PIO strategy to list the descriptors. The descriptors available in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), in trilingual form, their synonyms, plural and singular, and Boolean operators were adopted. Knowing that each source of information responds to different commands and works uniquely, the search strategy was adapted as shown in Chart 1.

Chart 1 - Presentation of information sources, descriptors, keywords, and search strategies. Uberaba, MG, Brazil, 2023.

Sources of information	Search strategy (descriptors and keywords)
PubMed®/Medline	*("Students, Nursing" OR "Student, Nursing" OR "Nurse Practitioners" OR "Practitioner, Nurse" OR "Nursing" AND Teaching OR "Teaching Methods" AND Stroke OR "Cerebrovascular Accident" OR "Brain Vascular Accident" AND Learning)*
Scopus	*TITLE-ABS-KEY (({Students, Nursing} OR {Student, Nursing} OR {Nurse Practitioners} OR {Practitioner, Nurse} OR {Nursing} AND {Teaching} OR {Teaching Methods}) AND ({Stroke} OR {Cerebrovascular Accident} OR {Brain Vascular Accident} AND {Learning}))*
Embase	*("Students, Nursing" OR Nursing AND Teaching AND Stroke AND Learning)*
CINAHL	*(("Students, Nursing" AND (Nursing) AND (Teaching) AND (Stroke) AND ("Learning"))*
Web of Science	*AK=(("Students, Nursing" OR Nursing AND Teaching AND Stroke AND Learning))*
ERIC	*(Nursing Students OR Nursing AND Teaching AND Stroke AND Learning)*
LILACS	Portuguese: *("Estudantes de Enfermagem" OR "Profissionais de Enfermagem" OR Enfermagem AND Ensino AND "Acidente Vascular Cerebral" AND Aprendizagem)* English: ("Students, Nursing" OR "Nurse Practitioners" OR Nursing AND Teaching AND Stroke AND Learning) Spanish: *("Estudiantes de Enfermería" OR "Enfermeras Practicantes" OR Enfermería AND Enseñanza AND "Accidente Cerebrovascular" AND Aprendizaje")* French: *("Élève Infirmier" OR "Infirmières Praticiennes" OR Infirmier AND*

Enseignement AND "Accident Vasculaire Cerebral" AND Apprentissage)

For the initial selection of titles and abstracts, the Rayyan Qatar Computing Research Institute (Rayyan QCRI) tool was used, which facilitates the automation of the review, including the identification of duplicates, incorporating a high level of usability and effectiveness of selection using the double-blind option between reviewers. To minimize possible bias, the selection was carried out independently by two reviewers. In cases of divergence in the process, a third reviewer was called in to reach a consensus on the selection. The pre-selected studies were then read in full, resulting in a sample of seven articles.

In the third stage, after reading the included articles, a previously validated instrument was used to analyze the results,[12] considering the following criteria: author, year of publication, country of origin, objective, main results, type of study and level of evidence.[13] It is worth noting that to classify the study, the first step is to identify the type of research question, which could be: treatment/intervention and diagnosis; prognosis or etiology in the health area; meaning or experience of the disease. The study is then placed on the pyramid depending on the level of scientific evidence.[13]

In the fourth stage, the included studies were analyzed using thematic analysis, characterized by pre-analysis, organization of the information, exploration of the findings, and finally, data processing.[14]

In the fifth stage of this integrative review, the results were interpreted, and the included studies were critically assessed, allowing the findings to be categorized and the level of evidence of the studies to be measured.[14] In the sixth and final stage, the synthesis of the findings was presented with the information that answered the question of this review. As this is an integrative review, the research was not submitted to the Research Ethics Committee.

Results

A total of 485 studies were identified, of which seven constituted the final sample (Figure 1).
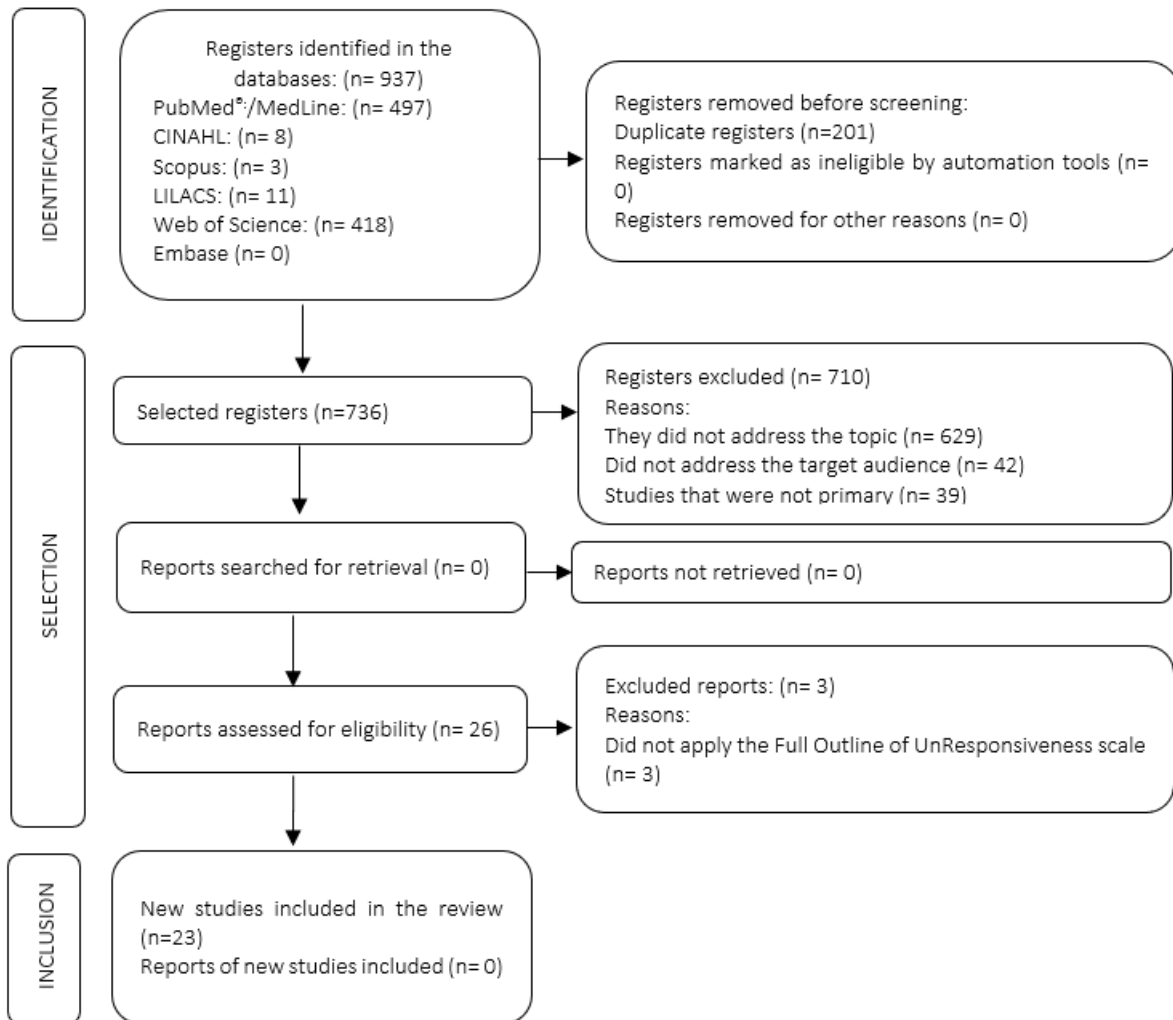
US National Library of Medicine, National Institutes of Health Research Database (Medline/PubMed®), Latin American and Caribbean Health Sciences Literature (LILACS), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medical Database (EMBASE) and Education Resources Information Center (ERIC).

Figure 1 - Flowchart for selecting publications for the integrative review. Uberaba, MG, Brazil, 2023.

Among the seven findings included in the sample, there was a predominance of studies carried out in the United Kingdom,[15-16] of an experimental nature,[15,17-18] with level of evidence [4,19-21] published in 2018,[16,20] (Chart 3).

Chart 3 - Characterization of the studies that constituted the sample of this integrative review. Uberaba, MG, Brazil, 2023.

Year and origin	Objective	Type of study/Level of evidence	Main results
2022,[18] Iran	To compare two new educational techniques on nurses' knowledge of nursing care in CVA.	Experimental study/ Level 2	The average knowledge score in the Workshop group was significantly higher than in the non-interactive multimedia learning group.
2020,[19]	Describe simulation	Descriptive	The application of simulation

France	techniques in the acute CVA scenario.	study/ Level 4	methodology in education and training improves the performance of healthcare professionals in real clinical practice and patient outcomes.
2018,[20] United States of America	To assess students' collaborative interprofessional education skills in a scenario involving team based CVA management.	Mixed approach study/ Level 4	There was a noticeable change in the students' self-assessments in the interprofessional domains evaluated by the Intelligence in Research and Strategic Consulting (IPEC- in Portuguese) Competencies Self-Assessment tool completed before and after the simulation experience. The students' qualitative reflections revealed new conceptions of collaboration, leadership, the roles of different professions, and the importance of communication after participating in the simulation.
2018,[16] United Kingdom	Summarize the design and development of the e-learning tool for teaching stroke patient care.	Methodological study/ Level 6	The multimedia e-learning tool can provide a vehicle for stroke training, bringing the mappings between theory and practice to life in the form of highly realistic scenarios.
2012,[15] United Kingdom	To discuss the use of vignettes as a tool to develop nursing students' knowledge of CVA management.	Experimental study/ Level 2	The vignette-based activities were effective in improving students' thinking about CVA and its management. The majority of students embraced this learning style and favored its greater use in the curriculum.
2011,[21] London	To describe the role that simulation training can play for nurses working in hyperacute CVA units.	Descriptive study/ Level 4	Simulation training cannot replace real-life work-based experience, but it can be used to increase knowledge and skills. A small pilot study suggested improvements in nurses' clinical and non-clinical skills.
2009,[17] Taiwan	To examine the effectiveness of two programs that teach nurses to use the Chinese version of the National Institute of Health Stroke Scale.	Experimental study/ Level 2	Both groups' scores on the correctness assessment, and satisfaction, increased significantly after the intervention. Nurses with less experience in neurological nursing who received the interactive computer-assisted instruction made a better assessment of stroke patients than those who received the instructor-led videotape learning.

The findings made it possible to identify the pedagogical strategies aimed at teaching nursing care to stroke victims, with an emphasis on clinical simulation,[19-21] followed by interactive computer-assisted instruction and instructor-led videotape,[17] vignettes,[15] multimedia e-learning tools[16] and workshops.[18] The skills developed through these pedagogical strategies were also

identified, in which cognitive skills stood out,[15-21] followed by affective[15,17,19-21] and psychomotor skills.[16,19-21]

Discussion

Considering the high incidence, complexity and, above all, the strong social impact on the individual and their family, it is essential that nursing professionals provide safe, quality care to stroke victims in all phases, from promotion, prevention, treatment, and rehabilitation.[22] For this reason, the process of teaching and learning the subject using pedagogical strategies is necessary to develop clinical competencies characterized by knowledge, skills, and attitudes.[22]

Thus, the findings of this integrative review are unprecedented and advance nursing teaching, research and care, especially in Brazil, by bringing together the pedagogical strategies that have been applied in nursing to CVA victims, intending to verify the strategies with the potential to develop cognitive skills (apprehension and mastery of knowledge), psychomotor skills (manual or physical skills) and affective skills (self-confidence, leadership, relationships, posture, feelings, attitudes, responsibilities and satisfaction).

Most of the manuscripts presented a low level of evidence.[19-21] This result justifies the development of new studies with more robust designs, characterized by experimental and quasi-experimental studies that test the effectiveness of pedagogical strategies in teaching nursing care to stroke victims.[23]

Regarding the pedagogical strategies used to enable the teaching process of stroke patient care, it was observed that educational methods and technologies are essential and relevant, providing information in various ways, such as videos, workshops, multimedia, computers, vignettes, and simulators used to facilitate the fixation of stroke content, seeking meaningful learning.[15-21]

Among the pedagogical strategies highlighted by the findings, clinical simulation, which was addressed by three studies and can develop the tripod of skills characterized by knowledge, skills and attitudes, stood out.[19-21] This strategy has had its effectiveness proven by a systematic review of studies that compared clinical simulation with traditional teaching and learning strategies, as it obtained statistically significant results in the development of clinical skills.[24]

A descriptive study identified by the present sample highlighted that, to develop clinical simulation in stroke management, the stages of preparation, divided into pre-simulation and pre-briefing/briefing, execution of the simulated scenario and, finally, structured debriefing, were

carried out.[19] Given the findings of this research, it was observed that this strategy can promote education and training in the care of stroke patients, providing a significant improvement in the performance of health professionals in clinical practice.[19] The strategy can improve patient outcomes, since it also contributes to patient safety by promoting a teaching environment in which the learner can make mistakes without causing harm to the person being cared for.[19]

Quantitative research has shown the positive impact of clinical simulation on students. By providing new insights related to collaboration, communication, leadership and discipline-specific functions, simulation becomes more effective when compared to traditional teaching methods. This evidence has been highlighted by lectures on topics such as CVA.[20] However, it should be emphasized that simulation still needs to be further developed in the context of nursing care in CVA.[20]

About the other pedagogical strategies identified, there was a predominance of the use of methods made possible by technological resources such as interactive computer-assisted instruction and instructor-led videotape,[17] vignettes[15], and multimedia e-learning tools.[16] These resources show that teachers or mediators of content on the subject need to base the scenario involving the case study on situations that are as close as possible to reality to promote meaningful learning, and they use digital tools to achieve this.[16]

Computer-assisted learning is addressed in an experimental study to examine the effectiveness of two programs that teach nurses how to use the National Institute of Health Stroke Scale (NIHSS) Chinese version to assess neurological damage, develop a treatment and discharge plan for stroke patients.[17] This strategy involves projecting a screen containing narration, interaction, animation and video that encompassed instructions for handling the scale, learning content, quizzes and automatic feedback content, as well as other information related to the scale.[17]

Computer-assisted learning has therefore become an important means of teaching. The development of programs such as the "Instructor-led Video Learning Program" (a course based on video instruction of the NIHSS scale led by a neurologist), which involve this strategy, becomes a key element in education, by making interactive learning the content of the course.[17] The results of this research have also been observed in previous research carried out using these teaching methods in the United States.[25-27]

Another point to consider, when comparing the effects of interactive instruction programs

and videos involving the application of the NIHSS, conducted by instructors, both were positive with regarding to the satisfaction shown by the students' evaluation.[17] In other words, both means of learning can be considered for education in the provision of care to stroke patients.[17] However, it was evident that learning was not satisfactory when using the video method to teach nurses with less experience in neurological nursing care, since, during the execution of this strategy, the students only watched the video and did not carry out the process of practice and reflection.[17]

In an experimental study carried out in Iran, the use of multimedia involved images, animation, sound, film, text and slide presentations on the description of the disease, causes, signs and symptoms, nursing assessment, nursing diagnoses and nursing interventions in relation to stroke, and was compared to a workshop developed virtually, in an interactive way, addressing the same content presented in non-interactive multimedia.[18] In general, the results indicate that multimedia training has a positive effect on nurses' knowledge and, therefore, the use of this method proved to be beneficial.[18] However, there was a significant difference between the two groups after the intervention, so the average score variations in the workshop group were higher, since it took place online and interactively.[18]

The use of vignettes for learning was addressed as a valid learning tool by an experimental study on aspects of stroke management, focusing directly on the provision of care in clinical settings where they would link students to real, evidence-based clinical situations, as well as improving learning in the early stages of nursing education. As a result, it was observed that vignette-based activities were effective in improving students' thinking about CVA and its management.[15]

In relation to the multimedia e-learning tool, this strategy was applied through a methodological study by a multi-professional team involving specialists in CVA management, education, virtual reality, and human-computer interaction.[16] Its construction was based on a series of acute neurological CVA scenarios, presented through videos and 3D animations, capable of helping nursing professionals to establish the causes of CVA through signs and symptoms.[16]

Although this study identified a limited number of scientific evidence that addresses the use of active strategies in stroke management, there is a wide range of methodologies that can enable the teaching of this subject, such as cooperative learning, team-based learning, case-based learning, collaborative case-based learning, project-based learning, problem-based learning, inverted classroom, educational games, Scratch, QUEST system, virtual patients, tele simulation,

among others.[28]

The main limitation of this review lies in the scarcity of studies that address the subject in depth, especially in the national context, which made it difficult to discuss the results; however, this gap instigates the development of new research on the subject.

It is hoped that this study will contribute to future research and to nursing practice by advancing science around teaching, research and nursing care by presenting a current overview of the pedagogical strategies that have been used in teaching nursing care to CVA victims and what skills they are capable of developing to assist teachers in the teaching and learning process.

Conclusion

The pedagogical strategies identified in the findings of this integrative review used in the process of teaching stroke victims were clinical simulation, interactive computer-assisted instruction and instructor-led videotape, vignettes, multimedia e-learning tools and workshops, with clinical simulation standing out because it was the most widely used strategy and was able to develop cognitive, psychomotor, and affective skills in a single strategy.

References

1 Moraes MA, Mussi FC, Muniz LS, Sampaio ES, Leitão TS, Santos CAST, et al. Clinical characterization, disability, and mortality in people with strokes during 90 days. Rev Bras Enferm. 2022; 75(2):e20201383. DOI: https://doi.org/10.1590/0034-7167-2020-1383.

2 Araújo JP, Darcis JVV, Tomas ACV, Mello WA. Mortality Trend Due to Cerebrovascular Accident in the City of Maringá, Paraná between the Years of 2005 to 2015. Int J Cardiovasc Sci. 2018; 31(1):56–62. DOI: https://doi.org/10.5935/2359-4802.20170097.

3 Santos LB, Waters, C. Perfil epidemiológico dos pacientes acometidos por acidente vascular cerebral: revisão integrativa. Braz J of Develop. 2020; 6(1):2749–2775. DOI: https://doi.org/10.34117/bjdv6n1-198.

4 Oliveira GG, Waters C. Perfil epidemiológico dos pacientes com acidente vascular cerebral isquêmico. Arq Med Hosp Fac Cienc Med Santa Casa São Paulo. 2021; 66(1):e019. DOI: https://doi.org/10.26432/1809-3019.2021.66.019.

5 Silva DN, Melo MFX, Ériko MMM, Borges AKP. Cuidados de enfermagem à vítima de acidente vascular cerebral (AVC): Revisão integrativa. REAS. 2019; (36):e2156. DOI: https://doi.org/10.25248/reas.e2136.2019.

6 Oliveira JHM, Cabanha MWC, Pereira TO, Lescano FA, Lopes EFB, Silva LSA, et al. Assistência de enfermagem ao paciente vítima de acidente vascular cerebral. PECIBES [Internet]. 2020 [acesso em Nov 20]; 5(2):44. Disponível em: https://periodicos.ufms.br/index.php/pecibes/article/view/10311.

7 Barbosa KK, Silva RAN, Barbosa DA, Abrao KR. Metodologias ativas na aprendizagem significativa de enfermagem. Rev Humanid Inov [Internet]. 2021 [acesso em Nov 28]; 8(44):100-109. Disponível em: https://revista.unitins.br/index.php/humanidadeseinovacao/article/view/4460.

8 Nascimento JSG, Pires FC, Nascimento KG, Regino DSG, Siqueira TV, Dalri MCB. Methodological quality of

validation of studies on simulated scenarios in nursing. Rev Rene. 2021; 22:e62459. DOI: https://doi.org/10.15253/2175-6783.20212262459.

9 Mendes KDS, Silveira RCCP, Galvão CM. Uso de gerenciador de referências bibliográficas na seleção dos estudos primários em revisão integrativa. Texto Contexto Enferm. 2019;28(20). DOI: https://doi.org/10.1590/1980-265X-TCE-2017-0204.

10 Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto contexto enferm. 2008; 17(4):758–64. DOI: https://doi.org/10.1590/S0104-07072008000400018.

11 Sousa LMM, Marques JM, Firmino CF, Frade F, Valentim OS, Antunes AV. Modelos de formulação da questão de investigação na prática baseada na evidência. Rev Investig Enferm [Internet]. 2018 [acesso em 2023 Jan 29];31-39. Disponível em: https://www.researchgate.net/publication/325699143_MODELOS_DE_FORMULACAO_DA_QUESTAO_DE_INVE STIGACAO_NA_PRATICA_BASEADA_NA_EVIDENCIA.

12 Ursi ES, Galvão CM. Perioperative prevention of skin injury: an integrative literature review. Rev Latino-Am Enferm. 2006;14(1):124-31. DOI: https://doi.org/10.1590/S0104-11692006000100017.

13 Melnyk BM, Fineout-Overholt E, Stillwell SB, Williamson KM. Evidence-based practice: step by step: the seven steps of evidence-based practice. Am J Nurs. 2010;110(1):51- 3. DOI: https://doi.org/10.1097/01.naj.0000366056.06605.d2.

14 Minayo MCS. O Desafio do Conhecimento: Pesquisa Qualitativa em Saúde. 10. ed. São Paulo: HUCITEC, 2007.

15 Emanuel V, Cross V. Using vignettes to teach stroke care. Nurs Times [Internet]. 2012 [cited 2023 Jan 29]; 108(9):20-22. Available from: https://pubmed.ncbi.nlm.nih.gov/22479769/.

16 Birns J, Woodward P, Brenton H, Bello F. Development of a Novel Multimedia E-Learning Tool for Teaching the Symptoms and Signs of Stroke. Creative Education. 2018; 09(08):1196-1211. DOI: https://doi.org/10.4236/ce.2018.98089.

17 Chiu S-C, Cheng K-Y, Sun T-K, Chang K-C, Tan T-Y, Lin T-K, et al. The effectiveness of interactive computer assisted instruction compared to videotaped instruction for teaching nurses to assess neurological function of stroke patients: a randomized controlled trial. Int j nurs stud. 2009; 46(12):1548-1556. DOI: http://dx.doi.org/10.1016/j.ijnurstu.2009.05.008.

18 Dehghan Z, Alimohammadi N, Mohamadirizi S. Comparison of two new educational techniques on knowledge of nurses about cerebrovascular accident nursing care in emergency department. J Educ Health Promot [Internet]. 2022 [cited 2023 Jan 29]; 11:60. Available from: https://pubmed.ncbi.nlm.nih.gov/35372591/.

19 Casolla B, Leciñana MA, Neves R, Pfeilschifter W, Svobodova V, Jung S, et al. Simulation training programs for acute stroke care: Objectives and standards of methodology. Eur Stroke J. 2020; 5(4):328-335. DOI: https://doi.org/10.1177/2396987320971105.

20 Karpa K, Pinto C, Possanza A, Santos J, Snyder M, Salvadia A, et al. Stroke Simulation Activity: a standardized patient case for interprofessional student learning. MedEdPortal. 2018; 14: 10698. DOI: https://doi.org/10.15766/mep_2374-8265.10698.

21 Roots A, Thomas L, Jaye P, Birns J. Simulation training for hyperacute stroke unit nurses. Br j nurs. 2011; 20(21):1352-1356. DOI: http://dx.doi.org/10.12968/bjon.2011.20.21.1352.

22 Schmidt MH, Selau CM, Soares PS, Franchi EF, Piber VD, Quatrin LB. Acidente vascular cerebral e diferentes limitações: uma análise interdisciplinar. Arq. ciências saúde UNIPAR. 2019; 23(2):139-144. DOI: https://doi.org/10.25110/arqsaude.v23i2.2019.6404.

23 Dutra HS, Reis VN. Experimental and quasi-experimental study designs: definitions and challenges in

nursing research. Rev enferm UFPE on-line [Internet]. 2016 [cited 2023 Feb 16]; 10(6):2230-41. Available from: https://periodicos.ufpe.br/revistas/revistaenfermagem/article/viewFile/11238/12840.

24 Nascimento JSG, Nascimento KG, Oliveira JLG, Alves MG, Silva AR, Dalri MCB. Clinical simulation for nursing competence development in cardiopulmonary resuscitation: systematic review. Rev latinoam enferm. 2020; 28: e3391. DOI: http://dx.doi.org/10.1590/1518-8345.4094.3391.

25 Howerton WBJR, Enrique PR, Ludlow JB, Tyndall DA. Interactive Computer-Assisted Instruction vs. Lecture Format in Dental Education. J dent hyg [Internet]. 2004 [cited 2023 Feb 16]; 78(4):10. Available from: https://pubmed.ncbi.nlm.nih.gov/16197750/.

26 Martin P, Klotz L, Alfred D. Longitudinal evaluation of a live interactive video baccalaureate nursing program. Nurse educ [Internet]. 2007 [cited 2023 Feb 19]; 32(1):43-7. Available from: https://journals.lww.com/nurseeducatoronline/Abstract/2007/01000/Longitudinal_Evaluation_of_a_Live_Interactive.12.aspx.

27 Schmidt B, Stewart S. Implementing the virtual reality learning environment: Second Life. Nurse educ. 2009; 34(4):152-5. DOI: http://dx.doi.org/10.1097/NNE.0b013e3181aabbe8.

28. Marques HR, Campos AC, Andrade DM, Zambalde AL. Inovação no ensino: uma revisão sistemática das metodologias ativas de ensino-aprendizagem. Avaliação. 2021; 26(3). DOI: https://doi.org/10.1590/S1414-40772021000300005.

Author's contributions

1 - Jussara da Cruz Jardim

Nurse. Specialist - jussara.c.jardim@gmail.com
Conception and/or development of the research and writing of the manuscript.

2 - Gustavo Correa de Amorim

Nurse. Specialist - gucamorim@gmail.com
Development of the research and writing of the manuscript, review and approval of the final version.

3 - Fabiana Cristina Pires Bernardinelli

Nurse. Master - enfermagem.pires@gmail.com
Development of the research and writing of the manuscript, review, and approval of the final version.

4 - Sheila Aparecida da Silva

Physiotherapist. Master - sassilva1721@gmail.com
Review and approval of the final version.

5 - Marisa Ferreira de Freitas

Nurse. Master - marisa.ferreira.frei30@gmail.com
Review and approval of the final version.

6 - Suzel Regina Ribeiro Chavaglia

Corresponding author
Nurse. PhD - suzel.chavaglia@uftm.edu.br
Conception and/or development of the research and writing of the manuscript.

How to cite this article