REVIEW ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

THE NURSE AND THE TECHNOLOGICAL INNOVATION IN HEALTH: AN INTEGRATIVE REVIEW

LA ENFERMERA Y LA INNOVACIÓN TECNOLÓGICA EN SALUD: UNA REVISIÓN INTEGRATIVA

O ENFERMEIRO E A INOVAÇÃO TECNOLÓGICA EM SAÚDE: UMA REVISÃO INTEGRATIVA

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ABSTRACT
Goal: To identify in the scientific literature the contribution of Brazilian nurses to the production of health technologies at different levels of care. **Methods:** The following descriptors were used: Health technology; Innovation; Nursing care; Health education. Complete original articles published in scientific journals between 2016 and 2021 were included. Incomplete texts (abstracts); review articles; publications outside the defined period; course completion papers, monographs, dissertations, and theses were excluded. **Results:** In the end, 17 articles by Brazilian nurses were analyzed. For this purpose, two synthesis matrices were used to integrate the main characteristics of the articles; objectives; methodology; and results. **Final considerations:** Brazilian nurses have contributed to the production of technologies at different levels of health care, based on the scientific literature, and also on those developed with the target audience for which they are intended. In addition, there is concern about validating this technology with specialists, designers, and the target audience.
Keywords: Health Technology; Innovation; Nursing Care; Health Education.

RESUMEN
Objetivo: Identificar en la literatura científica la contribución de los enfermeros brasileños a la producción de tecnologías de salud en diferentes niveles de atención. **Métodos:** Se utilizaron los siguientes descriptores: Tecnología en salud; Innovación; Asistencia de enfermería; Educación para la salud. Se incluyeron artículos originales completos publicados en revistas científicas entre 2016 y 2021. Se excluyeron los textos incompletos (resúmenes); artículos de revisión; publicaciones fuera del período definido; Trabajos finales de curso, monografías, disertaciones, tesis**. Resultados:** Finalmente, se analizaron 17 artículos de enfermeras brasileñas, para lo cual se utilizaron dos matrices de síntesis donde se integraron las principales características de los artículos; objetivos; metodología; resultados. **Consideraciones finales:** Las enfermeras brasileñas han contribuido a la producción de tecnologías en diferentes niveles de atención a la salud, con base en la literatura científica, y también con aquellas desarrolladas con el público objetivo al que están destinadas. Además, existe la preocupación de validar esta tecnología con expertos, diseñadores y público objetivo.
Palabras clave: Tecnología Sanitaria; Innovación; Asistencia de Enfermería; Educación Para la Salud.

RESUMO
Objetivo: Identificar na literatura científica a contribuição dos enfermeiros brasileiros na produção de tecnologias em saúde nos diversos níveis de atenção. **Métodos:** Utilizado tais descritores: Tecnologia em saúde; Inovação; Assistência de enfermagem; Educação em Saúde. Incluídos artigos originais completos, publicados em revistas cientificas no período de 2016 a 2021. Foram excluídos textos incompletos (resumos); artigos de revisão; publicações fora do período definido; Trabalhos de conclusão de curso, monografias, dissertações, teses. **Resultados:** Ao final, foram analisados 17 artigos de enfermeiros brasileiros, para tal utilizou-se duas matrizes síntese onde se integrou as principais características dos artigos; objetivos; metodologia; resultados. **Considerações finais:** Os enfermeiros brasileiros têm contribuído na produção de tecnologias nos diversos níveis de atenção à saúde, com base na literatura cientifica, e, também, com aquelas construídas com o público-alvo a que se destina. Além disso, há preocupação em validar essa tecnologia com especialistas, designers e público-alvo.
Palavras-chave: Tecnologia em Saúde; Inovação; Assistência de Enfermagem; Educação em Saúde.

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INTRODUCTION

According to Ordinance No. 2,510/GM, dated December 19, 2005, health technology is understood as materials, equipment, and procedures that, when organized, can assist in the implementation of care protocols and the management of healthcare delivery [1].

It is evident that the nursing team's contribution to technological innovation in health services establishes a comprehensive view of the care process, expanding the approach to care with improved quality of assistance. This creates the opportunity to enhance care planning and achieve better patient outcomes [2].

Technology can be divided into three types: soft technologies, based on communication, humanized care, and bonding; soft-hard technologies, involving structured knowledge; and hard technologies, consisting of equipment and machines that characterize an advanced technological environment, providing better care for critically ill patients [3].

The various possibilities of technologies can also be categorized as managerial and care-related. Managerial technologies allow for a dialogical approach between professionals and patients, promoting positive interaction within a harmonious environment. This facilitates the teaching-learning process, supports promising technical-scientific development, and encourages initiatives such as entrepreneurship [4].

Care technologies, in turn, constitute technical-scientific advancement, based on the search for and availability of knowledge through research, theories, and the experience between professionals and patients. They are care strategies aimed at patient safety, which the nurse can implement through, for example, the Nursing Process (NP) [4].

Nursing has evolved as a practical science in the use of new technologies for care, however, many challenges still exist, as there is a lack of entrepreneurial initiatives from health institutions and investment in this field, which hinders new possibilities for the development and improvement of new technologies for the innovation of health services [5].

Despite the lack of encouragement and investment in technological innovation in nursing, nurses have contributed in this area as care innovators, mainly aiming to facilitate nursing care at various levels of health promotion, prevention, and recovery, improving the quality of care, that is, from the use of educational booklets and much more [6].

In this sense, this study aims to: Identify in the scientific literature the contribution of Brazilian nurses in the production of health technologies at the various levels of care, based on the scientific literature from the period of 2016 to 2021.

METHODS

This is a bibliographic study of the integrative review type, which is a method that provides the synthesis of knowledge and the incorporation of the applicability of significant study results in practice [7]. The steps of the integrative review consist of: 1st Step: Identify

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the theme and formulate the guiding research question; 2nd Step: Search for the best evidence: establishing inclusion and exclusion criteria; sources and search strategies; 3rd Step: Critically evaluate the evidence of the selected studies; 4th Step: Integrate the evidence and synthesis; 5th Step: Discussion of the results; 6th Step: Presentation of the synthesis of the knowledge produced [8].

The PICO strategy represents an acronym for P – Population; I – Intervention; C – Comparison; and O – Outcomes. Within Evidence-Based Practice (EBP), these four components are important in forming the guiding question [9].

In this study, the following guiding question was posed: What is the scientific evidence regarding the contributions of Brazilian nurses in the production of health technologies at the various levels of care? To elaborate it, the PICO strategy was used, being: P – nurses; I – technological innovation; C – not applicable; O – scientific articles on technological innovation in nursing. The keywords defined for this study were: Health technology. Innovation. Nursing care. Health education.

Full original articles published in scientific journals between 2016 and 2021, in Portuguese, and addressing the study topic were included. Incomplete texts (abstracts); review articles; publications outside the defined period; undergraduate theses, monographs, dissertations, and doctoral theses were excluded.

Collections were gathered from the electronic databases of Latin American and Caribbean Health Sciences Literature (LILACS); Scientific Electronic Library Online (SCIELO); Virtual Health Library (VHL); and the Google Scholar search engine. As a search strategy, descriptor combinations were used with the Boolean operator “AND” to integrate documents on the subject. These were: technology AND nursing; nursing care AND health innovation; nursing AND innovation. These searches were conducted from August 2021 to January 2022, by the authors themselves, who encountered difficulties in finding articles that met the study objectives. To illustrate this process, the PRISMA flowchart was used (Figure 1).

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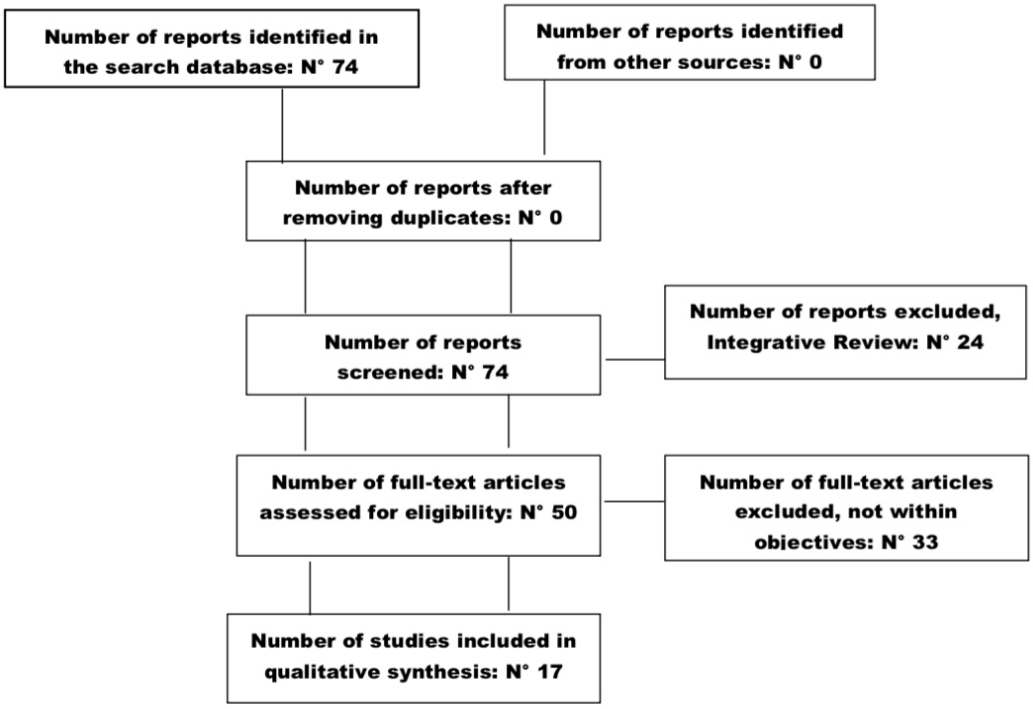
Figure 1 - PRISMA Flowchart



Source: Authors' research, Belém, 2022.

Seventeen articles by Brazilian nurses were analyzed, using two synthesis matrices that integrated the main characteristics of the articles: objectives, methodology, and results. The presentation of the results consists of two topics: Characterization of the analyzed articles and Technologies produced by Brazilian nurses.

RESULTS

Characterization of the analyzed articles

Table 1 below presents the characterization of the analyzed articles in terms of their specifications, year of publication, databases from which they were accessed, publication journals, type of methodology used, and the level of strength of evidence of the articles.

Table 1 - Synthesis matrix: analyzed articles

No.	ARTICLE TITLE	AUTHORS	YEAR	JOURNAL / DATABASE	METHODOLOGY / Level of Evidence
1	Method for the modeling and structuring of computerized nursing in intensive care	Daniela Couto Carvalho Barra; Sônia Regina[10]	2016	Full Text / Context	Hybrid production study
2	Mobile app for the nursing process in a neonatal intensive care unit	Jhonathan Lucas Araujo; Hugo Cristo Sant'Anna; Eliane de	2019	Full Text / Context / Nursing /	Methodological study. Level of evidence: 4

		Fátima Almeida Lima; Mirian Fioresi; Luciana de Cassia Nunes Nascimento; Cândida Caniçali Primo[11]		LILACS	
3	Mobile application for teaching the International Classification for Nursing Practice	Nikaelly Pinheiro Mota; Claudenisa Mara de AraújoVieira; Maria Naiane Rolim Nascimento; Adriana Moraes Bezerra; Glauberto da Silva Quirino; Nuno Damácio de Carvalho Félix[12]	2018	Brazilian Nursing Journal (REBEN) / SCIELO	Methodological research; Level of evidence: 4
4	Development of digital educational technology about minimally invasive intracranial pressure monitoring	Lilian Regina de Carvalho; Aline Natalia Domingues; Silvia Helena Zem-Mascarenhas[13]	2017	Full Text and Context / Nursing / SCIELO	Descriptive methodological study; Level of evidence: 4
5	Building a digital application for teaching vital signs	Francisco Gilberto Fernandes Pereira; Débora Valente da Silva; Luciana Maria Oliveira de Sousa; Natasha Marques Frota[14]	2016	Revista Gaúcha de Enfermagem / LILACS	Methodological study; Level of evidence: 4
6	Construction of a video about condom use for deaf and hearing people	Aline Cruz Esmeraldo Áfio; Sarah de Sá Leite; António Luís Rodrigues Faria de Carvalho; Paulo César de Almeida; Cristiana Brasil de Almeida Rebouças; Lorita Marlena Freitag Pagliuca[15]	2021	Rev Rene / LILACS	Multi-method study; Level of evidence: 3
7	Construction and evaluation of interactive educational technology for family caregivers about caring for dependent people	Maria José Silva Lumini Landeiro; Heloisa Helena Ciqueto peres; Teresa Vieira Martins[16]	2017	Collaborative article Portugal-Brazil. Institute of Biomedical Sciences Abe Salazar, University of Porto, Portugal. School of Nursing, University of São Paulo	Applied, exploratory descriptive research; Level of evidence: 4
8	Construction and validation of an educational booklet for mobile devices about	Nathalia da Costa Mello; Fernanda Garcia Bezerra Góes;	2020	Texto e Contexto Enfermagem /	Methodological research; Evidence level: 4

	breastfeeding	Fernanda Maria Vieira Pereira-Ávila; Juliana Rezende Montenegro Medeiros de Moraes; Liliane Faria da Silva; Maria da Anunciação Silva[17]		LILACS	
9	Educational technology for people with chronic kidney disease: content construction and validation	Fernanda Gatez Trevisan dos Santos; Victória dos Santos Laqui; Rafaely de Cássia Nogueira Sanches; Anderson da Silva Rêgo; Maria Aparecida Salci; Cremilde Aparecida Trindade Radovanovic[18]	2021	Revista Online de Pesquisa / BVS	Methodological research developed in four phases; Evidence level: 4
10	Construction and validation of behavioral technology for monitoring child development milestones	Michelle Aryanne Feitosa e Souza; Simone Soares Damasceno; Rachel de Sá Barreto; Luna Callou Cruz; Maria Corina Amaral Viana; Ana Valeska Siebra Silva; Dayanne Rakelly de Oliveira[19]	2018	Revista Rene / LILACS	Methodological study; Evidence level: 4
11	Construction and validation of a booklet for self-efficacy in Zika virus prevention	Ítala Keane Rodrigues Dias; Maria do Socorro Vieira Lopes; Emanuella Silva Joventino Melo; Evanira Rodrigues Maia; Rosa Maria Grangeiro Martins[20]	2021	Texto & Contexto Enfermagem / BVS	Methodological research; Evidence level: 4
12	Participatory development of educational technology in the HIV/AIDS context	Elizabeth Teixeira; Iací Proença Palmeira; Ivaneide Leal Ataíde Rodrigues; Gisele de Brito Brasil; Dione Seabra de Carvalho; Thyago Douglas Pereira Machado[21]	2019	Revista Mineira de Enfermagem / BVS	Qualitative approach study; Evidence level: 4
13	Comic books: technology in health for the humanization of care delivery to hospitalized children	Karla Maria Carneiro Rolim; Carlon Washington Pinheiro; Fernanda Jorge Magalhães; Mirna Albuquerque Frota; Francisco Antônio da Cruz Mendonça; Henriqueta Ilda Verganista Martins Fernandes[22]	2017	Revista de Enfermagem Referência Portugal / Google Scholar	Experience report with qualitative approach. Level of evidence: 5
14	Construction of hypermedia for	Isabel Cussi Brasileiro	2020	Revista	Methodological

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	prevention of bloodstream infection	Diasi; Eliane de Fátima Almeida Lima; Mirian Fiores; Dirceu Carrara; Izabella Soares de Oliveira[23]		Brasileira de Enfermagem (REBEM) / SCIELO	study; Level of evidence: 4
15	Managerial technology to mediate nursing consultation for people living with Chagas disease	Ana Gracinda Inácio da Silva; Wanne Thaynara Vaz Gurjão; Fernanda Carmo dos Santos; Gabriel Fazzi Costa[24]	2021	Rev. Nursing / BVS	Exploratory methodological research; Level of evidence: 4
16	Educational technology in the prevention and care of respiratory infections in daycare	Anne Grace Andrade da Cunha Marques; Arinete Véras Fontes Esteves; Ellen Pessoa Rocha; Marcos Vinícius Costa Fernandes[25]	2020	Ciência, Cuidado e Saúde / BVS	Methodological study; Level of evidence: 4
17	Development of didactic material for processing health products in primary health care units	Fabia Maria Souza Paula; Natalia Camelo do Nascimento Beserra; Rebeca Cristina Souza Lopes; Débora Rodrigues Guerra[26]	2017	Rev. SOBECC, São Paulo / Google Scholar	Descriptive research, experience report type. Level of evidence: 5

Source: Authors' Research, Belém, 2022.

It is observed that the analyzed articles point to the development and validation of educational technologies; technologies supporting teaching and technologies supporting nursing care practice. The years with the highest number of publications in scientific journals were 2017 and 2020, both with 4 publications each.

Three (3) of the publications were accessed through the Google Scholar search tool; five (5) articles were selected from the LILACS database; three (3) from the SCIELO database; six (6) from the BVS database.

These publications are distributed across all regions of Brazil, indicating a strong interest among nurses regarding the development of nursing technologies. In the North region, there are three (3) publications; in the Northeast region, seven (7) publications; in the Southeast region, five (5) publications, including one in collaboration with a university in Portugal; and in the South region, two (2) publications. This shows a predominance of these technologies in the Northeast region.

Thirteen (13) studies are methodological in nature, aiming to develop and validate nursing technologies, presenting a level 4 strength of evidence for their findings. Two (2) articles are experience reports on the construction of technologies, with a level 5 strength of evidence; and one (1) article uses mixed methods with a level 3 strength of evidence. For the presentation of the integrative review, the technologies

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produced by Brazilian nurses were identified as described below.

Technologies produced by Brazilian nurses

The following Table 2 demonstrates the evidence about the types of technologies that the nurses from the analyzed articles have developed with a view to technological innovation in nursing practice and education.

Table 2 - Synthesis matrix: technologies produced by Brazilian nurses

ARTIGO	RESULTADOS
1	Restructuring and organization of data and information carried out with the intention of updating, complementing, and adapting the Nursing Care Plan (PEI) for use in adult ICUs. Developed based on CIPE® version 2.0.
2	Developed based on Wanda Horta's Basic Human Needs and the International Classification. Crosses altered clinical indicators, suggesting possible diagnoses. For each diagnosis, it presents a list of possible interventions.
3	Technological tool based on the theoretical framework of Galvis Panqueva. The app was made available for free download on Google Play, compatible with Android devices, using the search tool under the name VitalEasy. For each item, a Standard Operating Procedure (SOP) was created.
4	Construction of the digital educational technology adopted the Computer-Assisted Learning Activity Planning (PACO); aimed to guide teachers in planning activities. The final development of the educational technology was called "Monitoring intracranial pressure (ICP): innovation with the minimally invasive method."
5	Content of the educational technology about anatomical, physiological, and immunological characteristics of children; pathophysiology and signs and symptoms of Upper Respiratory Tract Infections (URTIs); control, prevention, and care of children in daycare.
6	Educational video for the deaf about sexual health education. The study population consisted of two groups: sexual and reproductive health specialists and deaf people.
7	Mobile app called CIPE® Play, available for free download on the Android system via Google Play. Composed of a "user guide" moblet, consisting of five modules about the main information on SAE, PE, and their classification systems.
8	Preparation of a booklet intended for the continued education of CME professionals.
9	Construction and validation of the educational booklet titled "Simplifying Breastfeeding," created using Adobe Photoshop software.
10	"Guidance booklet for people with Chronic Kidney Disease (CKD)," aimed at promoting self-care for people with CKD regarding diet and kidney transplant.
11	Illustrated, colorful booklet containing comic stories and informative texts. Includes the origin of Zika; transmission mode; symptoms and prevention.
12	Instrument with topics based on Dorothea Orem's self-care deficit theory, to mediate the nursing consultation.
13	Booklet titled "Tips for Living Well," about transmission modes, diagnostic tests, follow-up, personal hygiene, environmental and food hygiene, and healthy eating.
14	Experienced by four students and three coordinators from the "Nursing Angels" program, Ceará Core. Development and use of a comic book: "Therapeutic Toy," educational in nature, based on the humanistic theory by Paterson and Zderad (1988).
15	Reminders for primary health care nurses to use the Child Health Handbook for monitoring child development milestones.
16	The User-Centered Design method was used according to the ABNT ISO-TR 16982:2014 standard, aimed at constructing a Virtual Learning Object in the form of an online course.
17	Based on the ADDIE model, grounded in Contextualized Instructional Design. Multimedia resources

	(image, video, audio, and text) are present in six menus. The caregiver opens the tool from an internet browser (Explorer or Chrome)

Source: Authors' Research, Belém, 2022.

Among the technologies developed by nurses, eight (8) are tools that use digital platforms, such as mobile applications or internet-based platforms; followed by the development of educational booklets, six (6); one (1) comic book with a therapeutic toy; one (1) behavioral technology using reminders; and one (1) managerial tool to mediate nursing consultations. All of them used literature review to support their content; however, some also conducted surveys with the target audience regarding their content. Of the eight digital technologies, three (3) are related to the use of the nursing process and classification of nursing practice, CIPE, using models to guide the development and organization of these technologies [10,11,12].

DISCUSSION

Among multimedia technologies, the restructuring of data and information of the computerized nursing process (PEI) for intensive care units (ICU) is observed. It is available via web on desktop environments and on mobile devices. It includes the association and registration of clinical assessment data, nursing diagnoses, and interventions, resulting in clinical assessment possibilities; diagnoses; and nursing interventions according to CIPE®2.0 [10].

A software application was developed based on Wanda Horta's Basic Human Needs and the International Classification for Nursing Practice, for iOS and Android platforms. The CuidarTechNeo Nursing Process app provides the nurse with a computerized tool that, from the completion of the history and physical examination, cross-checks the altered clinical indicators, suggesting possible diagnoses and interventions. Another functionality of the app is to send all formatted content by email to be printed and attached to the patient records, if necessary [11].

The mobile app addressing CIPE® was registered with the International Council of Nurses (ICN) for non-commercial use of CIPE®, titled CIPE® Play and made available for free download on the Android system, in the Google Play store. It consists of five modules covering the main information about the SAE, PE, and their classification systems [12].

The development of the digital educational technology (DET) aims to guide teachers in planning activities. The final development was called "Monitoring Intracranial Pressure (ICP): Innovation with the Minimally Invasive Method," consisting of 36 screens in Portuguese. Access requires login and a computer connected to the internet [13].

Another educational technological tool was aimed at teaching vital signs. A Standard

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Operating Procedure (SOP) was created to guide the student in performing the procedure and to clarify possible doubts about the semi-technique of that specific vital sign. It was made available for download in the Google Play store, for Android devices [14].

The development of a Virtual Learning Object, in the form of an online course, followed the COREQ checklist (Consolidated Criteria for Reporting Qualitative Research). Its target audience includes nursing and medical students and professionals [14].

Another type of multimedia technology is related to the production of an educational video for deaf individuals, about sexual health education, produced with simultaneous translation into Libras (Brazilian Sign Language), audio, and Portuguese subtitles. It creates a fictional situation of a couple who contract an STI and want to understand how it is acquired and prevented [15].

The development of the educational technology "Caring for Dependent People" aimed at making available information adapted to the needs of family caregivers of dependent individuals. It contains information, guidance, photos, videos, and audio, structured around three related topics such as tube feeding, positioning and transferring [16].

In addition to digital technologies, a widely developed type of technology by nurses is educational booklets, primarily used for educational purposes, both for professionals and patients.

The booklets created were related to continuing education for professionals from the Central Sterile Supply Department (CSSD); a breastfeeding guidance booklet; guidance for patients with chronic kidney disease; prevention of respiratory illnesses in children; prevention of the Zika virus; and guidance for people living with HIV/AIDS. They were developed through methodological studies consisting of four to six phases, based on literature reviews and the needs of the target population, using approaches such as action research and focus group techniques [17,18,19,20,21,22].

The booklet aimed at the continuing education of CSSD professionals was structured into four chapters, covering topics related to the processing of health products (PPS) [17]. The booklet titled “Descomplicando a Amamentação” (Demystifying Breastfeeding), related to breastfeeding, represented the diversity of the Brazilian population, so that the educational material included a variety of ethnicities [18].

The creation of the “Guidance Booklet for People with Chronic Kidney Disease (CKD)” involved a situational diagnosis with 48 patients followed at the nephrology service of a hospital institution [19]. The booklet on the prevention and care of respiratory infections in children at daycare centers addressed topics such as children's anatomical, physiological, and immunological characteristics; pathophysiology and signs and symptoms of Upper Respiratory Tract Infections (URTIs); as well as control, prevention, and care in daycare settings [20].

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For the Zika virus prevention booklet, the authors opted for a colorful format, blending comic-style storytelling with didactic texts, featuring fictional characters [21]. Meanwhile, the booklet for people living with HIV/AIDS, titled "Tips for Living Well", addresses modes of transmission, diagnostic exams, monitoring, personal hygiene, environmental and food hygiene, and healthy eating [22].

Two (2) technologies are classified as behavioral: one involves a comic book using therapeutic play (TP) for venipuncture care in hospitalized children, based on a humanistic theory approach. The other involves the development and validation of a behavioral technology for monitoring childhood developmental milestones in the form of reminders [23–24].

And finally, there is an article on a managerial technology, an instrument developed and validated to support nursing consultations for individuals living with Chagas disease, with based on Dorothea Orem's Self-Care Deficit Theory, which resulted in an instrument grounded in her theory [25].

It is worth noting that all technologies developed were validated by expert judges, and some also by the users of the technologies. The most commonly used validation techniques were the Delphi method and Pasquali's theoretical model, with the Content Validity Index (CVI) being used to measure agreement among judges. Except for one, all studies received approval from ethics committees of their respective institutions, and, in general, they are related to undergraduate and postgraduate educational institutions. All were validated with over 70% agreement among judges and the target audience.

The analyzed articles show that nurses have contributed to digital technologies aimed at innovating ways of caregiving, educating, and mediating processes whether with patients or health professionals. In this regard, digital media in the form of multimedia such as mobile apps, software, online courses, and videos have been developed by nurses through methodological studies, often in partnership with the fields of technology, information technology (ICTs), and design [10,11,12].

ICTs in nursing have transformed the way large amounts of information are handled in care settings, enabling fast and organized access. Scientific data storage improves the performance of nursing teams and also enhances the quality of care [26]. In this context, mobile technologies, in addition to being tools for knowledge and expanded work systematization, provide an opportunity to offer self-care guidance, positioning the nurse as a consultant and advisor, thereby improving outcomes [27].

Moreover, educational technologies, especially those involving information technology, are viewed by many educators and educational institutions as opportunities to modernize teaching and learning [28]. In healthcare, they are being used as a resource that aids and diversifies activities, allowing greater flexibility and interaction with both patients and professionals [28].

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It was also observed that nurses value light-hard technologies, such as educational booklets, management tools that can be filled in during nursing consultations, or even comic books, which can help improve children's behavior in stressful hospital situations caused by equipment or procedures [29,30,31].

Light-hard technologies consist of knowledge developed over time and do not require high-tech resources for their application, for example, massage, bathing, and aromatherapy [32].

Managerial technologies, on the other hand, involve systematized and tested theoretical and practical actions, through the planning, execution, and evaluation of the work environment. They are used to manage nursing care and health services, aiming to intervene and improve their quality [33].

FINAL CONSIDERATIONS

It is concluded that Brazilian nurses have contributed significantly to the development of health technologies at various levels of care. These technologies are built based on scientific literature on the subject, but also co-created with the target audience to which they are intended. They include digital technologies, used both in computer software and mobile applications.

There is also strong interest in light-hard technologies, such as educational booklets. These technologies are intended not only for health professionals and students, but also for users of the health system, with an emphasis on educational purposes.

These technologies primarily employ quantitative analysis and are evaluated based on the level of agreement regarding content between expert judges and the target audience. However, attention is also paid to appearance and design, and thus, the technologies are submitted to evaluations by judges who assess their presentation and functionality.

This study may contribute by guiding nurses interested in nursing technologies on where and how to access and use these innovations, so they can be implemented beyond their place of origin, and further disseminated, used, and improved, both in nursing practice and education.

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Declaration of Conflict of Interest

Nothing to declare.

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