

## Innovation strategies with emergency applications: a review

Estratégias de inovação com aplicativos de urgência e emergência: revisão sistemática

Estrategias de innovación con aplicaciones de emergencia: una revisión

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### **Abstract**

**Objectives:** To identify and evaluate innovation strategies with urgent and emergency applications in Brazilian literature. **Methods:** This was a systematic review of the literature. The PRISMA statement was followed at all stages of this study. The selection of articles was carried out in the databases PubMed / Medline, Web of Science, VHL (Medline, Lilacs, IBECs, BDENF) and SciELO library without a specific date. The PICOS strategy: “patient, intervention, comparison, results and study design” was followed and the search carried out resulted in the selection of ten articles. **Results:** The main findings were theses, articles with themes extracted from master’s theses and integrative literature reviews, in which new instruments and applications for care practice were validated, which were evaluated by the nursing team. It is worth mentioning that care, in all its dimensions, requires continuous updating, allowing a range of possibilities to expand knowledge in the area. **Conclusion:** The study allowed us to understand that the insertion of technology, although little reported in the literature, causes a mixture of feelings in the daily care, since it allows autonomy and practicality of professionals. It is worth mentioning that care, in all its dimensions, requires continuous updating, allowing a range of possibilities to expand knowledge in the area.

**Keywords:** Hospital Emergency Services; Nursing; Mobile applications; Emergency medical services; Health teaching.

### **Resumo**

**Objetivos:** Identificar e avaliar estratégias de inovação com aplicações de urgência e emergência na literatura brasileira. **Métodos:** Trata-se de uma revisão sistemática da literatura. A instrução PRISMA foi seguida em todas as etapas deste estudo. A seleção dos artigos foi realizada nas bases de dados PubMed/Medline, Web of Science, BVS (Medline, Lilacs, IBECs, BDENF) e biblioteca SciELO sem data específica. A estratégia PICOS: “paciente, intervenção, comparação, resultados e desenho do estudo” foi seguida e a busca realizada resultou na seleção de dez artigos. **Resultados:** Os principais achados foram teses, artigos com temas extraídos de dissertações de mestrado e revisões integrativas da literatura, em que foram validados novos instrumentos e aplicativos para a prática assistencial, que foram avaliados pela equipe de enfermagem. **Conclusão:** O estudo permitiu compreender que a inserção da tecnologia, embora pouco relatada na literatura, provoca uma mescla de sentimentos no cotidiano do cuidado, pois permite autonomia e praticidade dos

profissionais. Vale destacar que o cuidado, em todas as suas dimensões, requer atualização contínua, permitindo um leque de possibilidades de ampliação do conhecimento na área.

**Palavras-chave:** Serviço Hospitalar de Emergência; Enfermagem; Aplicativos móveis; Serviços médicos de emergência; Ensino em saúde.

### **Resumen**

**Objetivos:** Identificar y evaluar estrategias de innovación con aplicaciones urgentes y de emergencia en la literatura brasileña. **Métodos:** Esta fue una revisión sistemática de la literatura. La declaración PRISMA se siguió en todas las etapas de este estudio. La selección de artículos se realizó en las bases de datos PubMed/Medline, Web of Science, BVS (Medline, Lilacs, IBECs, BDENF) y biblioteca SciELO sin fecha específica. Se siguió la estrategia PICOS: “paciente, intervención, comparación, resultados y diseño del estudio” y la búsqueda realizada resultó en la selección de diez artículos. **Resultados:** Los principales hallazgos fueron tesis, artículos con temas extraídos de disertaciones de maestría y revisiones integradoras de literatura, en los cuales fueron validados nuevos instrumentos y aplicaciones para la práctica del cuidado, que fueron evaluados por el equipo de enfermería. Cabe mencionar que la atención, en todas sus dimensiones, requiere de una actualización continua, que permita un abanico de posibilidades para ampliar el conocimiento en el área. **Conclusión:** El estudio permitió comprender que la inserción de la tecnología, aunque poco relatada en la literatura, provoca una mezcla de sentimientos en el cotidiano del cuidado, ya que permite la autonomía y practicidad de los profesionales. Cabe mencionar que la atención, en todas sus dimensiones, requiere de una actualización continua, que permita un abanico de posibilidades para ampliar el conocimiento en el área.

**Palabras clave:** Servicio de Urgencia en Hospital; Enfermería; Aplicaciones móviles; Servicios médicos de urgencia; Enseñanza en salud.

## **1. Introduction**

The use of technology has been increasingly used in society, since it allows its consumer speed in acquiring information and practicality in its handling without interfering in daily activities. This rise began in the 1960s, however, starting with scientific evolution in Brazil, contributing positively to the care provided by nursing (Barra, 2017; Fang, 2019).

As it is a global resource with easy access, it allows the exchange of information in real time, corroborating the effective communication between health teams. Thus, they aim to improve the performance of professionals in relation to the development of daily activities, such as the preparation of diagnoses, guidelines, care and decision-making (Barra, 2017; Lima, 2019; Xueqing, 2019).

In urgent and emergency units, the care provided by the nursing team must take place with caution, as the procedures performed in these places are highly complex, often invasive, offered to dependent and fragile patients, requiring manual skills, technical knowledge and humanization of the patients-professionals who work in them (Sousa, 2019).

It is worth mentioning that for a good adhesion by the team to these technological instruments and mobile applications in their routine, one must consider the demand and the specificity of each sector in which they are applied (Baumann, 2019; Ferreira, 2020). In addition, the use of this resource in services provided to urgency and emergency units is of paramount importance, as well as in other units of care for critical and semi-critical patients, due to the need to optimize time and precision during procedures (Ferreira, 2020; Lin, 2020).

However, as it is an innovative work tool, capable of generating doubts among the professionals who use it, it is still little applied in practice. Thus, the nursing teams' lack of preparation in the face of the emerging context, regarding the use of mobile applications and smartphones, makes it difficult to access and insert it in the work environment (Barra, 2017).

Studies are also scarce in the literature, but knowledge of applications in the area of urgency and emergency is necessary, as they permeate new paths and new possibilities, allowing comprehensive and quality care, quickly and safely, and should be inserted into care practice immediately. With this, it became important to carry out this study, which consists of a systematic review of productions with the objective of identifying and evaluating innovation strategies through urgency and emergency applications in the Brazilian literature.

## 2. Methodology

This was a systematic review study, which is the method of choice to solve a specific question about a certain problem in the health area. In this way, a detailed synthesis of all the selected researches is carried out, since they are related to the guiding question, and can also guarantee an applicable and resolving intervention for the problem in question (Sampaio, 2007).

The guiding question was elaborated, based on the PICOS strategy, an acronym in English that, in Portuguese, corresponds to participants, interventions, comparisons, results or outcomes and study design (Santos, 2007). The research question: "What are the innovation strategies with urgent and emergency applications in literature?"

In order to answer the guiding question, a systematic review of the literature was carried out in journals indexed in the databases PubMed / Medline, Web of Science, BVS (Medline, Lilacs, IBECs, BDENF) and SciELO library without a specific date. In each search, descriptors were established from the Health Sciences Descriptors (DeCS), which are: Hospital Emergency Services; Nursing; Mobile Applications; Emergency Medical Services; Health Teaching.

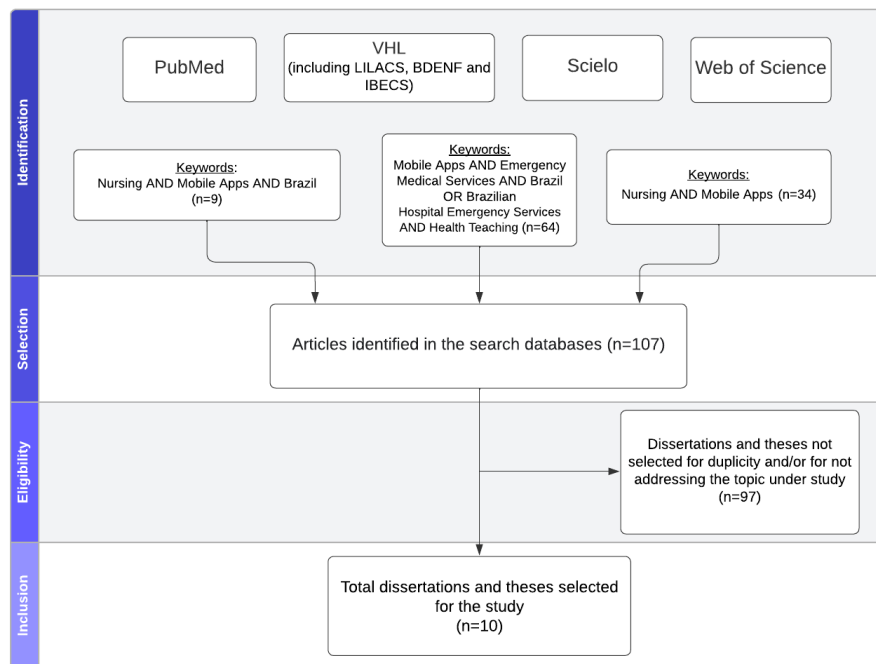
To compose the sample of this research, observational studies, randomized clinical trials, quasi-experimental studies and other intervention studies published in English, Spanish or Portuguese in the last 10 years were selected. The inclusion criteria of the studies for this review were: (1) include adults (19 years or older) in urgent and emergency situations; (2) using oral antidiabetics or insulin; (3) who investigated strategies using applications for education and health; (4) in Brazil. As an exclusion criterion, publications that do not meet the inclusion criteria will be considered.

The search was carried out in the databases, simultaneously, using the combined descriptors through the Boolean connectors "AND" and "OR". After that, the titles and abstracts will be carefully read and, subsequently, the entire reading of each selected manuscript will be read.

## 3. Results and Discussion

Searching the electronic databases, 107 potentially eligible publications were identified. After reading the title and summary of each publication, 05 were duplicated and were excluded. Of the remaining total (n = 102), and after applying the selection criteria, 92 publications were also excluded because they did not address the study theme, limiting the selection for reading in full to 10 articles. Thus, the sample of the systematic review was composed of 10 studies, as shown in Figure 1.

**Figure 1:** Flowchart of the study selection process



Source: Authors.

Searching the databases, 107 articles were identified, including dissertations and theses, based on pre-selected descriptors, such as communication systems between emergency services; nursing; mobile applications; emergency medical services; out-of-hospital cardiac arrest.

Of the 10 articles included, 8 were published in Brazil and two abroad, these compounds, mostly, by integrative literature reviews (60%), followed by validation studies and evaluation of instruments associated with the practice. The applications verified in the literature were SafeBathing and SepsisCare, in addition to software developed for application in healthcare services. In relation to the target audience, the selected articles proposed to assess the importance of mobile technologies in the daily life of Brazilian nursing, especially with regard to the service developed by nurses. The regions with the highest number of researches in the area in question were the Southeast and South, due to the high concentration of technology, innovation and science in these regions (Table 1).

**Table 1:** List of articles included in the study.

Title	Objective	Main results	Journal
1. Use of technological resources by nurses: development of an ambulance drive prototype for people with hearing impairment	To develop the prototype of a mobile application for remote ambulance activation for urgent and emergency care for individuals with hearing impairments.	The developed application can be used by the population that are characterized as deaf and dumb, becoming an alternative assistive technology tool, giving users the preserved right to enjoy the opportunity to save lives.	Brazilian Journal of Business
2. The use of a cell phone application to access nursing protocols: experience report	To socialize the experience lived by a group of nurses with the creation and use of an application to standardize the standard operating protocols for the nursing care, built through a	As a result, easier access to institutional protocols and content aggregation for care practices stand out.	Research, Society and Development

		free platform and with a self-explanatory tool.	
3. Evaluation of a prototype for the Systematization of Nursing Care on a mobile device	To evaluate a prototype for use in mobile devices that allows the registration of data for the Systematization of Nursing Care in the Neonatal Intensive Care Unit.	The mobile technology used by nurses in the Neonatal Intensive Care Unit was positive, although some reported difficulties in handling it, while others with experience in using mobile devices did not face problems using it. The application has the necessary functions for the Systematization of Nursing Care in the unit, but changes were suggested in the screen interface, some data collection terms and parameters that the application offers. The main contributions of the software were: agility in the development and documentation of systematization, freedom of movement, standardization of child assessment, optimization of time for the development of bureaucratic activities, possibilities for information retrieval and reduction of the physical space occupied by the records.	Revista Latino-Americana de Enfermagem
4. Electronic communication between health professionals in patient care: an integrative review	To analyze the scientific literature on communication by electronic means among health professionals.	Six articles were included, published from 2011 to 2016, in English. The resources were smartphone, pager and tablet. The applications used were WhatsApp, Medigram and Short Message Service (SMS). Agility, ease of use and aid in decision making were the advantages found in the use of this resource in the professionals' communication; among the disadvantages are the lack of privacy and confidentiality of information, interruptions in care and inability to use the technological resource.	Revista SOBECC
5. Sepsiscare: Mobile app evaluation in nursing care for patients with sepsis*	To evaluate a mobile app for the prevention, identification and nursing care of the septic patient.	The SepsisCare application was developed on the Mobincube® platform, with 28 screens, which, in the nurses' conception, is an important resource for nurses' practice in caring for patients with sepsis.	Cogitare Enfermagem
6. Mobile applications in health: characterization of the scientific production of Brazilian nursing	To identify the development of mobile health applications in the Brazilian scientific production of nursing dissertations and theses.	Sample with 24 studies, 19 master's dissertations and 5 doctoral theses. Varied themes, with a predominance of studies in intensive care, adult and elderly health and also the systematization of nursing care. Of the productions, 16 (66.7%) focused on assistance, six (25%) focused on education and two (8.3%) focused on management. It was possible to identify that the Brazilian nursing is scientifically advancing in the field of mobile technology and appropriating this resource to produce applications that bring results that strengthen care practice, education and health management, despite being scarce in relation to the context of international production.	Revista Eletrônica de Enfermagem

7. Emergency Preparedness and Disaster Response: There's An App for That	With an ever-expanding catalog of apps related to disaster medicine, it's difficult for the lay public and response teams to know where to look for effective smartphone apps. A systematic review of these apps was performed.	This survey revealed 683 apps and was reduced to 219 based on relevance to the field. The Community Emergency Response Teams and FEMA had the best apps for National Disaster Medical System responders. The Centers for Disease Control and Prevention (CDC) had high-quality apps for first responders in a variety of fields. The National Library of Medicine's Wireless Information System for Emergency Responders (WISER) app was a great app for hazardous materials responders. The American Red Cross had the most useful apps for natural disasters. Several valuable apps for public use, including alerting apps, educational apps, and a well-crafted regional app, were also identified.	Prehospital and Disaster Medicine
8. Mobile technologies in the field of nursing	To identify studies in the literature on mobile technologies in the nursing field.	Fifteen articles were selected, which addressed mobile technologies in the field of nursing for nurses, undergraduates and patients. The results indicate the need for further studies on mobile technologies in the field of Nursing, especially with undergraduates.	Revista Brasileira de Enfermagem
9. "Safe Bathing" multimedia application on a mobile platform as a technology for bedside care for infarcted patients: construction and validation	To validate a multimedia application on a mobile platform to carry out a safe bed bath for infarcted patients.	The Safe Bathing application was built with 4 modules, being validated by the IVC with excellent percentages of 0.93 agreement among experts for validating its content. Fleiss' Kappa was classified, in most of the items evaluated, as good and excellent, which is 0.80 to 1.00 according to the Kappa classification.	Universidade Federal Fluminense - Mestrado Profissional em Enfermagem Assistencial
10. Persuasive Technology in Nursing Education About Pain	To measure the quality of a virtual mobile learning object, measure the mental workload of the educational intervention, and assess learning outcomes.	Three simulated clinical scenarios make up m-OVAdor, allowing a simulated assessment of acute pain through interactive tools. The technology met the quality criteria for educational software, with low mental workload, demonstrating a significant strategy for learning about pain among nursing students.	Stud Health Technol Inform

Fonte: Ferreira, et al. (2021).

The development of mobile applications for health promotion within graduate nursing programs in Brazil was identified in the literature, mainly in master's theses. This is justified by the academic interest in implementing innovation in other health services, whether public or private. With that and in the composition of the present study, theses and articles with themes extracted from master's theses were selected, addressing the construction and validation of instruments capable of facilitating the nursing processes and the systematization of assistance, reinforcing the relevance of the theme under study.

Nursing, as well as other professional categories, is looking for technological improvement and its insertion in the work environment, since it promotes quality in the care and comfort for the patient, his family and the whole team, as it allows a quick, individual and safe. However, considering that such advances require different and complex adaptations, in addition to strengthening skills, it is up to the professional to revolutionize and, mainly, to recycle their customs, behaviors and habits (Guerra et al., 2020; Lima, 2019).

Therefore, for the application, developed for mobile phones, to be truly effective, it must present characteristics capable

of simplifying its handling, such as: speed, practicality, language and accessible tools, which are pleasant to the user, allowing the execution of different actions and mass availability. Therefore, to develop the application, it is necessary to think at least for which assistance context, public and purpose are intended (Guerra et al., 2020; Lima, 2019).

Studies also point out that persuasive attitudes involving nursing, being positive, aim to attract and influence the way of organizing ideas and putting them into action within the context in which it is inserted. This means that applications are not only understood as tools, but as methods of continuous learning and function improvement. It can be said, then, that nursing, as a source of information and encouragement, is able to standardize new operational protocols for safe and holistic assistance through technology (Alvarez, 2016; Guerra et al., 2020).

This adequacy of applications in health services to practice, as well as the technological expansion in the various specialties in which nursing operates, despite allowing to simplify the conducts to be performed, is still permeated by failures, mainly associated with accessibility, and by new meanings, since the person handling them may have special needs, whether related to hearing or vision, and who find in technology support for simple and less complex activities, thus requiring a new approach for their application (Almeida, 2020; Dionízio, 2017; Silva et al., 2018).

In the case of emergency services in Brazil, including those that provide mobile assistance in the state of Minas Gerais, the first contact occurs exclusively by telephone, showing limitations on access for people with special needs, especially the deaf and dumb. This technical failure in communication can lead to an increase in the waiting time for ambulances to be moved to the location or for them not to be sent, which is a crucial decision for the life of the victim in question (Rezende, 2016; Silva et al., 2018).

However, it is an avoidable situation, since there is the possibility of codifying the actions to be provided by health services, also known as assistive technology, aiming to promote improvements in basic and common activities, insertion in society and independence of the person with disability (Almeida, 2020; Rezende, 2016)

In an attempt to computerize interpersonal relationships in health services, especially in emergency services, the main objective of the applications is to ensure relevance in their application, especially at the bedside, through clear and precise language, with accessibility for all audiences and easy to handle. Thus, care will be provided quickly, safely and able to meet all emerging demands, in addition to facilitating communication between professionals (Bachmann, 2015; Mello, 2018).

In addition to the positive points, there are also concerns regarding the impacts caused by the insertion of applications to assistance, since there is a possibility of breach of secrecy and privacy of each individual, and nursing must be attentive to the principles of professional ethics and, together, guarantee to your team constant training and improvement for better adaptation in its handling (Moura, 2019).

In short, given the lack in relation to the theme, in addition to its growing expansion and complexity, it is necessary and justifies the importance of this integrative literature review.

#### **4. Conclusion**

The study allowed us to understand that the insertion of technology, more precisely the use of applications in urgent and emergency services, although little reported in the literature, causes a mixture of feelings in the daily care, since it allows autonomy and practicality, even if it is preceded by inadequate training, making full adherence impossible. Despite the limitations, mobile technologies can be great allies in the construction of knowledge and the acquisition of experience of professionals before entering the fields of practice. Still, it is worth mentioning that care, in all its dimensions, requires continuous updating, allowing a range of possibilities to expand knowledge in the area.

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