Mobile applications used in the nursing work process: integrative review

Aplicativos móveis utilizados no processo de trabalho em enfermagem: revisão integrativa

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RESUMO

Objetiva-se identificar nas evidências científicas os aplicativos móveis utilizados no Brasil para o processo de trabalho em Enfermagem. Trata-se de uma revisão integrativa, com pesquisa de estudos primários indexados na SciELO, LILACS e BDENF. Foram selecionados 11 artigos científicos, dois quais cinco apresentaram foco no ensino, dois na segurança do paciente, um na enfermagem psiquiátrica, dois na atuação do enfermeiro na Unidade de Terapia Intensiva e um na auditoria de enfermagem. Houve um crescimento de pesquisas associadas à utilização de aplicativos multimídias em plataforma móvel no processo de trabalho em Enfermagem, embora ainda seja reduzido o número de estudos desenvolvidos. Constatou-se por meio dos estudos que os aplicativos móveis na Enfermagem foram utilizados como suporte rápido e eficaz na obtenção de informações em qualquer ambiente geográfico. Conclui-se sobre a necessidade de estudos de validação dos aplicativos por especialistas na área de Enfermagem e informática, além da produção de estudos complementares, com vistas ao aprofundamento desse tema. Espera-se que os enfermeiros sintam-se estimulados à produção científica nessa temática, ao considerar os resultados significativos encontrados nesta pesquisa para o ensino e prática profissional da equipe de Enfermagem.

Palavras-chave: Enfermagem; Processo de Enfermagem; Tecnologia; Trabalho.

ABSTRACT

The aim is to identify in the scientific evidences the mobile applications used in the work process in Nursing. It is an integrative review, with research of primary studies indexed in: SciELO, LILACS and BDENF. Eleven scientific articles were selected, of which five focused on teaching, two on patient safety, one on psychiatric nursing, two on the nurse's work in the Intensive Care Unit and one on the nursing audit. There has been a growth of research associated to the use of multimedia applications in mobile platform in the work process in Nursing, although the number of studies developed is still reduced. It was verified through the studies that the mobile applications in Nursing were used as fast and effective support in obtaining information in any geographical environment. It is concluded that there is a need for validation studies of the applications by specialists in the field of Nursing and computer science, as well as the production of complementary studies, in order to deepen this theme. Nurses are expected to feel stimulated to scientific production in this subject, when considering the significant results found in this research for the teaching and professional practice of the Nursing team.

Keywords: Nursing; Nursing Process; Technology; Job.

NOTA

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INTRODUCTION

Mobile technology is a growing reality in society. Therefore, it influences a new profile of information and interactivity with its users. Business Insider data revealed that there are around 1.4 billion smartphones worldwide, which allows you to indicate a ratio of two devices for every nine people. With the advancement of technology, it has been possible to see a transformation in mobile communication, commerce, the financial and entertainment sector, as well as in the health field [1-3].

In the context of the development of new health technologies, especially the mobile applications, a new area has been promoted: electronic health. This can be defined as the use of information that allows employees greater control of risk situations, speed in decision making and agility in performing more effective actions in critical situations. The current relevance of this theme has led the World Health Organization (WHO) to create a World Observatory on Electronic Health and promote the issue at the level of action strategy [4,5].

The health field has experimented with a new model to improve care delivery and teaching, where the use of mobile applications helps to practice the consultation, diagnosis and follow-up of patient care, without restriction of time and space[6].

In the area of Nursing, it is considered that the tools provided by Information and Communication Technologies (ICTs) associated with clinical, educational and management practice can be used to optimize results and reduce health risks, as well as to understand factors determinants that promote health or lead to disease[7-9]. Therefore, the use of mobile devices in the work process in Nursing has been gaining space as updating and modernization, which allows a closer approximation of the patient with the professional, for breaking communication barriers and developing an immediate affinity in the technologically accessible area.

In view of the above, it is important to emphasize that the mobile applications used in the Nursing work process are considered as an advance in digital technology, because it allows to offer an experience closer to the real situation and favors the visualization of the practical handling, which allows to constitute a tool of assistance and pedagogical support for the construction of knowledge and health practices[10].

In this scope, the objective of the study was to identify in the scientific evidences the mobile applications used in Brazil for the work process in Nursing.

METHOD

To reach the proposed objective, an integrative review of the literature was used. Integrative review is the analysis of relevant research that supports decision making and improvement of clinical practice. Six stages were carried out: the elaboration of the research question, sampling or searching in the literature of the primary studies, extraction of data, evaluation of the included primary studies, analysis and synthesis of the results and presentation of the review[11].

To guide the integrative review, the following question was asked: "What is the scientific evidence on the mobile applications used in the Nursing work process?".

The search for primary studies was performed according to the criteria and manuals of each database. We used controlled descriptors (Nursing Science, Nursing Process, Technology and Work) and the uncontrolled descriptors (keywords) - Application and Mobile Application, combined with Boolean operators (AND and OR). The descriptors were searched in the period between January and February of 2018, in the virtual library and databases: Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature in Health Sciences (LILACS) and Database of Nursing (BDENF).

The search of the selected studies in the referred databases took place manually. The descriptors were combined in different ways to ensure a broad search, in an environment recognized by the CAPES journal portal, whose combinations are described in Table 1.

The inclusion criteria of the delimited primary studies were those that portrayed the mobile applications used in Brazil for the Nursing work process, published from January 2013 to February 2018, and with the following classifications: individual study with experimental design, study with non-experimental design, such as descriptive correlational and qualitative research or case studies, report of cases or data obtained systematically, of verifiable quality or evaluation data of programs published in the Portuguese, English and Spanish languages. Therefore, levels of evidence 2, 4 and 5 [12,13] were considered. The exclusion criteria established were: informal case reports, book chapters, dissertations, theses, reports, news, editorials, non-scientific texts.
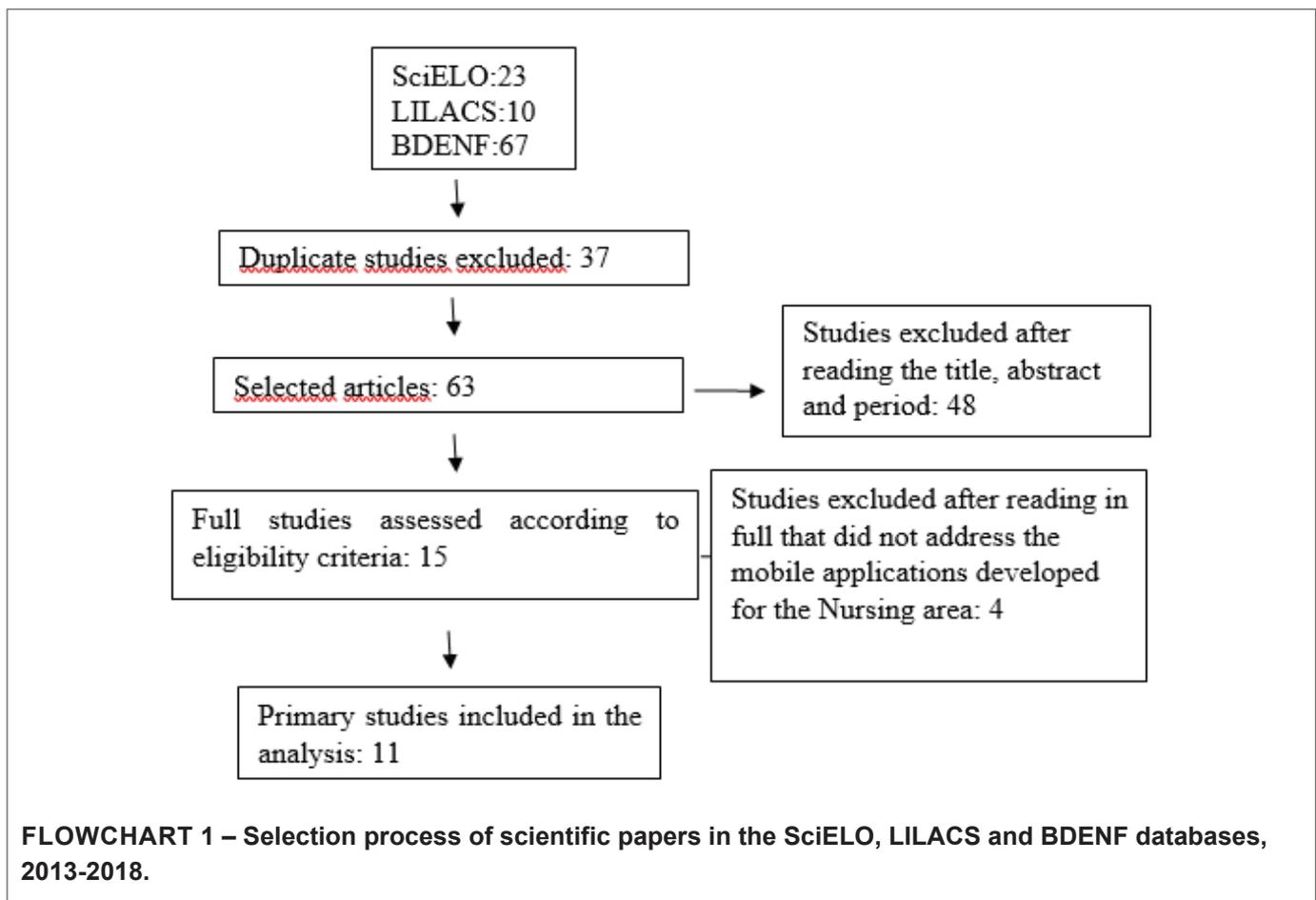
From the results found after the research of the studies and strictly complying with the inclusion and exclusion criteria presented, the title and the abstract of each scientific article were read in order to verify their adequacy with the guiding question of the present investigation. selection process is presented in Figure 1.

The selection process and method of agreement of the studies was developed by two reviewers independently, who selected the studies according to the eligibility and inclusion criteria.

Data extraction from the eleven selected scientific articles was performed using a form containing the characterization of the scientific studies according to the information: article title, year of publication, study site, database, methodological outline and level of evidence.

TABLE 1 – Crossings between the descriptors used in the SciELO, LILACS and BDENF databases, 2013-2018.

Database	Combinations	No.
SciELO	Nursing AND Application AND Technology	15
LILACS	Nursing Process AND Mobile Application OR Nursing	4
BDENF	Nursing AND Application	11
SciELO	Nursing AND Mobile Application AND Work OR Technology	7
LILACS	Nursing AND Application AND Mobile Application	3
BDENF	Work AND Nursing AND Application	3
SciELO	Nursing Process AND Technology AND Application OR Nursing OR Mobile Application	1
LILACS	Nursing AND Mobile Application	3
BDENF	Nursing Process OR Technology AND Application	53

SciELO:23
LILACS:10
BDENF:67

Duplicate studies excluded: 37

Selected articles: 63

Studies excluded after reading the title, abstract and period: 48

Full studies assessed according to eligibility criteria: 15

Studies excluded after reading in full that did not address the mobile applications developed for the Nursing area: 4

Primary studies included in the analysis: 11

FLOWCHART 1 – Selection process of scientific papers in the SciELO, LILACS and BDENF databases, 2013-2018.

The data analysis was carried out in a descriptive way, which allowed the evaluation of the level and quality of the available evidence about the mobile applications used in the Nursing work process, as well as identifying knowledge gaps for the development of future research.

The Agency for Health Care Research and Quality (AHRQ) categorized the level of evidence of the work. The quality of the evidence is classified into six levels, namely: level 1 - meta-analysis of multiple controlled studies; level 2 - individual study with experimental design; level 3 - study with quasi-experimental design as study, without randomization with single group pre- and post-test, time series or case-control; level 4 - study with non-experimental design, such as descriptive correlational and qualitative research or studies; level 5 - report of cases or data obtained in a systematic, verifiable quality or program evaluation data; level 6 - opinion of reputable authorities based on clinical expertise or opinion of expert committees, including interpretations of non-research-based information[13].

RESULTS

Of the 11 selected articles in the thematic area of this study, two (18.2%) were published in the year 2013; one (9.1%) in 2014; two (18.2%) in 2015; four (36.3%) in 2016; and two (18.2%) in 2017. Five studies (45.4%) were carried out in São Paulo, followed by two (18.2%) in Fortaleza. The study site was not reported in one (9.1%) article.

Regarding the design of the selected studies, those of technological production with experimental approach stood out with six (54.5%) publications. Therefore, level 2 [13] is taken as scientific evidence.

From the 11 studies that were selected and included in this integrative review, Table 2 summarizes the primary studies according to the title, year of publication, place of study, design and level of scientific evidence. To better identify each selected study, an article was organized in alphanumeric sequence, starting from A1 to A11.

In order to analyze and discuss the mobile applications used in the Nursing work process, the selected studies were organized into categories by thematic adherence of each research, namely: "Studies focusing on nursing teaching"; "Studies focusing on patient safety"; "Studies focusing on psychiatric nursing"; "Studies focusing on the work of the nurse in the Intensive Care Unit (ICU)" and "Studies focusing on the nursing audit" (Table 3).

Studies focusing on nursing education

In relation to the category "Studies focusing on nursing teaching", five scientific articles were selected. Each

TABLE 2 – Characterization of selected articles according to title, year of publication, place of study, design and level of scientific evidence, 2013-2018.

No.	Title	Authors	Year	Place of study	Design	Evidence Level
A1	Oncoaudit: application development and evaluation for registered nurses	Grossi LM, Pisa IT, Marin HF.	2014	São Paulo, SP	Experimental	2
A2	Use of digital applications in the medicament calculation education for nursing	Fernandes PFG, Afio CJ, Marques FN, Gomes SM.	2016	Fortaleza, CE	Experimental	2
A3	Developing a methodology to follow the nursing egress from a Higher Education Institution	Camelo SHH, Mishima SM, Pereira MCA, Laus AM, Porto HS.	2015	Ribeirão Preto, SP	Descriptive / Exploratory	4
A4	The construction of educational software on auscultation of respiratory sounds	Melo FNP, Damasceno MMC.	2016	Fortaleza, CE	Experience report	5
A5	Evaluation of an application for decision support in the care of pressure ulcers	Tibes CMS, Cherman EA, Souza VMA, Westin UM, Mascarenhas SHZ, Évora YDM.	2015	Ribeirão Preto, SP	Descriptive / Exploratory	4
A6	Multimedia application on mobile platform for wound treatment using herbal and medicinal plants	Salomé GM, Bueno JC, Ferreira LM.	2017	Pouso Alegre, MG	Descriptive / Exploratory	4
A7	Multimedia application on mobile platform for teaching the measurement of central venous pressure	Galvão ECF, Puschel VAA.	2013	São Paulo, SP	Experimental	2
A8	Development of the TabacoQuest application for computerization of data collection on smoking in psychiatric nursing	Oliveira RM, Duarte AF, Alves D, Furegato ARF.	2016	Ribeirão Preto, SP	Experimental	2
A9	Construction of a digital application for the teaching of vital signs	Pereira FGF, Silva DV, Sousa LMO, Frota NM.	2016	Não relatado	Experimental	2
A10	Process of creating a mobile application in the area of intensive care and its applicability in nursing: an experience report.	Santana ACS, Andrade NBS, Silva JOM, Seixas ACM, Souza CM.	2017	Aracaju, SE	Experience report	5
A11	Mobile technology at the edge of the bed: computerized nursing process in intensive care from the cipe 1.0	Barra DCC, Sasso GTM.	2013	Florianópolis, SC	Experimental	2

study was related to a differentiated area of instruction, but all aimed at the visualization of patient follow-up data by nursing students.

Among the publications, a study started from the application of apps in the instruction of the calculation of medicines for nursing students, and obtained a positive influence in the learning with greater safety of the students in the implementation of the calculations of medicines[14].

Another study revealed the experience of the construction and use of an educational software for nursing students in the auscultation of respiratory sounds, with the purpose of assisting the step by step of the auscultation, its purposes, the classification of normal and adventitious sounds and the respective aesthetic characteristics. This study evidenced important contributions related to the teaching-learning of contents related to the nursing area[15].

Other studies have proposed the use of mobile technology for the teaching of vital signs and Measurement of Central Venous Pressure (CPV) for nursing students, aiming to foster a motivating and dynamic environment, integrating images and texts in an application available for mobile phones, it is a mobile and autonomous means of learning, besides the constant monitoring of the patients without the need to remain in the bed[16,17].

The last scientific article found on this thematic category revealed the implantation of an online mobile methodology to follow the graduates of the undergraduate nursing course, with the purpose of maintaining a database updated with the learning of the alumni of the Institution of Higher Education[18].

Studies focusing on patient safety

In the category "Studies focusing on patient safety", two studies were selected that included the use of mobile applications aimed at the practice of nursing in the prevention of ulcers and wounds. Mobile applications for patient safety have been developed with a focus on preventing the occurrence of adverse events in health facilities, especially for acute wounds and pressure ulcers. In one of these studies, a mobile platform with phytotherapics and medicinal plants was used in the prevention and treatment of chronic and acute wounds[19,20].

Studies focusing on psychiatric nursing

In this category, one scientific article was selected. The work presented the development of the mobile application for research on the use of tobacco among psychiatric patients accompanied by the nursing team. In this system, it was possible to identify and prevent human errors and increase the quality of data after validation during an interview. In addition, the study also allowed the automatic tabulation, which made the interviews less tiring. Its success will encourage the use of this application and other computational resources by nurses, as a research tool in the area of mental health[21].

Studies focusing on the role of the Nurse in the Intensive Care Unit (ICU)

The studies selected according to their focus for nursing in the Intensive Care Unit added two scientific papers. Among them, one presented the focus on the evaluation of Intensive Care nurses in the ergonomics and usability criteria of the Computerized Nursing Process, developed in a mobile technological device based on the International Classification for Nursing Practices, in which the practical application allowed evaluate, intervene and manage nursing care, providing greater safety, knowledge and involvement of nurses with the needs of the patient in the study.

The technology to access information through the application was developed and used in the other selected scientific article, and it was possible to access information about: ICUs, medicines used in this unit, blood gases, mechanical ventilation, scales used to assess neurological status, pressure and degree of sedation[23].

Studies focusing on the nursing audit

Finally, one scientific paper was selected according to its main emphasis in the category "Studies focusing on the nursing audit". In this category, we found an application with information that aided the auditing of drugs in hospital accounts, with emphasis on user satisfaction and usability. However, this technology had limitations due to the reduced number of evaluators. However, it was concluded about its use in the practice of nursing audit[24].

DISCUSSION

The data analyzed showed that the scientific articles published on the mobile applications used in the Nursing work process is a new and growing field. The publications found between the years of 2013 to 2018 presented higher concentrations in the year 2016, with four publica-

TABLE 3 – Classification of studies in thematic accession categories, 2013-2018.

Categories	Selected articles
Studies focusing on nursing education	A2, A3, A4, A9, A7
Studies focusing on patient safety	A5, A6
Studies focusing on psychiatric nursing	A8
Studies focusing on the role of nurses in the Intensive Care Unit (ICU)	A10, A11
Studies focusing on nursing audit	A1

tions. There has been a slight expansion of publications on the theme over the years and it is believed that this number should be even higher this year due to the popularization of smatphones and tablets.

Research emphasized that the possibility of obtaining information about patients' clinical data reliably, available at any time and place, and the granting of customized therapeutic interventions has modified the ways in which nursing services are offered. The so-called mobile health allows the opening of a growing field of action[25].

The analysis of selected scientific articles showed that the category of performance most benefited in the use of mobile applications in the work process in Nursing presented a focus on higher education. Studies have revealed that digital technologies enable innovative teaching by means of an experience closer to the real situation and visualization of practical handling, when shown as valid as a training strategy, mainly in the relation between theory and practice[17,26]. The development of apps to support health education can be highlighted as a gap to be explored as mobile technologies are increasingly common, available 24 hours and can be transported to any environment, including the classroom.

Studies have argued that the way to reduce this gap may be through the use of software to support patient follow-up. Decision support systems, in turn, are directly responsible for improving the performance of health professionals, and, consequently, for the quality of the offered health service[27-29].

Therefore, the role played by mobile applications represents a pedagogical support tool for the construction and application of theoretical and practical knowledge and allows to provide an environment in which the Nursing student can exercise reflection and action[14,15,17].

Research revealed that students and nursing professionals approved the use of mobile applications, for the advantage of being used in a variety of environments, being made available on websites and downloads, which allows their access and use by any individual[16].

It is worth mentioning that some of the selected researches were still in the form of a prototype, and are not available for use[15,16,19]. The development possibilities for using mobile applications are numerous. However, there are several obstacles that need to be overcome: high cost, business model and marketing, multimodal capture, compliance with standards and interoperability, reliability of data collected by sensors, security and privacy of data collected[25].

With technological advances in health, especially in the process of work in Nursing, it was possible to verify that there was a change in the way of consuming and managing information. Having said this, the focus is no longer only on the physical space of a library but has been extended to the mobile applications[30-31].

A research developed in England on the habits of information consumption among residents and students in the health area, confirmed that many of the participants considered that mobile applications are a valuable tool for clinical support and educational resources[32].

Despite the low number of scientific studies developed by nursing professionals selected in this integrative review, it is possible to highlight the importance of investment in this field of research, because although this issue is still under debate, this type of technology attracts many customers in this field. This information can be proven because most of the selected scientific articles have used an experimental methodology, despite the fact that the few publications and discussions among the Brazilian journals have on this innovative subject[33].

No entanto, apesar da importância e da popularização dos aplicativos móveis utilizados no processo de trabalho em Enfermagem, além de serem um novo paradigma para a geração de evidências para melhorias no ensino, na pesquisa e na assistência, o número de pesquisas nessa temática ainda é escasso.

CONCLUSION

The scientific articles selected in this integrative review enabled us to observe a growth of researches associated to the use of multimedia applications in mobile platform in the process of work in Nursing, although the number of studies is still reduced. Nursing needs to be increasingly closer to the development of new technologies associated to scientific research, since they allow a field to be invigorated and innovated in practice and teaching, in order to reduce the professional exercise linked to the crystallized memorization and to value the clinical evidence available.

As a facilitating factor, it was possible to verify in this study that the mobile applications in the work process in Nursing were used as fast and effective support in obtaining information in any geographical environment through the use of a very common resource in the current daily life.

As challenges, the fact that mobile applications have been used for only a few areas belonging to the Nursing work process stands out. In addition, validation studies of the applications by specialists in the area of Nursing and informatics, besides the need of production of complementary studies, with a view to the deepening of this subject become necessary.

Nurses are expected to feel stimulated to the scientific production in this subject, when considering the significant results found in this research for the teaching and practice of the work process of the Nursing team.

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