THE IMPLEMENTATION OF ELECTRONIC RECORDS RELATED TO THE NURSING PROCESS: INTEGRATIVE REVIEW

A implementação dos registros eletrônicos relacionados ao processo de enfermagem: revisão integrativa

La implementación de los registros electrónicos relacionados con el proceso de enfermería: revisión integrativa

Product of the dissertation "Implementation of electronic records regarding nursing diagnoses" of Professional Master in Nursing of the Federal University of Health Sciences of Porto Alegre in 2017.

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ABSTRACT

Objective: the objective of this study was to identify which strategies are being used in the implementation of electronic records related to the nursing process, in PubMed, Scopus and Web of Science databases. **Method:** this is an integrative review in which the descriptors used were electronic health records and nursing process. **Results:** the data found indicate that the studies were mostly quantitative research, published in the journal Nursing informatics (Studies in Health Technology and Informatics) developed in universities and in the American continent. **Conclusion:** the data indicate that most of the researches are referring to the usability of electronic health records. Other aspects addressed were the weaknesses and perspectives associated with the use of electronic registration, as well as the nursing process in computerized systems.
Descriptors: Electronic health records ; Nursing records ; Nursing process.

RESUMO

Objetivo: o estudo objetivou identificar quais estratégias estão sendo utilizadas na implementação de registros eletrônicos relacionados ao processo de enfermagem, nas bases de dados: PubMed, Scopus e Web of Science. **Método:** trata-se de uma revisão integrativa na qual os descritores utilizados foram *electronic health records* e *nursing process*. **Resultados:** Os dados encontrados indicam que os estudos em sua maioria foram pesquisas quantitativas, publicadas no periódico *Nursing informatics* (*Studies in Health Technology and Informatics*) desenvolvidas em universidades e no continente americano. **Conclusão:** os dados apontam que a maior parte das pesquisas são referentes a usabilidade do registro eletrônico em saúde. Outros aspectos abordados foram as fragilidades e perspectivas associados ao uso do registro eletrônico, bem como o processo de enfermagem em sistemas informatizados.
Descritores: Registros eletrônicos de saúde; Registros de enfermagem; Processo de enfermagem.

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RESUMÉN

Objetivo: el estudio tuvo como objetivo identificar qué estrategias están siendo utilizadas en la implementación de registros electrónicos relacionados al proceso de enfermería, en las bases de datos: PubMed, Scopus y Web of Science. **Métodos:** se trata de una revisión integrativa en la cual los descriptores utilizados fueron electronic health records y kind process. **Resultados:** los datos encontrados indican que los estudios en su mayoría fueron investigaciones cuantitativas, publicadas en el periódico Nursing informatics (Studies in Health Technology and Informática) desarrolladas en universidades y en el continente americano. **Conclusiones:** los datos apuntan que la mayor parte de las encuestas son referentes a la usabilidad del registro electrónico en salud. Otros aspectos abordados fueron las fragilidades y perspectivas asociadas al uso del registro electrónico, así como el proceso de enfermería en sistemas informatizados. **Descriptores:** Registros electrónicos de salud; Registros de enfermería; Proceso de enfermería.

INTRODUCTION

Planning, organizing and executing the nursing team actions in order to promote, prevent, recover and rehabilitate the health of the individual is the essence of the nurse's work and is called Nursing Care Systematization (NCS). The nursing process sustains the NCS, being organized into five interrelated, interdependent and recurrent stages, as follows: data collection or nursing history; nursing diagnosis; nursing planning; implementation, and evaluation.[1] The Resolution No. 358/20091 fro the *Conselho Federal de Enfermagem (COFEN)* [Federal Nursing Council], which repealed the Resolution No. 272/2002, reinforces the need to implement NCS in health services and included the responsibility of nursing technicians and assistants in the nursing process. Nonetheless, health services have difficulties, mainly, with the implementation of the stages of the nursing process and its records, where this is a kin of fragility that directly impacts the quality of care provided.[2]

On the other hand, health institutions have sought to implement electronic records instead of paper medical records. However, the implementation of electronic records has presented difficulties such as the fact that nurses prioritize day-to-day actions to the detriment of documentation, as well as the need for orientation by the permanent education sector, training and, lack of knowledge about standardized terminologies.[2,3,4]

Given the aforementioned, in order to base knowledge on the different forms of implementation of electronic records based on the nursing process, in view of difficulties and facilities, the present study was developed with the aim of identifying what strategies have been used in the implementation of electronic records related to the nursing process. The guiding question was as follows: what has been produced scientifically about both the electronic records implementation and the nursing process?

METHOD

Herein, an integrative review was used as a methodology, a strategy that makes it possible to synthesize findings from primary studies developed through different research designs.[5] Therefore, results are synthesized without hurting the epistemological affiliation of the included empirical studies.[6] According to this followed by the following steps: 1) identification of the theme and definition of the guiding question; 2) establishment of inclusion and exclusion criteria; 3) definition of the information to be extracted from the articles; 4) evaluation and categorization of included studies; 5) interpretation of results; 6) presentation of the review synthesis. In order to guide this research, the guiding question was then formulated: what has been produced scientifically about both the electronic records implementation and the nursing process?

The databases used in the search were PubMed, Scopus, and Web of Science. We used the descriptors electronic health records and the nursing process, as well as the Boolean operator 'and' between them. Inclusion criteria were papers published in English, Portuguese and Spanish; in the form of original articles and reviews with summaries available in the databases, also including the period from 2012 to 2016. The last 5 years have been considered in view of the need to seek updated references and recent technological strategies. As exclusion criterion, it was considered a publication not available in full, Theses and Dissertations.

Data collection was done in January 2017, making use of an instrument constructed specifically for this study, based on the research of Brazilian nurses[6] composed of the following items: title, authors, journal, year, country, language, either linked or proposed institution, goal, method and main results of the study. The search was performed in an orderly fashion in the PubMed, Scopus, and Web of Science databases, so items indexed in more than one database were selected on the first search.

The articles were also evaluated on the level of evidence, which characterizes the way evidence is classified hierarchically and according to the methodological approach adopted.[5] Thus, the evidence results from: level 1 (systematic review or meta-analysis of multiple randomized clinical trials); level 2 (well-designed randomized clinical trials); level 3 (well-designed clinical trials without randomization); level 4 (case-control and cohort studies); level 5 (systematic reviews of descriptive and qualitative studies); level 6 (descriptive studies or with a qualitative approach); level 7 (expert opinion).

All abstracts for selection were read, but some articles that met the selection criteria were not available in full. Strategies of analysis, synthesis, and presentation of results, main concepts, as well as identification and categorization of the main ideas and themes and

verification of their validity and authenticity, were used. Hence, the data were initially organized from the absolute frequency (n) and percentage (%), and later distributed by the following themes: the usability of electronic health records, fragilities and perspectives associated with the use of electronic health records and the process of nursing in computerized systems.

RESULTS AND DISCUSSION

Considering the 77 articles that were found in the examined databases, 39 of these are available online. They were selected according to the guiding question and reading the abstract 24 articles. **Table 1** shows the distribution of the items according to the examined databases.

Table 1 – Distribution of the items found, available and selected by databases. *Porto Alegre* city, *Rio Grande do Sul* State, 2017.

Database	Electronic health records/ Nursing process	Available in full	Selected (n)	%
PubMed	27	14	11	45.83%
Scopus	40	23*	11	45.83%
Web of Science	10	2	2	8.33%
Total	77	39	24	100

*7 repeated items, which were already indexed in PubMed database.

Concerning the publication year, one-third of the articles were published in the last year and since 2013 there has been an increase in publications concerning electronic records in health and nursing process. Among the languages of publication, only one article was published in Portuguese, the other in English.

Among the countries of origin, most of the studies were developed in the United States, followed by Australia and South Korea, both with 3 articles each. The other studies came from Switzerland, Finland, Argentina, Slovenia, the Netherlands, Canada, Thailand, Brazil, Norway, and Germany. Nursing informatics was the most studied journal (41.66%), followed by the Nursing Clinics of North America (16.66%) and the International Journal of Medical Informatics (12.50%). The other journals published only one article each.

The either proposed or linked institutions that were also described in the publications were mostly universities (70.83%), hospitals or clinics (16.66%), scientific events (8.33%) and only an article financed by industry. Regarding the methods used, it is emphasized the quantitative research with 41.66% of the articles analyzed. Qualitative research and experience reports appear with 20.83% of the publications.

The articles selected in the review were gathered by themes, and the theme that presented a larger percentage of articles was the usability of the electronic health record (50%). It is important to consider the percentage presented by the category the nursing process in computerized systems, having its representation with 33.33% (**Tables 2 and 3**).

Table 2 – Items according to their theme. *Porto Alegre* city, *Rio Grande do Sul* State, 2017.

Theme	n	%
The usability of electronic health records	12	50.00
The nursing process in computerized systems	8	33.33
Fragilities and perspectives associated with the use of electronic health records	4	16.66
Total	24	100

Considering the evidence level, the category of usability of the electronic health record was the only one to present articles with level 1, two articles of a systematic review, while in total, the level of evidence 4 was the one that predominated with the representativeness of 14 articles (**Table 3**).

Table 3 – Articles divided by theme and classified according to their evidence level. *Porto Alegre* city, *Rio Grande do Sul* State, 2017.

Theme	Article's title	Evidence level
The usability of electronic health records	Impacts of structuring nursing records: a systematic review	1
	Technological Advances in Nursing Care Delivery	1
	Standardized Mapping of Nursing Assessments across 59 U.S. Military Treatment Facilities	4
	Comparing usability testing outcomes and functions of six electronic nursing record systems	4
	Factors Associated with the Timeliness of Electronic Nursing Documentation	4
	Development of the Quality of Australian Nursing Documentation in Aged Care (QANDAC) instrument to assess paper-based and electronic resident records	4

Theme	Article's title	Evidence level
The usability of electronic health records	Automatic Generation of Nursing Narratives from Entity-Attribute-Value Triplet for Electronic Nursing Records System	4
	Evaluating the Feasibility of Using Mobile Devices for Nurse Documentation	4
	Percepção de enfermeiros em relação à implementação da informatização da documentação clínica de enfermagem	4
	Electronic Nursing Documentation: Patient Care Continuity Using the Clinical Care Classification System (CCC)	5
	Embedding Nursing Informatics Education into na Australian Undergraduate Nursing Degree	5
	Technology and Monitoring Patients at the Bedside	5
The nursing process in computerized systems	Effects on the Quality of the Nursing Care Process Through an Educational Program and the Use of Electronic Nursing Documentation	3
	A survey of nursing documentation, terminologies and standards in European countries	4
	The quality of paper-based versus electronic nursing care plan in Australian aged care homes: A documentation audit study	4
	Outcome Calculations Based on Nursing Documentation in the Firt Generation of Electronic Health Records in the Netherlands	4
	ICNP Catalogues for Supporting Nursing Content in Electronic Health Records	4
	Evaluation of the national nursing model and four nursing documentation systems in Finland – Lessons learned and directions for the future	4
	Graph Based Model to Support Nurses' Work	5
	Computerization of a Nursing Chart According to the Nursing Process	5
Fragilities and perspectives associated with the use of electronic health records	Nursing Documentation: An Evaluation of an Action Research Project	4
	Identifying Barriers for Implementation of Computer Based Nursing Documentation	4
	Transitioning Care Across Various Health Care Organizations	5
	Technology and the Bedside Nurse An Exploration and Review of Implications for Practice	5

Through the integrative review it is possible to identify some strategies that are being used in the implementation of electronic records related to the nursing process. The scientific production in this area is growing, which may be related to the fact that the nurse professional is appropriating this subject and seeking knowledge, since the reality of computerized systems in health institutions is no longer a choice, but rather the rule.

The findings indicate that the studies were mostly quantitative research, published in the journal Nursing informatics, and carried out in universities and in the American continent. The data indicate that most of the researches are referring to the usability of electronic health records. This is due to the fact that this theme is still a challenge and not explored not only by nurses, but by health professionals as a whole, even though we are currently surrounded by technology.[7] Nevertheless, other aspects have been addressed, such as the frailties and associated perspectives to the use of the electronic register, as well as the nursing process in computerized systems, which will be discussed next.

The usability of electronic health records

Increasingly, nurses are working in a high-tech environment and must use resources to make patient care excellent. Some examples of these features in which electronic health records are inserted are clinical decision-making systems, computerized prescriptions, radiofrequency identification data, smart pumps and callhealth.[8] It is known that not all institutions have these resources, meanwhile, this does not mean that nurses cannot undertake within their workplace suggesting, constructing or implementing a new technology.

When implementing a certain technology, one of the factors to be considered is user satisfaction, which according to the literature, can be achieved by trust, utility, efficiency and multidisciplinary teamwork. In fact, with the electronic

health record, everything that was previously handwritten is passing or has already passed into a computerized version. In this process, patient and family become part of the decision-making process around the care plan, just as portable mobile devices will be gateways for individual health care.[9]

In Argentina, the use of mobile devices was evaluated in the nursing team of a large hospital, it was verified that the quality of clinical documentation increased as well as patient care. It is also highlighted that the need for paper notes has been discarded and the ongoing training on the use of information and technologies was indispensable in the implementation.[10] Thus, it is demonstrated how paper handbooks can be replaced by other technologies without loss to the care.

A qualitative research that sought to understand the perception of nurses in a pilot test with a software related to the nursing process, points out that the favorable aspects in nurses' viewpoint were as follows: the participative administration policy and the organizational culture adopted in the institution, the participation of nursing assistants in software development, as well as clinical reasoning and decision making that are more appropriate to each patient. The software in question has brought benefits such as improving the time spent on documentation, eliminating redundancies, improving team communication time, optimizing access to information, and providing information to the multidisciplinary team.[11]

An innovative nursing documentation project in Bangkok, Thailand, demonstrated a continuity of patient care between nursing patient ratings and care plans using the Clinical Care Classification (CCC) Classification System.[12] Another study in the Asian continent developed and assessed a natural generation language to fill nursing narratives using detailed clinical models. It was noticed that in generating narratives it is possible to improve the semantic interoperability of nursing data, in other words, the registers.[13] Therefore, it is evident that there is concern in evaluating the quality of nursing records, since researchers have sought to create instruments for this.[14]

Different authors corroborate that the use of the electronic record optimizes time,[8, 10, 11] on this question we investigated the factors associated with punctuality in the electronic documentation of nursing in South Korea and it was found that this was often completed outside of working hours, as well as the fact that new nurses are unfamiliar with the system and need support.[15]

A study that aimed to describe the main impacts of different data structuring methods used in nursing records, found that the use of the standardized nursing language increased the descriptions of interventions and the results,[16] which contributes to a more adequate assistance to the patient's needs. On the other hand, in the creation of an interoperable set of measures of evaluation of nursing flow chart in the scope of the military treatment, more

than half of the mapped data did not have standardized terminological representations, which the researcher points out as fragility and makes recommend a future work for to develop the model of the nursing process in this system.[17] Still, in relation to the standardized nursing language, it is proved how it facilitates the daily workflow and how the reuse of the data associates to the continuity of care.[16]

There are concerns related to the use of informatics in nursing also for undergraduate courses. Australian study reports the process used by a university to integrate computer science throughout the undergraduate nursing curriculum in which it was recognized how most nurses lack information technology skills and uses as sources of information other people including colleagues, for instance, rather than using evidence-based resources. These practices may threaten patient safety and contribute to the reduction of the quality of patient outcomes.[7] Still, in the area of education, it is suggested that nurses need more training to benefit from the standardized nursing language,[16] which has been used in association with the use of the electronic record.

The usability of electronic nursing records is still not well known and several studies on the performance of electronic records show distinct results.[9,12,18] In other words, the development of health promotion applications, for example, could maintain control of the physical activity, dietary intake and sleep patterns, but their use will not replace the follow-up of a health professional such as the nurse, because even if the evaluation mode is allied to technology, perception, observation, education and even physical examination need the vision and human intervention of the professional.

Moreover, the use of technology in electronic health records is not simply replacing what was documented on paper, but tailoring models, adding tools and especially understanding usability problems and differences can help designers and implementers when planning and develop products that require the use of electronic health records.

Fragilities and perspectives associated with the use of electronic health records

Data management and analysis of the large data contained in electronic health records will result in information and have great potential to generate a new standard of knowledge source.[19] So, it is relevant to identify weaknesses in order to contribute to the improvement of this management.

Norwegian cities that in the health institutions have had their electronic records for more than fifteen years have presented the following weaknesses: lack of precision and quality, complicated documentation process, conflicting interests, lack of functionalities.[20] The main barriers,

however, considering [11] German hospitals, the lack of motivation, insufficient technology for data collection at the bedside, poor financial benefit at a high cost, poor software performance, insufficient hardware, and lack of knowledge about the programs.[21] Other American research reports: unintended consequences, such as dependence on technology, strong emotional reactions, interruptions to the workflow. Privacy violations, for instance, may cover protected information left on a computer for unauthorized access to health records. Nonetheless, this same study recommends keeping the patient at the center of focus in order to avoid distraction and time consumption.[19]

The voice of the care nurse is cited as fundamental to understand what data need to be translated into actionable information and how this information should be communicated in the context of patient care.[19] This is in line with the professionals' account of an electronic records implementation process in health that point to the need for a clear and visible leader important to success, as well as the importance of collaboration and involvement by policymakers, providers of electronic health records and health professionals, as well as the use of articles based on evidence.[20]

The projections with the use of electronic health records are that there is a greater sharing of information; error reduction; improvement of interaction between patients and professionals; readability promotion; more complete billing documentation; enhancement of patient privacy and safety; increased productivity; and cost reduction.[22] Thus, nurses must be involved in all stages of this redefinition by documenting it, in order to ensure that the future course of technology in patient care is directed by nurses and not nurses. Therefore, it should be taken into account that the insertion of electronic health records is part of the transition of care and may contribute with information interconnected between the different levels of health care.

The nursing process in computerized systems

A survey conducted in 20 European countries, most of which interviewed from academia, research or nursing education, found that standardized nursing diagnoses are used in computerized systems in only three countries (Andorra, Austria and Switzerland), five do not use any nursing diagnosis and the others use to some degree. The North American Nursing Diagnosis Association (NANDA), Nursing Interventions Classification (NIC) and Nursing Outcomes Classification (NOC) taxonomies are the most widely used, however, they require translational and cultural validations to be implemented.[23] In contrast to the previous study, Australia, recent research notes that there is a tendency to omit the nursing or diagnostic problem. This research compared electronic records and paper records, verifying that the content quality of the nursing process does not vary greatly from one to the other.[24]

A retrospective audit makes it difficult for the nurse to know how to transfer the patient's own reasoning process in the standardized language, which defines the diagnoses, results, and interventions.[25] Bearing this in mind, it is evident the need to promote knowledge about the nursing process for the professionals, considering that nursing interventions, established early to solve nursing diagnoses, have an effect on hospital efficiency, in other words, they impact the hospitalization time as well as the financial expenses generated.

The solutions to a nursing problem are abstractly defined recommendation pathways through their concepts of domain, instances, and relationships, which presented a graphics-based model to support the work of nurses, even though it still has to be tested more in the practice.[26] In Finland researchers in the field of computer science report the variability, complexity, and richness of the different domains of nursing and how this should be considered being inserted into an information system.[27]

An interesting example is a Swiss information system in which when the patient's information is documented in an electronic report, the system itself finds hypothetical nursing diagnoses and automatically suggests them, making suggestions for nursing interventions and outcomes.[28] However, many of the nursing diagnoses suggested were not selected by the nurses, which is explained by a failure of the decision support system, which the study suggests to explore in future studies. Structural and environmental barriers are still cited, such as high personnel turnover, management priorities changes, insufficient time for reflection and documentation, speed and accessibility of the computer.

The computerization of a nursing framework according to the nursing process describes how to reach the last version to be implanted, it required the development and changes of organizational paradigms.[10] It is necessary to clarify and exemplify for both managers and nurses about the importance of clinical decision support, and repositories for the reuse of clinical data,[29] as well as quality assessment, research, management decisions and policy development involving the inclusion of nursing taxonomies in computerized systems.

Nevertheless, there is a pronounced challenge to associate electronic health records with the nursing process. But, with studies in the literature that show models of success, it is known of the possibility through a rigorous planning and execution. Hence, it is essential to consider the standardized nursing language as a means of representing nursing knowledge,[14] and in order to accomplish that, it is important to pursue its dissemination in electronic platforms and also as nurses' daily work tool.

CONCLUSION

With the accomplishment of this study, it is clear the concern of researchers around the world with the usability of the health electronic records. Likewise, initiatives to associate the nursing process with information systems. Electronic health records are present in mobile devices, clinical decision systems, callhealth systems, radio frequency identification data, drug control systems, intelligent infusion pumps, among others. Therefore, the nurse must seek computer skills in order to contribute to the improvement and creation of technologies. On the other hand, the nursing process needs to be continually worked on in formations and educational activities so that nurses feel safe about clinical judgment and reasoning.

It is suggested that other researches in the areas of informatics and nursing be performed, deepened and disseminated, in order to guide nursing professionals in the decision-making and planning of actions aimed at electronic health records. Hence, this integrative review may support projects and attempts to implement electronic health records, especially those referring to nursing, in order to facilitate and make feasible the optimized care processes.

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**Disclosure: The authors claim
to have no conflict of interest.**