

## Assessment of an electronic system for clinical nursing documentation\*

*Avaliação de sistema eletrônico para documentação clínica de enfermagem*

*Evaluación de un sistema electrónico para la documentación clínica de enfermería*

Heloisa Helena Ciqueto Peres<sup>1</sup>, Antônio Fernandes Costa Lima<sup>2</sup>, Diná de Almeida Lopes Monteiro da Cruz<sup>3</sup>, Raquel Rapone Gaidzinski<sup>4</sup>, Neurilene Batista Oliveira<sup>5</sup>, Diley Cardoso Franco Ortiz<sup>6</sup>, Michelle Mendes e Trindade<sup>7</sup>, Rosângela Tsukamoto<sup>8</sup>

### ABSTRACT

**Objective:** To present the evaluation of an electronic system for documenting the nursing process (NP) from the perspective of nurse users. **Methods:** This exploratory, descriptive study was conducted with 16 nurses at the University Hospital at the University of São Paulo. The nurses assessed modules and system screens of the Electronic Documentation System of the Nursing Process of the University of São Paulo (PROCEnf –USP) judging visual comfort, handling, clarity and completeness of documentation, objectivity and adequacy of the information content of the nursing record in clinical and surgical units. **Results:** The majority of the nurses evaluated the functional characteristics of the PROCEnf-USP as excellent or very good, highlighting the clinical reasoning support for decisions about diagnoses, outcomes and nursing interventions. All positioned themselves favorably to the implementation of PROCEnf-USP. **Conclusion:** The results of the evaluations showed that the nurses are encouraged to acquire new technical skills and technology, with the adoption of PROCEnf-USP, for the documentation of the NP in the institutional reality. **Keywords:** Nursing informatics. Nursing process; Evaluation

### RESUMO

**Objetivo:** Apresentar a avaliação de um sistema eletrônico para documentação do processo de enfermagem (PE) na perspectiva de enfermeiras usuárias. **Métodos:** Estudo exploratório, descritivo realizado com 16 enfermeiras do Hospital Universitário da Universidade de São Paulo. As enfermeiras avaliaram módulos e telas do sistema Sistema de Documentação Eletrônica do Processo de Enfermagem da Universidade de São Paulo- PROCEnf-USP, julgando o conforto visual, manuseio, clareza e abrangência da documentação, objetividade das informações e adequação do conteúdo ao registro de enfermagem em unidades clínico-cirúrgicas. **Resultados:** A maioria das enfermeiras avaliou as características funcionais do PROCEnf-USP, como excelentes e muito boas, destacando o suporte ao raciocínio clínico ao apoiar decisões sobre diagnósticos, resultados e intervenções de enfermagem. Todas se posicionaram favoravelmente à implementação do PROCEnf-USP. **Conclusão:** Os resultados das avaliações mostraram que as enfermeiras estão estimuladas a adquirir novas habilidades técnicas e tecnológicas, com a adoção do PROCEnf-USP para a documentação do PE na realidade Institucional.

**Descritores:** Informática em enfermagem; Processos de enfermagem; Avaliação

### RESUMEN

**Objetivo:** Presentar la evaluación de un sistema electrónico para la documentación del proceso de enfermería (PE) en la perspectiva de enfermeras usuarias. **Métodos:** Estudio exploratorio, descriptivo realizado con 16 enfermeras del Hospital Universitario de la Universidad de Sao Paulo. Las enfermeras evaluaron módulos y pantallas del Sistema de Documentación Electrónica del Proceso de Enfermería de la Universidad de Sao Paulo – PROCEnf-USP, juzgando el confort visual, manipulación, claridad y extensión de la documentación, objetividad de las informaciones y adecuación del contenido al registro de enfermería en unidades clínico-quirúrgicas. **Resultados:** La mayoría de las enfermeras evaluó las características funcionales del PROCEnf-USP, como excelentes y muy buenas, destacando el soporte al raciocinio clínico al apoyar decisiones sobre diagnósticos, resultados e intervenciones de enfermería. Todas tomaron posición favorable respecto a la implementación del PROCEnf-USP. **Conclusión:** Los resultados de la evaluaciones mostraron que las enfermeras están estimuladas para adquirir nuevas habilidades técnicas y tecnológicas, como la adopción del PROCEnf-USP para la documentación del PE en la realidad Institucional.

**Descriptorios:** Informática aplicada a la enfermería. Proceso de enfermería. Evaluación

\* Study conducted at the University Hospital of São Paulo (HU-USP) – São Paulo (SP), Brazil.

<sup>1</sup> Associate Professor. Professional Guidance Department at the School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>2</sup> PhD. Professor, Department of Vocational Guidance of the School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>3</sup> Professor. Department of Medical-Surgical Nursing, School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>4</sup> Professor, Department of Vocational Guidance of the School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>5</sup> Nurse of the Unit of Clinical Surgical from the Nursing Department, University Hospital (UH), University of Sao Paulo – USP – São Paulo (SP), Brazil; Graduate (Masters) in Nursing Management School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>6</sup> Masters in Nursing. Nurse Education Support Service, Department of Nursing, University Hospital (UH), University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>7</sup> Nurse of the Unit of Clinical Medicine, University Hospital (UH), University of Sao Paulo – USP – São Paulo (SP), Brasl. Graduate (Masters) in Nursing from the School of Nursing, University of Sao Paulo – USP – São Paulo (SP), Brazil.

<sup>8</sup> Master of Science. Nurse of the Unit of Clinical Medicine, University Hospital (UH), University of Sao Paulo – USP – São Paulo (SP), Brazil

Corresponding Author: **Heloisa Helena Ciqueto Peres**

Endereço: Av Dr Enéas de Carvalho Aguiar, 419, Cerqueira César. CEP 05403-000

São Paulo (SP), Brasil.

E-mail:hheperes@usp.br

Received article 02/03/2011 and accepted 17/11/2011

## INTRODUCTION

Given the complexity of professional nursing practice, the high amount of clinical information and management, the constant changes in the clinical situation of patients and technological developments, the computer is seen as an important tool to improve nursing documentation and development the nursing process (NP)<sup>(1-3)</sup>.

The nurses are seeking an automated information system that covers the NP and adds formal knowledge elements that reflect their clinical practice<sup>(4)</sup>. Consequently, these are significant challenges to the design and implementation of information systems that enhance the performance and the professional standard of nursing<sup>(5)</sup>.

The computerization of the nursing documentation is the great challenge in many parts of the world because it allows the recovery of data and information related to clinical decision making in nursing, key requirement for evidence-based practice. It will contribute to the development of research indicating the validity of the diagnostic accuracy and may expand the capacity of the nurse's clinical judgment and therefore provide improvements in the quality of nursing care<sup>(6)</sup>.

Having this perspective, a management group in the Nursing Department (ND) of the Hospital Universitário from the University of São Paulo (HU-USP), consisting of nurses, nursing teachers and computer professionals was responsible for the planning and conduct of strategies aimed at computerize the documentation of PE<sup>(7)</sup>.

The group has developed an electronic system based on the framework of harmonization of the diagnosis of North American Nursing Diagnosis Association International (NANDA-I)<sup>(8)</sup>, with assistance from the Nursing Interventions Classification (NIC)<sup>(9)</sup> and the results of the Nursing Outcomes Classification (NOC)<sup>(10)</sup>, called NANDA NIC NOC Linkages<sup>(11)</sup> (NNN), which establishes four domains and 28 classes.

The system, called PROCEnf-USP (Electronic System Documentation Process of Nursing, University of Sao Paulo), allows nurses and nursing students answer a set of 31 questionnaires branched (with three of mandatory completion), with tabulated responses that generate diagnostic hypotheses. After the choice of the diagnoses that best characterize the situation of the patient at the time of admission, the user proceeds to check their results, nursing interventions and activities<sup>(7)</sup>.

In order to implement the USP-PROCEnf and evaluate the quality of the relationship user / system, the management group planned to carry out a pilot test in units of Clinical Medicine (Cl Med) and Clinical Surgery (Cl Sur) of the HU-USP. The choice of these units was

based on the fact that they encourage the admission of adult patients and perform work processes similar to those from other hospital units, which would facilitate replication of the results obtained using the system at other units of the Hospital.

As a means to enable the successful conduct of the pilot test of the USP-PROCEnf were prepared cycles of theoretical-practical training, aiming to introduce and sensitize nurses to use, providing familiarity with the electronic system and establish improvements by means of assessments, tests, monitoring and updates of it.

## OBJECTIVE

Present the evaluation of the USP-PROCEnf for electronic documentation of nursing process in the perspective of nurses users in HU-USP.

## METHODS

This is an exploratory descriptive study conducted with the participation of nurses, representatives from all units and work shifts, users of the system in the ND of the HU-USP. Thus, 16 of the 20 nurses who integrated training programs for use of the PROCEnf-USP participate in the study, developed in the Computer Laboratory of the Institution in May and June of 2009. All of them sent their evaluations by self-report at the end of the training program on the own site, responding to an instrument prepared for this purpose.

The assessment tool was based on the quality model, according to Brazilian standard NBR ISO/IEC 9126-1 (version equivalent to International Standard ISO/IEC 9126-1) which corresponds to the quality attributes related to satisfaction and usability<sup>(12)</sup>. The instrument consisted of information concerning the profile of nurses (gender, age, education, degree, title, digital fluency) and evaluation system comprised closed questions about the modules (visual comfort, handling, clarity and completeness of documentation, objectivity and clarity of information, appropriateness of content to the nursing record in units of Cl and Cl Med Sur.) In addition to the closed questions, the instrument provided space for free expression of opinions of nurses on the system and its use. The opinions given were analyzed and categorized according to the themes presented (positive and negative points observed, possible solutions to the problems, difficulties and facilities provided to implant the system).

The research project was presented to the Committee on Education and Research and to the Ethics Research Committee of the HU-USP, and the data collection was only initiated after approval by these agencies (Protocol Registration no. 590/05 – SISNEP

CAAE: 0043.0.198.000-09) and acceptance the of nurses's participation, by signing the consent form.

## RESULTS

From the 20 nurses who joined the programs of theoretical and practical training for users, 16 participated in the study, were female. The age of the raters ranged from 25 to 44 years, with predominant age group of six nurses (37.5%) from 25 to 30 years and six nurses (37.5%) from 40 to 45 years. Regards to the academic degree, there were 9 of them with a lato sensu specialization, 5 with a master's degree, one Ph.D. and one with a bachelor's degree in nursing. Fourteen of these people were assistants and nurses who worked in clinical documentation and record management in different units of the HU-USP.

Regarding digital fluency, it indicates that nurses had access to the computer, and 10 (62.5%) at home and 6 (37.5%) in the HU-USP, 15 (93.7) reported using the computer/Internet daily and all claimed they had never done distance learning courses and had experience in using electronic mail, Messenger (MSN) and Video Conferencing. Most of them, 11 (68.7%) assessed as basic degree of knowledge and skills in computer and 5 (31.2%) considered to present an intermediate level of knowledge.

The nurses evaluated the modules and screens of PROCEnf-USP, judging visual comfort and handling system, documentation (clarity and comprehensiveness), information (objectivity and clarity) and content (adequacy of the data to the registry of nursing units of Med Cl and Sur. Cl.)

As shown by the data of Chart 1, most items were evaluated as Excellent, Very Good and Good. Six nurses rated some items as Regular or Bad, two reports have not evaluated the item Report and the item Review, have had difficulty justifying print these documents.

In the space for free expression of their opinions, the nurses delivered a favorable opinion for the system implementation in other inpatient units, adopting realistic and mature attitude towards the process of change in the PE documentation. They identified as much interest as facilities such as availability from de group of nurses; as for the difficulties related to possible manifestations of resistance to change and difficulties in the applicability of the system in practice and in specialized areas, for example, in the Emergency Room Institution.

It is verified that the system was positively evaluated and most of the nurse's comments were focused on the possibility of PROCEnf-USP contribute to the clinical reasoning to support decision making related to the diagnoses of NANDA-I, as results of NOC and NIC nursing interventions. These features of the electronic

**Chart 1.** Evaluation of the USP-PROCEnf by nurses working in the ND of the HU-USP modules and screens on the system, Sao Paulo – 2009

Modules / Screen	Excellent	Very good	Good	Regular	Bad
A. Pacient search	8	6	2	-	-
B. Rating	5	9	2	-	-
C. Reply Questionnaire	1	11	3	1	-
D. Calculate Diagnosis	4	9	2	1	-
E. Indicate Diagnosis	4	9	3	-	-
F. Diagnosis Selection	4	8	4	-	-
G. Nursing Results	4	7	5	-	-
H. Nursing Intervention	5	8	3	-	-
I. Nursing Activities	4	8	3	-	1
J. Review	4	6	4	1	-
L. Report	2	8	4	-	-
M. Visual Comfort	3	6	6	1	-
N. Comfort in Handling	5	3	7	1	-
O. Clear and Sufficent Documentation	4	6	5	-	-
P. Clear and Objetive Information	6	5	5	-	-
Q. Content related to the and Sur. Cl and Med Cl	8	8	-	-	-

system were highlighted as essential to the nurses professional practice. Characteristics were also listed for convenience and ease in handling the PROCEnf-USP.

The nurses also showed to be aware of the documentation informatization of the NP and suggested that the transition was carried out with the participation of all involved, continuing the training programs, tutoring and tracking, linking them to the technical usability issues of the system, as well as the enhancement of the NP.

Regarding the difficulties, some nurses reported aspects as slowness and complexity of the system, beyond the necessity of having the field of use of nursing classifications in the context of the NP and adapting the system to be used in other units of the institution. However, they considered that the difficulties would be surpassed with practice use.

Finally, to ensure the viability of the system in the assistential reality, the nurses suggested that only three questionnaires should be mandatory in answering them and those ones that require the domains and classes of NNN in which the patient had problems related to the reasons of his or her hospitalization

## DISCUSSION

Most of the nurses in the study demonstrated experience and professional qualification, had more than one specialization course and worked in the position of clinical nurse. Regarding digital fluency, despite all of them had reported having access to computer/internet and use these technologies every day, both at home and in the HU-USP, they thought having basic degree of knowledge and skills in computing.

The nurses are part of a generation that did not grow up with technology. The new technological-culture standard featured, is an unknown field for nurses that instead of being a “shelter” that helps you solve problems, is itself a problematic situation that needs to be interpreted, questioned and investigated, aiming at the reconstruction and expansion of new concepts of technological knowledge so that they can be applied in teaching, research, care and nursing management<sup>(13)</sup>.

It is evident that the computer is a tool that is part of professional nursing practice and that the informatics is present in their daily lives. Thus, it is necessary technological training of nurses at various levels of depth for effective project implementation of information technology in work processes, building a new conception of computer compatible with the human dimension of professional nursing practice.

The global challenge for the implementation of projects of electronic documentation of nursing is the need to articulate the requirements of different health

professionals and consumers and the adoption of nursing terminologies<sup>(14)</sup>.

For the nurses in this study, the construction of PROCEnf-USP, comprising a set of best practice principles, characterized by continuous communication between all involved, and process management models, made possible adherence to the practice of the electronics as well as adequacy of the data to the care reality.

It is noteworthy that technological advances, globalization and the required shift of persons in the workplace determine a new professional position of nurses. They need constant updating, through programs of continuing education and information technology is an essential tool to facilitate this learning at work or elsewhere. Thus, it is important for nurses to dominate this area of knowledge and enhance it so to contribute to scientific diffusion of innovative practices for nursing<sup>(15)</sup>.

Considering the reports on the possibilities of implementing the system, it is clear that the nurses were favorable towards the use of this new tool in professional practice and willing to face the due process of change.

It is stressed that the professionals' acceptance is crucial to the success of Electronic Health Records (EHR). A study of professionals from Germany and Austria has examined the expectations, fears and possible barriers, as well as the desired features in EHR and concluded that 80% to 90% of the respondents were in favor of sharing information online as a basic functionality, and the main concern was related to protection and data security<sup>(16)</sup>.

The complexity of the data was identified as a complicating factor for the applicability of the system for the professional practice, leaving us with the Aspirus Wausau Hospital (AWH) experience in the implementation of classification systems of electronic documentation. In the account of the experience of AWH, the authors observed that if it happens too fast it can be overwhelming for many professionals because it is an entirely new workflow, because they are not accustomed to working with computers and also because of the new terminology. In this study, we emphasize the importance of education for professionals to be familiarized with the terminologies NANDA-I, NIC and NOC and the need for feedback for continuous improvement of the documentation<sup>(17)</sup>.

In this sense, the group manager PROCEnf-USP, based on assessments of nurses and aiming at the improvement of NP, planned and carried out a training program directed to the nurses of the HU-USP addressing specifically the ratings results<sup>(11)</sup> and interventions nursing<sup>(10)</sup>.

Information technology and communication tools to provide nursing care to improve health by electronically linking assessments, interventions and outcomes and support decision making. Challenges remain to standardize the electronic registration of nursing terminologies and to capture data and patient information and identify the results of this translation of structured documentation of nursing practice<sup>(18)</sup>.

In this sense, the group manager PROCEnf-USP, based on assessments of nurses and aiming at the improvement of NP, planned and carried out a training program directed to the nurses of the HU-USP addressing specifically the ratings results<sup>(11)</sup> and nursing interventions<sup>(10)</sup>.

The technological information and communication in nursing provide tools to improve health by linking assessments, interventions and outcomes to support decision making.

Challenges remain to standardize the nursing electronic registration and the terminologies to capture data and patient information and identify the results of this translation of the structured documentation to the nursing practice<sup>(18)</sup>.

One of the assumptions of the project was the construction of an electronic system which would embrace in its content all the necessary data for documentation of patient assessment, covering various fields and classes<sup>(19)</sup>. In this way, the nurses' suggestions for change and enhancement requests in PROCEnf-USP, were incorporated into the system. It was built also a tool called "Help", structured with information on the relationship between diagnoses of NANDA-I<sup>(9)</sup>, results of NOC<sup>(11)</sup> and NIC interventions<sup>(10)</sup>, and a detailed manual guidance about the system in order to facilitate adaptation to the user's system and structure NNN<sup>(8)</sup>.

One of the limitations of the study was that the sample was of convenience with a group of nurses

who had participated in training programs in a simulated environment. However, according to the software methodology development this time is essential to identify the system needs of improvement, aiming at the customer satisfaction. To evaluate the attributes quality of USP-PROCEnf related to usability in the context of clinical practice, other studies are being developed.

## CONCLUSION

The data obtained through assessments have identified that the nurses of the study are encouraged to deepen their knowledge about the NP, as well as acquiring new technical and technological skills by demonstrating positive attitudes towards the adoption of PROCEnf-USP in their professional practice.

The possibility of the electronic system subsidizing clinical thinking to support decisions about diagnoses, outcomes, nursing interventions and activities was highlighted by these nurses as a great differentiator.

Despite some flagged difficulties with the inexperience of the initial use of the system, the technological development was positively evaluated by nurses, who had suggestions for improvements that were incorporated into PROCEnf-USP.

The results indicated the need for new research about the involvement of nurses in the development process, evaluation and implementation of information systems in health and nursing. It is envisioned a project evaluation of usability, ergonomics, recovery and data security, long time record of the documentation in electronic systems; expectations of nurses regarding the use of mobile computers, customer satisfaction, as well as clinical trials based on evidence nursing and quality of clinical nursing.

## REFERENCES

1. Dal Sasso GT, Peres HC, Silveira DT. Computerized nursing process in critical care unit using the ICNP –Beta 2. *Stud Health Technol Inform.* 2006; 122:1021-3.
2. Sperandio DJ, Évora YD. [Nursing care planning: proposal for software prototype. *Rev Latinoam Enferm.* 2005;13(6):937-43. Portuguese.
3. Westra BL, Delaney CW, Konicek D, Keenan G. Nursing standards to support the electronic health record. *Nurs Outlook.* 2008; 56(5):258-66.
4. Santos SR, Nóbrega MM. [The search for theory-practice interaction in the nursing information system – approach from grounded theory]. *Rev Latinoam Enferm.* 2004;12(3):460-8. Portuguese.
5. Massad E, Marin HF, Azevedo Neto RS, Lira AC, editores. *O prontuário eletrônico do paciente na assistência, informação e conhecimento médico.* São Paulo: H. de F. Marin; 2003.
6. Hao AT, Hsu CY, Li-Fang H, Jian WS, Wu LB, Kao CC, et al. Apply creative thinking of decision support in electrical nursing record. *Stud Health Technol Inform.* 2006;124(3):313-9.
7. Peres HH, da Cruz DA, Lima AF, Gaidzinski RR, Ortiz DC, Mendes e Trindade MM, et al. Development Eletronic Systems of Nursing Clinical Documentation structured by diagnosis, outcomes and interventions. *Rev Esc Enferm USP.* 2009; 43(Spec No 2):1149-55.
8. North American Nursing Diagnosis Association – International. *Nursing diagnoses: classification and definitions 2009-2011.* 2nd ed. Philadelphia: NANDA International; 2008.
9. Bulechek GM, Butcher HK, Dochterman JM. *Nursing Interventions Classification (NIC).* 5rd ed. St Louis: Mosby; 2008.

10. Moorhead S, Johnson M, Maas ML, Swanson E. Nursing Outcomes Classification (NOC). 4rd ed. St Louis: Mosby/ Elsevier; 2008.
11. McCloskey JC, Jones DA. Unifying nursing languages: the harmonization of NANDA, NIC and NOC. Silver Spring: ANA; 2004.
12. Associação Brasileira de Normas Técnicas. NBR ISO/IEC 9126-1:2001. Engenharia de software – qualidade de produto. Parte 1: modelo de qualidade. Rio de Janeiro: ABNT; 2003.
13. Peres HH, Kurcgant P. Being a nursing teacher in an informatized world . *Rev Latinoam Enferm*. 2004;12(1): 101-8.
14. Häyrinen K, Saranto K, Nykänen P. Definition, structure, content, use and impacts of electronic health records : a review of the research literature. *Int J Med Inform*. 2008; 77(5): 291-304.
15. Alves VL, Cunha IC, Marin HF, de Oliveira O. [Creation of web site for nurses about diabetic foot]. *Acta Paul Enferm*. 2006;19(1 Supl 1): 56-61. Portuguese.
16. Hoerbst A, Kohl CD, Knaup P, Ammenwerth E. Attitudes and behaviors related to the introduction of electronic health records among Austrian and German citizens. *Int J Med Inform*. 2010; 79(2): 81-9.
17. Klehr J, Hafner J, Spelz LM, Steen S, Weaver K. Implementation of standardized nomenclature in the electronic medical record. *Int J Nurs Terminol Classif*. 2009; 20(4): 169-80.
18. Dal Sasso GT, Silveira DT, Barbosa SF, Évora YD, Marin HF. Tecnologias da informação e da comunicação em enfermagem e tele-enfermagem. In: Prado C, Peres HH, Leite MM. *Tecnologia da informação e da comunicação em enfermagem*. São Paulo: Atheneu; 2011. p. 112-25.
19. Peres HH, Ortiz DC. Sistemas eletrônicos de informação em saúde e o processo de enfermagem. In: Gaidzinski RR, Soares AV, Lima AF, Guitierrez BA, Cruz DA, Rogenski NM, Sancinetti TR. *Diagnóstico de enfermagem na prática clínica*. Porto Alegre: Artmed; 2008. p. 339-53.