

Computerization of a Nursing Chart According to the Nursing Process

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Abstract. The benefits associated with the computerization of clinical records are known since a long time ago. Documentation evolution from paper to electronic format aims to always improve communication, reduce errors and facilitate continuity of care. Ideally when improvements to nursing records are contemplated, they should consider the nurses needs, new functionality workflow impacts and correspondence with representation models of standardized data that are specific to their domains practices. The aim of this study was to describe the development and implementation of computerized nursing record at Hospital Italiano de Buenos Aires.

Keywords: Electronic nursing record, Nursing process, Nursing taxonomy, Electronic health records

1. Introduction

Paper has been the format to support most of health records generating difficulties with the content, storage, availability, accessibility of information and resulting in losses, confusion and illegibility [1-2]. These issues and the increase in volume, complexity and diversity of healthcare information have determined the need to distribute it in information systems in an effective and efficient way [3]. Electronic health records (EHR) are implemented in order to reduce medical errors associated with medication; make more effective communication and facilitate the availability of information for educational purposes and research as well as ensuring the continuous health care [4-5]. Nursing records are important part of clinical documentation being registration of nursing process a very important section. However, when evaluating nursing record integration of nursing process (NP) and nurse documentation is not always evidenced [6-7]. Electronic nursing records have been developed in different organizations to increase the quality of the records but need to understand in depth the impact on the nursing process documentation [8]. Several studies have reported that due to the use of computerized records has increased the completeness of routine nursing assessments and care plans [9], quality and quantity of documentation and how often parts of NP are registered [6].

The aim of this study is describe the development and implementation of the computerized nursing record at Hospital Italiano de Buenos Aires (HIBA).

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2. Methods

Hospital Italiano de Buenos Aires (HIBA) is a teaching hospital that serves 3 million consultations and 45,000 surgical procedures a year providing an infrastructure of 750 inpatient beds. Staff is composed of 2800 doctors, 1500 nurses and 1900 employees spread among administrative and support staff.

The EHR is home-developed by the Department of Health Informatics (DHI), problem-oriented and patient-centered. It started out in 1998 generalized to different levels of care and specialty care groups including nursing. The nursing record was developed in stages beginning with a digital literacy process in conjunction with the development and integration of administrative applications, followed by a redesign of the paper records with subsequent digitization and computerization in stages culminating in a substantial modification of architecture and data model.

In recent years the Joint Commission International (JCI) accreditation process taking place at HIBA promotes changes in the information system. Over the same period the DHI standardized and implemented a process of user-centered design (UCD) practices establishing procedures of design and evaluation of information systems. We describe the evolution of the electronic nursing record (ENR) with emphasis on the major periods of time.

3. Results

The most important milestones achieved during computerization of the nursing record at every stage are outlined in Figure 1.

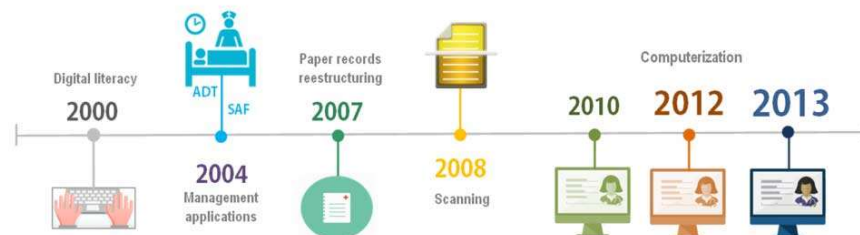


Figure 1: HIBA electronic nursing record evolution

- **Digital literacy:** in 2000 nurses achieve access to hospital internal network (intranet) and institutional e-mail. Also received training in management software for invoicing of supplies and drugs.
- **Development and integration of administrative applications:** in 2004 an admission, discharge and transfer (ADT) system were implemented to keep the hospital census and an application to nursing resources distribution and management (both online).

- **Redesign of paper records:** In 2007 HIBA had 64 models of different papers records. Information was restructured by modifying the medical prescriptions. NR it was also modified in sections of initial assessment - notes; vital signs control, fluid balance and pain assessment.
- **Digitization-Scanning:** in 2008 format of record sheets changed for digitization. In parallel, clinical pharmacists 'transcribed' on a daily basis to an online pharmacy management (SAF) medical prescriptions. Outside the scheduled hours, nurses did.
- **Computerization:** In 2010 paper record was computerized including sections of medication administration, hydric balance, vital signs control and free-text notes area. Census management remained and assessment of pain was not included. In 2012, ENR was organized according to NP stages in sections of initial assessment, care planning, implementation and evaluation. Each section could be used in sequence or not. By 2013 evaluation and audit of nursing records showed high variability because of free-text format and the 'dissociated' sections threatened nursing process clinical documentation. The information recorded remained 'static' affecting communication and continuity of care. Considering the nurses Department requirements to have a nursing record **based on** a) Virginia Henderson conceptual model, b) NANDA-NIC-NOC (NNN) classifications, c) patient safety international goals, and d) JCI accreditation process, an interdisciplinary team worked in a new version of the ENR with the strategies outlined in table 1. Due to the legacy system constraints, the architecture and data model changed and precluded the gradual implementation. Therefore a process of training and support pre and post system implementation was required.

Table 1: Development strategies for the redesign of HIBA electronic nursing record in 2013

Domains	Actions
Conceptual framework -NNN taxonomy	Virginia Henderson model adaptation NANDA-NIC-NOC taxonomy selection and adaptation Hierarchy of information: risk assessments and detection screenings (patient safety)
Usability - GUI	User centered design: Analysis of content, usability and navigation. Observations and interviews with nurses in interaction with EHR Nursing process prototypes Tests: improvement iterative cycles
Software engineering - data model	Relational database integrated with legacy system Modeling terminology (SNOMED CT) Linked model: Needs > Concepts > Diagnostic > Interventions
Training - Induction	Daily meetings for 3 weeks 900 nurses Demonstration of functionality in test environment Audiovisual material
Implementation	Big Bang methodology On-site support post implementation Telephone Support

4. Discussion

We described the process of development and implementation of the electronic nursing record at HIBA. To reach the last deployed version it took more than 10 years of development and change of organizational paradigm to progress from a record model with a vision of the nurse 'executing' planned by other professional care to a model based on nursing conceptual framework grounded in the scientific method. All innovation involves an adjustment period to the new features that will vary according to adopter's characteristics and stages of behavior that is going through [10] but, 2013 ENR introduced not only new capabilities but the requirement to document according to nursing process logic using NNN standardized taxonomies under terminological control. Recommended practice when records are computerized if you want to share and reuse information, representing variability, complexity and richness of the different nursing domains [11-12].

Different determinants joined together: nurses' digital literacy at the beginning; followed by adaptations to technological changes, expansion of computer equipment, connectivity and PCs availability per nurse, as well as changes in the registration tool that intensified in recent years or even latest version implementation modality (Big Bang). Incorporating UCD techniques for the redesign of the ENR interface followed workflow and clinical trial performed by professionals, increasing the chances of being truly support nursing work [13]. Considering that nurses have expressed to feel excluded from discussions in decision-making about EHR [14], this strategy led to mitigate unintended consequences of implementing an EHR [15].

In pre-deployment training instances, emerged as concern the possible increase of time associated with the new ENR, so different lines of research were initiated by stages aimed at determining the expectations and perceptions of nurses regarding registration [16] as well as the study of the time needed to perform nursing activities including documentation relating to pre EHR implementation [17]. Post implementation measurements and evaluation are currently in preliminary stage of preparation.

Finally, the new record turned out to be a documentation tool but would be a training instrument and conceptual reinforcement, requiring a strong support post implementation. Because the reasoning associated to NP logic involves cognitive processes and knowledge that Argentine's nurses education provides extremely heterogeneous [18, 19].

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