

## *Information Systems in Nursing: new challenges, new opportunities...*

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*The importance of the produced and documented data resulting from professional nursing practice has, over the last decades, been an enormous challenge for the development of Information Systems in Nursing (ISN), essentially due to the demand for information in healthcare and the difficulties in management.*

*The need for accessibility to information is growing for all those involved in the process of care. On the one hand, it is observed that clients' participation in making their own health decisions is growing; at the same time, healthcare professionals demand that clinical information be present at the time and place it is most needed, regardless of its origin or healthcare level. On the other hand, administrators and policy makers require timely access to information, in order to determine policies and programs for managing and monitoring the quality of the care made available.*

*In Portugal, we have watched a progressive increase in awareness regarding the relevance of information as an essential resource for improving the quality of nursing care. Nursing research has contributed, through its pathways in the context of practice, to developing solutions capable of promoting decision-making among nurses<sup>(1-3)</sup>. We have watched the natural evolution of ISN, from paper-structured to computerized ISN, which allowed for the construction of a new model of data for the ISN, to the level of its present structure and content. Some difficulties associated with the availability of information were overcome and data were no longer centered on tasks developed by nurses and in the narrative description of the events. These events proceeded to the inclusion of the International Classification for Nursing Practice (ICNP<sup>®</sup>), which then proceeded to the connection between natural language and classified language. Nursing diagnoses, interventions and outcomes were incorporated and, among other contributions, the referential integrity among the nursing documentation elements was improved.*

*Nevertheless, the development of ISN has posed enormous challenges centered on the interoperability among the information systems currently in use. The current discussion focuses on the development of strategies that promote communication and the sharing of data and/or information through several functional units, thus permitting this data flow to maintain the original meaning of the data, using common languages and protocols.*

*Hence, it is confirmed there is a need to facilitate the sharing and use of information by nurses, assuring that it is understood by both systems and users. Although the literature often refers to technical interoperability as the central challenge to maintaining information systems, it is not limited exclusively to its technical dimension. Regarding the sharing of the data produced by nurses, particularly in terms of its comprehension by the users, in maintaining the clinical and operational objective, the context and the meaning of information, a central dimension of interoperability – semantic interoperability –, is essential in aspects related to nursing care.*

*It is in this context that the importance of nursing terminology emerges, a fact that encouraged the Ordem dos Enfermeiros (Nurses' Order) and the Portuguese government itself to adopt the ICNP<sup>®</sup> as the international standard for nursing terminology, assuring it is utilized in every Information System in healthcare, specifically within the Electronic Health Record.*

*The questions that have emerged in view of the development of nursing terminologies, namely the ICNP (through the evolution of its versions: alpha, beta, beta2, 1.0, 1.1, 2.0 and 2011), and the use of different terminologies in other contexts, are related to the formalization of clinical knowledge and its representation. Hence, there is a need for a global effort to develop structures that permit the construction of clinical enunciations (nursing diagnosis, outcomes and interventions) in the format of specifications that translate the semantic equivalence. We have watched some international initiatives, namely of the OpenEHR Foundation, through the Clinical Information Modeling Initiative (CIMI) in the development of archetypes for the representation of clinical nursing contents. The OpenEHR Foundation has dynamized the information system concept based on archetypes, publishing specifications, maintaining a repository for them and providing tools that permit their development, management and publication. Thus, when an archetype is developed, it is possible to define a set of data for a determined clinical concept so as to guarantee a universality of its utilization, maintaining its semantic integrity throughout different uses when the data is used as a record, or added and compared across different information systems. This model of archetypes defines, for each clinical concept, how the information should be expressed, so that its utilization and reutilization for different purposes and contexts guarantees that the meaning of the data corresponds to the clinical concept represented by the archetype.*

*The formalization of the clinical knowledge and of its representation through archetypes is, without a doubt, the great challenge that is faced by semantic interoperability.*

*Clearly, other challenges exist for the development of ISN, namely the separation between knowledge models and information models. With the continuous change in knowledge, only this separation will provide the necessary conditions for nursing experts to model knowledge without the need to be concerned with the technical issues of the semantic reconstruction of the information system every time changes occur.*

*The development of Information Systems in nursing have posed new challenges but, at the same time, have generated new opportunities... It is necessary to guarantee that its further developments assure a comprehensive view of the level of interoperability and of the knowledge of the discipline of nursing.*

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