

## NURSING INFORMATICS. CURRENT AND FUTURE TRENDS

Corina Vernic

”Victor Babeş” University of Medicine and Pharmacy Timișoara, Department of Functional Sciences

**ABSTRACT:** Informatization and the need of knowledge in the medical field has significantly grown in this century. The purpose of informatization aims to prepare nurses, as well as to benefit from integrating computer technology into everyday practice.

It is essential to include concepts related to the role of computer technology in clinical practice into the future basic nurse training curricula.

I mentioned several classification systems in nursing, they are very useful when generating and processing databases in nursing, in order to facilitate the description and comparison of nursing practices (International Clinical for Nurses Practice, North American Nursing Diagnosis Association, Nursing Interventions Classification, Nursing Outcomes Classification, Clinical Care Classification).

The look into the future will be the use of telemedicine and telenursing, in order to exchange information from one place to another with the purpose of improving the patient's health condition. Nurses can also access the patient's electronic health records, and provide the patients with healthcare information and also with education materials. As such, nurses must be supported by excellent electronic health record and other technologies.

As a conclusion, information technology is not a remedy, but it will offer this profession an unprecedented faster capacity for the production and dissemination of new knowledge in the nursing domain. The short presentation of the supporting terminologies in nursing practice has introduced more of the information management tools, used by nurses in their work.

**KEYWORDS:** Nursing Informatics, Information Technology, Electronic Health Record, International Clinical for Nurses Practices

### 1. INTRODUCTION IN NURSING INFORMATICS

Informatization and the need of knowledge in the medical field has significantly grown in the 21st century. The purpose of informatization aims to prepare nurses, as well as to benefit from integrating computer technology into everyday practice.

“Nursing informatics (NI) is the integration of nursing, its information, and information management with information processing and communication technology, to support the health of people worldwide” (the IMIA-NI Strategic, July 2007).

We can say that nursing informatics is described as the intersection of computer, information and science in nursing, to manage and communicate data, information, and knowledge in nursing practice. Generally the

definition reflects the work of nurse informaticists, the emergence of patients as active participants in their own care, and the key concepts intersecting nursing and informatics [MM09, ST02].

Nurses have turned their attention to the computer process, the latter aiming to help them in their daily practice, thus reducing time lost unnecessarily with manual data registration, and allowing more contact with the patient. Therefore, nurses must be equipped with appropriate instruments, capable of efficiently manage data.

### 2. CREATING AND USING CLINICAL KNOWLEDGE

Graves and Corcoran (1989) have suggested that the real knowledge in the field of nursing is: “simultaneously the laws and relationships that exist between the elements that describe the phenomena of concern in nursing (factual knowledge) and the laws or rules that the nurse uses to combine the facts to make clinical nursing decisions”. From their point of view knowledge leads to decision-making as well as to new discoveries in the field of clinical trial [GC89].

Carper (1978) described the four patterns of knowing:

- (1) Empirics, the science of nursing;
- (2) Esthetics, the art of nursing;
- (3) Personal knowledge;
- (4) Ethics, the moral knowledge of nursing.

*Empirics:* allows access to factual knowledge derived from archives of aggregated clinical research and integrated with clinical information system.

*Esthetics:* allows access to multicultural practices and beliefs.

*Personal:* allows access to a personal knowledge of clinical experiences and reactions.

*Ethics:* allows access to standards of ethical practice and experts in the field of moral reasoning [Car78].

Evidence-based practice and research utilization are concepts that have been widely addressed in the nursing literature. The benefits of integrating research in practice is evident, though Estabrooks (1999) suggested that only a little is yet known about the factors that influence clinical research integration in daily practice. Nurses need absolute involvement in creating tools in the field of Informatics, to facilitate the access to knowledge. The computer system of collecting and processing data must be implemented

on a wide scale, and the standards that concern documenting in the field of nursing must use the solutions offered by information technology (IT), with the hope that they evolve [Est07].

Strategies that will need implementation:

- identifying the nurse leader's needs of education in computer science;
- developing mentoring programs for the acquisition of leadership skills in computer science;
- assuring enrollment of nurse leaders as sponsors for electronic health records initiatives.

### 3. CLINICAL PRACTICE

In spite of efforts to implement a more efficient and easier to use computerized system, there is still limited online functionality when it comes to the possibility of nurse information. Many studies and reports have shown that many are still in the early phase of purchasing and implementing a computer system [EP06].

There is one opportunity of involving nurses in the development of the information system and in getting IT solutions in terms of clinical practice. Considering the average age of the majority of nurses, it is understood that getting familiar with the use of computers is necessary, so attention should be given to their private documentation in the field of IT.

Strategies for Nurses:

- nurses must be encouraged to participate in the acquisition, design, implementation and evaluation phases of the information system;
- IT solutions must be adopted to help benefit a quality clinical care;
- nurses must be supplied with materials and resources that will facilitate the acquisition of competence in the field of informatics.

### 4. NURSES OF EDUCATION

Over the years, numerous efforts have been made to identify the essence of competences the nurses would require for a good functionality of the medical system.

The essence of concepts and competencies in the informatics field is in a more private way related to an interprofessional education model.

Stagers, Gassert and Curran believe that nursing students and nurses in general should be taught skills in NI [SGC01].

Stagers, Gassert and Curran (2001) specify that the nurses should be able to see relationships among data elements, make judgments based on trends and patterns within the data, use current informatics solutions, and also collaborate with the informatics nurse specialists. It is emphasized that the nurses must be able to use system applications to manage

data, information, and knowledge in different specialties, as well as promote the integrity and access to information related to confidentiality, legality, ethical, and security issues [SGC01].

There's an assumption that those who will now graduate will be more familiar with the computer system compared to nurses who already practice. It is essential to include concepts related to the role of computer technology in clinical practice into the future basic nurse training curricula.

Education strategies in nursing informatics:

- the need to promote prototypes of informatics integration in schools of nursing;
- create opportunities to educate and spread competencies and information concepts;
- nursing faculties compulsory need to obtain core competencies in the IT field;
- allocation of funds for the development of a model of innovative curricula;
- include criteria for accreditation that require integrating basic informatics concepts and competencies in all basic nursing programs.

As a representative of Romania for Nursing Informatics in International Medical Informatics Association and European Federation for Medical Informatics, I designed the following Analytical Program for Medical Informatics and Biostatistics Department for General Medical Assistance in our University: Table 1 and Table 2.

**Table 1. Course topics**

No.	Course topics
1.	Introduction to information theory. The objects of study in Medical Informatics
2.	Computing system. Hardware. Software. Operating systems. Integrated software
3.	Computer Networks. Internet
4.	Telemedicine. Telenursing
5.	Data files. Medical databases.
6.	Classification systems: ICD-10, ATC, ICNP, NANDA, CCC of Nursing Diagnoses. Reports on DRG, SIUI.
7.	Electronic Health Record
8.	Introduction in Biostatistics. Statistical parameters. Distribution
9.	Statistical tests. Classification of tests. Usual statistical tests. Correlation analysis
10.	Risk analysis. Health statistics.
11.	Image processing. Image acquisition.
12.	Medical informatics systems
13.	Computer systems used in clinics and hospitals
14.	Protection and data security. Health Card. Electronic prescription.

Practical works topics are presented in Table 2.

Table 2. Practical works

No.	Practical works topics
1.	Introduction in Windows. Utility programs
2.	Word for Windows. Typesetting
3.	Word for Windows. Exercises
4.	Internet surfing
5.	Internet surfing – specific to nursing activity
6.	Microsoft Power Point
7.	Power Point Presentation
8.	Single patient medical chart – IC MED (Figure 1)
9.	Databases. Introduction in EPI Info
10.	Spreadsheets. Introduction in Excel
11.	Statistical and Epidemiological problems. EPI Info and Excel (Figure 2).
12.	Image processing. Image J (Figure 3)
13.	Integrated system for family doctors – Medins
14.	Statistics Seminar

Masters also have an important role in preparing nurses. There is an international Master’s Course in Health Informatics for Nurses: Introduction in Health Informatics; Introduction in Health Sciences; Hospital information systems – NIS; Databases; Research methodology; Security of Health Information; Electronic Patient Record; Telemedicine ... etc. International doctoral programs exist for getting PhD for nurses.

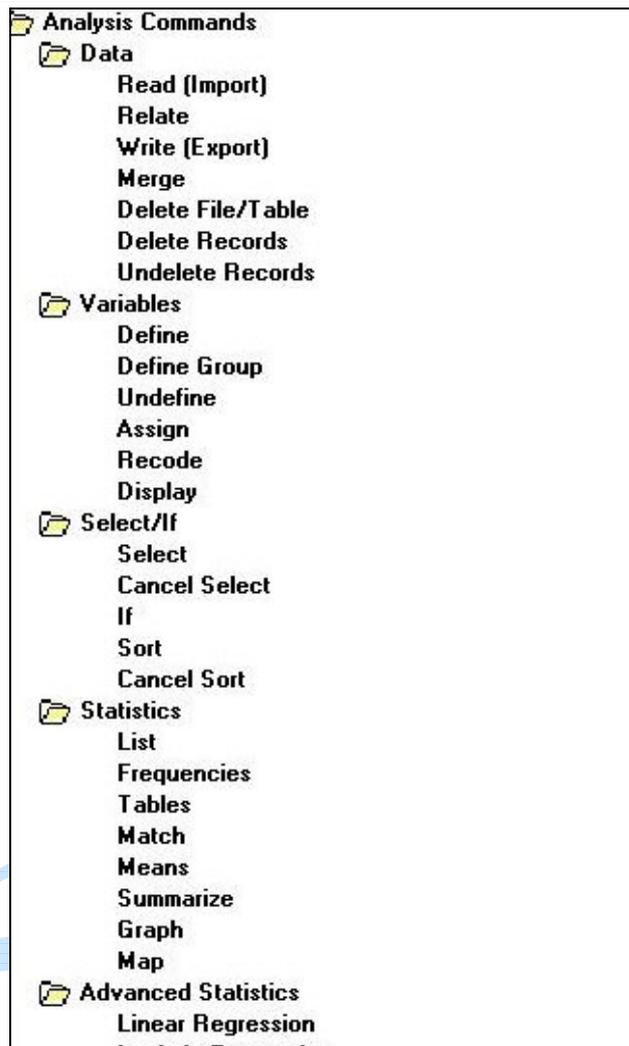


Figure 2. Analysis menu in EPI Info



Figure 1. ICMed main menu

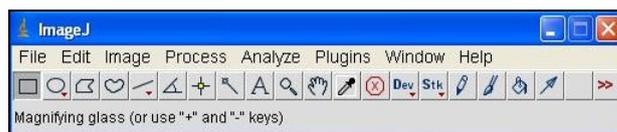


Figure 3. Image J main menu

## 5. CLASSIFICATION SYSTEMS IN NURSING

I will mention some of the most used classification systems [SM06].

*International Clinical for Nurses Practice (ICNP)* is an international classification used in nurse practice which was created and developed by the International Council of Nurses in Geneva, Switzerland. ICNP is a standardized terminology, a classification with a multi-axial structure used to represent diagnoses, interventions and outcomes in health care. Benefits of ICNP: It establishes an international standard, in order to facilitate the description and comparison of nursing practices; It serves as a unifying unitary system of nursing languages in international practice; It represents concepts used in local, regional, national and international medical assistance, in different specialties, languages and cultures; It generates information about the nurse practice, which will

influence educational and decision-making processes, patient care related policies, medical assistance Interventions, as well as the use of resources; It facilitates getting healthcare data, through the description and the comparison of medical care to individuals, families and communities worldwide; It improves communication within the discipline of nursing as well as other disciplines; It encourages nurses to reflect on their practices and improve the medical care quality.

*North American Nursing Diagnosis Association (NANDA)* is a guide about the classification of nursing diagnoses in a taxonomy and it includes definitions and defining characteristics.

Benefits of the NANDA classification system: It provides a standardized language to nurses for their practice description that can be used to communicate with nurses of all specialties, members of other health care disciplines; It provides a classifier as well as a system for the development, validation and classification of nursing terminologies.

*Nursing Interventions Classification (NIC)* contains 514 nursing intervention that describe the treatment nurses perform, updated linkages with NANDA diagnoses.

*Nursing Outcomes Classification (NOC)* has 330 results based on research to provide standardization of expected patient, caregiver, family and community results for measuring the effect of healthcare interventions. Each result features a definition, a set of specific indicators, measures to facilitate implementation and clinical reference.

*Clinical Care Classification (CCC)* is a research-based nomenclature designed to standardize the terminologies for documenting nursing care in all clinical care settings. Exists: CCC Nursing Diagnosis and Outcomes and CCC Nursing Interventions and Actions.

The CCC System is being used to document nursing care in the electronic health record (EHR) computer-based patient record and Personal Health Record System.

The CCC System is used to: document integrated patient care process; classify and track clinical care; develop evidence-based practice model; analyze patient profiles and populations; predict care needs, resources, and costs [SM06].

## 6. NURSING RESEARCH

The Foundation of Knowledge model suggests that the most important aspect of discovering information is the ability to purchase, process, generate and disseminate knowledge that had been acquired. As information in the field of nursing site combines a wide range of issues pertaining to clinical practice, research, administration and education, this paradigm will catapult nurses in front of other specialists in the

field of health in terms of applying the various facets of technology. Still, though there are few nurses who have training and are in step with new technology, they are capable of research in the health domain, representing a real challenge. In an environment of rapid change in technology, associated with an overwhelming proliferation of information sources, nurses stood in front of a huge number of options regarding the acquisition of information for the purpose of their academic training, clinical and research situations. Professional databases used by nurses: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline. CINAHL includes information from various areas such as nursing, alternative medicine, community medicine, while Medline database contains over 10 million abstracts and articles.

Nurses are already familiar with data collection, patient monitoring and getting medical history. They can record data from their own observations or with various devices. The text thus obtained will then be interpreted and organized either manually or via computer. The data becomes information when these separate components will be interpreted, organized, structured and combined in a specific context. Personal computers, laptops, tablets and PDAS (personal digital Assistant) have become part of the resources needed for the fitting of a researcher in the research project study [MM09, SM06].

## 7. A LOOK TO THE FUTURE

Most of the nurses must still adjust to the idea of integrating the computer system in their daily practice and understand the rationale behind. A future additional multidimensional data and informational sources transformation is expected. The following will be able to be performed: the promotion of professional education; design development and the application of the computer system in the medical field; deliver care that is informed by the most current evidence.

*Care through Telemedicine.*

Telemedicine is the exchange of medical information from one place to another by means of electronic communication in order to improve the health of the patient.

The clinical use of telemedicine is made through: transmission of images designed to help establish the diagnosis; transmission of clinical data for evaluation, diagnosis or disease control; promoting health through disease prevention; using advices via telephone in emergency conditions; the use of video in real time (video conferencing) [MM09].

*Nonclinical uses of technology in the field of telemedicine.*

There are a number of nonclinical uses of telemedicine: distance education, including

continuous medical education, as well as educating the patient; administrative use including supervision, presentations; research via the Internet and other online sources of information and data management.

The term Telehealth is a relatively new medical term in the nursing vocabulary, a broad term which includes telemedicine [MM09].

The American Telemedicine Association (2007) defines:

“Telemedicine is the use of medical information exchanged from one site to another via electronic communication to improve patients’ health status. Closely associated with telemedicine is the term “telehealth”, which is often used to encompass a broader definition of remote healthcare that does not always involve clinical service.”

*Telenursing. Applications of telenursing.*

Telenursing refers to the use of telecommunications and information technology with the aim of providing medical services in order to improve the patient-nurse relationship. It is part of Telemedicine and has a lot in common with other medical applications, such as Teliagnosis, Teleconsulting, Telemonitoring.

The most developed area of telenursing in our day is home care through telemedicine (Figure 4).

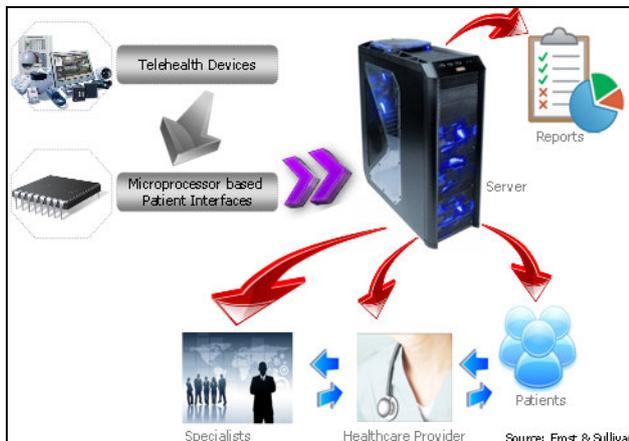


Figure 4. Telenursing

As Telenursing has evolved, the definition has expanded to include a wider range of services. In the last 4 decades Telenursing developed increasingly more offering up the possibility of the patient to be discharged early, as he could be monitored further from home. This challenge to extend the range of conventional home care has enabled service offering to a wider range of patients, such as: those who are immobilized; those who live in disadvantaged areas, with no direct access; those with chronic diseases such as chronic obstructive respiratory disease, diabetes, congestive heart disease; Parkinson's, Alzheimer's.

Another application of telenursing is the establishment of call centers that can be run by various organizations, hospitals and other health

organizations. Some call centers include Telemonitoring services which allow the patients at home to transmit different biometric data to be later interpreted by a specialist. Nurses are the ones that sort calls according to gravity. Patients are offered information and counselling within a well developed disease management program.

Telenursing may also include other activities such as educating patients in terms of diet or exercise featuring teleconsultations, analysis of the results from various tests and exams, as well as a physician's assistance in the implementation of the protocols on the treatment [MM09].

*Electronic health record.* The nurses, as the care givers closest to the patient in the primary and acute care, are playing an active role in communication with patients and their families, they can access the patient's EHR, and provide the patients with healthcare information and also with education materials. As such, nurses must be supported by excellent EHRs and other technologies. Therefore, in their role as the “central hub” of information, nurses have significant responsibility for the quality and safety of patient care. When information systems are implemented in any healthcare setting, nurses must be involved in decision making about the usefulness, efficiency, and satisfaction with information technologies to assure continuity of patient care is maintained.

Because ICNP is intended to be a standard of concepts used in nursing, the implementation of an electronic file is indicated, facilitating actions communication specific to the health care.

A good recommendation is training of the nurses in the use of the national system of electronic health ID cards. These cards will contain information about the individual health insurance payments of citizens, in addition to other personal data.

## 8. CONCLUSIONS

Information technology is not a panacea, but it will provide the profession with unprecedented capacity more rapidly, generate and disseminate new knowledge.

The brief discussion of terminologies supporting nursing practice introduced several of the information management tools used by nurses to complete their work.

Telenursing is a rapidly developing mode of health service delivery in which nurses can expect to play a key role.

---

**9. REFERENCES**

- [Car78] **B. A. Carper** - *Fundamental patterns of knowing in nursing*, Advances in Nursing Science, 1(1), pp. 13-24, 1978.
- [Est07] C. Estabrooks - *Will evidence-based practice make practice perfect?*, Canadian Journal of Nursing Research, 30(4), pp. 273-294, 2007.
- [EP06] C. Eggert, D. Protti - *Clinical electronic communications: A new paradigm that is here to stay?*, Electronic Health care, 5(2), pp.88-96, 2006.
- [GC89] **J. R. Groves, S. Corcoran** - *The study of nursing informatics Image*, The Journal of Nursing Scholarship, 21(4), pp. 227-231, 1989.
- [MM09] D. McGonigle, K. Mastrian - *Nursing Informatics and the Foundation of Knowledge*, Jones and Bartlett Publishers, Sudburg, Massachusetts, 2009.
- [SM06] **V. K. Saba, K. A. McCormick** - *Essentials of Nursing Informatics*, McGraw-Hill, Medical Publishing Division, 4th ed, 2006.
- [ST02] **N. Stagers, C. B. Thompson** - *The evolution of definition for nursing informatics: A critical analysis and revised definition*, Journal of the American Medical Informatics Association, 9(3), pp. 255-261, 2002.
- [SGC01] **N. Stagers, C. A. Gassert, C. Curran** - *Informatics competencies for nurses at four level of practice*, Journal of Nursing Education 40, pp. 303-316, 2001.