

Designing of Electronic Health Record Software in the Nursing and Midwifery Faculty of Tabriz

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ABSTRACT

Introduction: much effort was conducted to support the use of electronic record systems in nursing process. Some of the most important reasons for its application are efficiency, security and the quality of the patients' data registration. The purpose of this study is to present electronic registration software of patients, health assessment and to determine the attitude of nurses towards it. **Methods:** this is a R&D leading to construction of the patient's health assessment software. In the beginning, Gordon Model and the daily charts of the patients were prepared to paper. During the next 8 months these charts were converted into the software programs. The databases were implemented using "the SQL server" and "C#Net" programming language. **Results:** the software used in this study included 4 parts; the first one contained information of Gordon health assessment model in 11 items, the second contained charts of the study, the third part consisted of Lund-Browder table and dummy data table for 4 age groups, and the fourth one was image information storage part for burn wounds pictures. **Conclusion:** despite barriers, electronic systems could lead to confidential information, increase the quality of nursing records, and also reduce the amount of expenses.

Introduction

There is a high rate of changes and innovation in the educational technology field due to its relationship to the dynamic sciences. Changes and innovation are not only on hardware but on software as well. So definition of this word is changing over time. Electronic hospital, as an efficient system, provides an important service to patients, physicians, nurses, hospital and society.¹ Nurses, as the most influential group of the society, have the responsibility to care and educate the patients. Studies on nursing care pattern in Iran indicate that there are many problems in nursing process that are more "qualitative".² According to the researches some of the most important causes of low quality healthcare include adverse environment for innovation and new ideas, lack of using theoretical sciences and clinical nursing scales.³ Nursing process is one of the most essential factors in improving the quality of nursing cares. It is also one of the most important components of the nursing profession and all nursing cares require applying this procedure and integration of them.⁴ American Nurses Association (ANA) uses nursing process as the main scale of nursing care, known as the new approach that presently is implemented in most of the developed countries.⁵ Pressures to improve the quality of services and failure to achieve

this goal due to traditional nursing programs have caused the managers and planners to consider the need to follow a scientific and logical method in nursing services.⁵ Nursing profession needs a specific framework and pattern. Nowadays the framework of nursing process is specified and the implementation of it needs a clinical model. This provides an environment in which nurses would be skilled through this system.

Secondly, this professional model is more clarified by preparation of care scales for its independent or semi-independent components. Thirdly, it presents the tools for establishing communication and creating documentation system essential for different stages of nursing process.⁶ The first phase of nursing process, called assessment, involves a continual and dynamic process, which consists of the client's data collection. This stage centers on the patient's health assessment, environment, strengths, culture and beliefs.³ Much more appropriate information should be acquired during this phase. Assessment begins while people go to hospital or care center and will keep on continually and repeatedly.³ This research aims to design electronic nursing documentation software form the patient's health assessment corresponding to nursing standard patterns in Nursing and Midwifery Faculty of Tabriz.

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Methods

This is a research and development (R&D) study that led to the construction of the educational software of the patient-health assessment in pediatric burn units. Research and development in economy and industry is a creative work including human knowledge to create a new product.⁷ At first several health assessment models, such as Roy, Martha Rogers, Orem and Gordon were reviewed.

Gordon model was selected for ease of use as an electronic database of the patients' records. This model with eleven categories examines the health status of the patients. Then the daily charts were added in order to complete relevant information. Microsoft C#NET was used as programming language. This is one of the newest and the most popular object-oriented programming language that is compatible with windows products. The user interface was designed by the latest components of TELERIK Company that supports Microsoft's standards. Microsoft SQL Server was used to design database system of this software, which was consistent with C#NET programming language that is one of the most important operating systems in use today. SAP Crystal Report was used for reporting, which is one of the most powerful reporting systems, compatible with the .NET programming language technology. Then in the next three months the charts and tables were converted into an electronic software package.

Results

Most of the researches indicate that one of the prerequisites for introducing computer-based nursing process documentation is the use of standard and predefined health care strategies so that all the records would be based on nursing standards. The advantages of using predefined programs are as follows:

- 1) This leads to higher efficiency of health care plans and decreasing problems of the documentations as well as being related to the use of nursing terminology
- 2) Standards will lead to clear nursing care; its components will be comparable with each other. It can be an essential step in improving the quality of nursing management, too.
- 3) The learners will be supported by using these standards, which offer the possibility of knowledge exchange between nursing team members.
- 4) More information can be recorded and the data loss will be reduced⁸

Using predefined health care standards will facilitate understanding of the nursing process and consequently, support nursing training. The findings indicated that the acceptance of the computerized documentation was easier for the care units in which nursing process was

accepted. The studies showed that when introducing computerized systems the expected goals should be clearly specified, including the development of the clinical records (as a guide for better nursing management), improving quality of clinical records, reduction in efforts in data recording, the increasing use of the clinical information recorded in nursing researches, and finally the enhancement communication between the care team members. Achieving these goals is possible with co-ordination of different clinical teams; so nurses will be prepared to accept the use of predefined care plans as well as nursing standards.⁹ There are many studies on psychological effects of using software tools and electronic documentation methods in the clinical environments. According to the results, psychological changes due to computerization can lead to stress, uncertainty and confusion in medical staff.¹⁰ On the other hand the users' satisfaction and attitudes towards the electronic methods is the main factor in using digital documentation software.¹¹ Other studies showed that this method is more effective than paper records.¹² According to many studies the factors influencing nurses' attitudes towards the acceptance of the digital documentation systems include: job variables such as working hours per week, education level, organizational position and workplace environment.¹³ Various software formats have been designed by some countries including Germany, the USA, and Canada. This kind of software aims to improve the healthcare and the quality of documentation. However, in Iran, there is no model that can independently support nursing documentations. So, this new software is designed to provide a model in nursing practice standards whose various sections are:

A) Demographic characteristics and Gordon's 11 functional Health Pattern including:

- 1) Health Perception Health Management Pattern;
- 2) Nutrition Metabolic Pattern;
- 3) Elimination Pattern;
- 4) Activity Exercise Pattern;
- 5) Sleep Rest Pattern;
- 6) Cognitive- Perceptual Pattern;
- 7) Self-Perception-Self-Concept Pattern;
- 8) Role-Relationship Pattern;
- 9) Sexuality-Reproductive Pattern;
- 10) Coping-Stress Tolerance Pattern;
- 11) Value-Belief Pattern.

After his/her arrival, the patients' information should be recorded; these data can be edited if necessary.

B) Charts of the data including:

1) Charts of vital signs, respiratory status, temperature, pulse rate, blood pressure, displayed using different colors;

2) Daily pain chart, using a 0-10 numerical scale. Pain location was marked electronically on the dummy designed for each age group;

3) Daily burn wound assessment chart electronically checks the following items: types of dressings, existence of infection (culture swap), wound color, discharges, odor, necrotic tissue, fever (temperature of >38 degrees C), burn wound scar, debridement, formation of granulation tissue (bright red strawberry marks in the middle of the wound), epithelialization (formation of epithelial cells at the wound margins).

C) Lund and Browder chart for estimating percentage of body surface area burned:

The dummy chart of this software is designed for four age groups (under 1 year, 1-4 years, 5-9 years, and 10-15 years). In computerized dummies, the burn depth and area are according to the degree of burn shown by predefined different colors.

D) Files for saving wound images: during the hospitalization of the patient images of burn area taken in regular and successive periods of time are gathered by the nurses and will save in a file of burn wound images. The main purpose of this section is promoting evidence-based nursing in the clinical practice (and in this study in burns units) to make health care more efficient and improve its quality.

E) The software record sections including the recorded information related to Gordon's demographic characteristics, functional health patterns, daily vital signs and the pain severity chart reports, the printable view of overall average as well as graphic reports concerning the extent and degree of the burned area.

F) Executive facilities of this software including backups store files and user management system.

Discussion

Using digital record systems and programs can improve healthcare quality, increase security of patients' information, reduce the cost and time spent for documentation and maintaining legible, and accurate records in comparison with paper records.¹⁴ However, according to some of the other studies such as research conducted by Lee and Moody on nurses' attitudes towards digital documentation some of the limiting factors of using these systems include: duplication of records, frequent computer failures, lack of motivation of users, delay in the electronic record process, lack of experience in working with computer systems and uncommon deletions of information.¹⁵

In another research, 43% of users stated an increase in daily activities whilst using such systems.¹⁶ Sometimes this kind of duplications (recording data both on paper and computer) can be due to legal issues. Because of our national legal authorities digital information are not legal document and the people can't defend their rights based on these information.¹⁷ Considering the dynamic nature of nursing science, in comparison to nursing stations availability of information at the bedside is much more useful.¹⁸ So having only one computer set without using advanced hardware such as the portable handheld or pen computers, voice recognition systems and data entry via touch screen are among the factors that make it difficult to access the patients' records; nevertheless, the more commitment to carry out the staff's duties and having an effective system, the more positive impact on their performance.^{19,20} It is worth noting that factors affecting the staff commitment include workload, total manpower, complexity of personnel rules and services, flexibility of the software, the quality and quantity of input data, advanced level of hardware tool, the number of computer sets in each ward.²¹ With the participation of the staff members of each unit, system designers can stimulate the involvement of the active users and identify their responsibility for new system functions; it is useful in assessing the needs, involving the employees in expectations, providing a sense of ownership and commitment to system.²² Beside a system can be regarded as a "weak" system when it has no acceptance among its list. Then the employees may be pessimistic about it and reject the new technology.²³ The staff will not benefit properly and efficiently from this system if not satisfied with its quality as well as quality of service integration. This is especially true in hospital settings.²⁴ Besides the limitations mentioned above, this software tries to provide procedure in which users can easily enter the patients' health assessment information in the computer (which is consistent with the nursing process), among them are: the easy installation of the software on computer, working under the Web network, abstaining long typing components, using color charts for better evaluation of patients, using standard patterns in records and avoiding the waste of time and nursing care activities, and the formal inclusion of the health assessment parameters in the software. According to the results, the user is the major element of a system and his/her satisfaction has direct impact on the growth and survival of it. On the other hand, the perceived usefulness of a system is based on the users' knowledge and awareness.²⁵ Members must participate in defining system objectives, finding solutions to achieve the objectives and choose one of them.²⁶ Considering the challenges of the performance and quality of the current software there is a need for more studies to survey the users' point of view.

Competing interests

No conflict of interest to be declared.

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