

ROLE OF INFORMATION SYSTEM IN VUKOVAR GCH SYSTEM ON THE EXAMPLE OF NURSING E-RECORDS

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Abstract

The aim of this paper is to show the importance of computerization in health-care system on the example of electronic records in nursing. Electronic record-keeping system was implemented in Vukovar General County Hospital (GCH) in 2011 with the aim of facilitating data entry. Today we can say that the implementation of e-care has improved nursing care. Health workers today have a common goal to raise the quality of the healthcare system, which we have defined as the delivery of appropriate care in compliance with specific laws, requirements and standards. One of the requirements is computerization, which is necessary because every day a lot of information is produced and processed into data, which is then used for making informed decisions about patient care and allows us to effectively manage the healthcare system. Modern management is based on computerization.

Keywords: computerization, electronic record-keeping, Vukovar hospital

JEL Classification: L1, I1, I11

INTRODUCTION

In the last thirteen years a big step forward has been taken in the health care system of the Republic of Croatia with regard to computerization. The growth of health care costs prompted the reform of the healthcare system, seeking solutions to reduce costs, quality proofs, good results and justification of investment. The implementation of information and communication technologies in the health care system creates a favourable business climate. Computerization aims to rationalize health spending. It is estimated that at least 20-30% of the funds spent in health could be used more rationally. Computerisation should produce the data and indicators for this rationalization through the example of irrationally prescribed medications and referrals to diagnostic and specialist examinations, the total investment for primary health care information system can pay off in less than two years. (Stevanović; Stanić, 2004: 131). Primary health care computer system is a place of most effective spending control and the focus of control should be set up in hospitals or diagnostic and therapeutic institutions, because the system of the Croatian Health Insurance Fund (CHIF) does not provide a prompt control and intervention, but usually only finds irrational consumption that had occurred in the previous year. (Stevanović, Stanić, 2003: 1).

Central Croatian Health Information System (CCHIS) with more than 17,000 users and a large number of hospital information systems constitutes a good basis for the computerization of the entire health system in the Republic of Croatia. (National Health Development Strategy 2012-2020, 2012). The author states that the organization and implementation of e-health care could be described as follows:

- IT services for primary and outpatient specialist health care: family doctors' offices, outpatient clinics, clinics and joint practices (dental), laboratories, pharmacies (e-prescriptions).
- IT services for hospital health care: hospital information systems, medical specialties applications (transfusion), specialized diagnostic applications (laboratory), IT solutions related to medical instruments (intensive care unit), supporting activities (hospital pharmacies).
- IT services for public health: public health insurance, public health institutes, specialized patient registers (tissue banks), IT support for specialized processes (accreditation).

- Central health care-IT services: central management of e-care system, harmonized with health care system strategy, business IT subsystems in health care, IT standardization including certification and compliance with legal regulations, telemedicine, including the creation of virtual healthcare teams and mHealth solutions, electronic health care records, Internet portals for patients and health professionals, information security, IT training, master data management (for example procedure catalogues, diagnosis ...), central technical base and network infrastructure. (Mađarić, 2010).

Hospitals manage a budget amounting to HRK 11 billion, which is more than 50% of total health care budget, i.e. 10% of the national budget, they employ 45 000 people, 200 of which are IT specialists. Hospital Information System is established in 42 public hospitals, while 20 hospitals have no central information system. (National Health Development Strategy 2012-2020, 2012: 250). Hospitals send daily invoices to CHIF, and take files for valid insured parties from CCHIS, but there is no interconnection between hospitals nor is there any unique set of data to be monitored and sent and there is no reporting system which would include hospital data. E-waiting lists and e-appointments in progress represent the first step in the integration between hospital systems and their integration with central health care information system. (National Health Development Strategy 2012-2020, 2012). The rapid expansion of information technologies and networks in medicine shows a strong interest in telemedicine and the Internet. Today we can say that medicinal information technology is highly developed and that its development is accelerating with the acceptance of large quantity of data that we store and use in decision-making process and for effective health care system manage.

1. THE IMPORTANCE AND APPLICATION OF INFORMATION TECHNOLOGIES IN HEALTH CARE

We are witnessing the use of computers, computerization and internetization of public health care, health care systems and medical procedures in all sectors of their activities, this is our modern reality. (Tonković, 2004: 47). Health care investment depend on the quality of health services and the accuracy of diagnostics and therapeutic procedures, thus government spending on health care is increas-

ing for the purposes of reviving efficiency and profitability of public health care services and their reorganization. The reasons for that are the following:

- spending on public health and health care are extremely large, which means that significant savings are possible
- biomedicine and biotechnology are among the most propulsive branches with regard to technological development and innovation
- information and communication technologies threaten to introduce radical changes in possible approaches of organization of public health and health care, and education of health workers
- doctors can hardly (but are not obliged) be profitably and rationally use all the possibilities of new technologies, devices and equipment (“are not obliged” because their primary duty is medical knowledge and health care and taking care of patients)
- big changes and innovations can be expected in “home” care, caring for the increasing number of elderly people, and health care for the individual himself, integrated and multimedia (telemedicine) approach, multidisciplinary team work, business knowledge, lifelong learning and further education are the necessity of our future and the future of medicine, i.e. health care systems. (Tonković, 2004; 47).

Computerized methods offer help in solving the problem in health care and are one of the important features of health care development. Progress and rapid development of new technologies also provides a host of benefits to health care institutions through electronic patient records. In the opinion of this author, the uses and benefits include:

- increased business and public health care and health institution profitability,
- reduced „downtime” of health care professionals,
- increased patient circulation and comfort,
- increases safety and availability, and reduced probability of devices and equipment failure,
- increased diagnosis accuracy and treatment efficiency, which in itself is a type of advertisement for health care facility,
- enabled quality monitoring and maintenance costs monitoring for devices and equipment.

(Tonković, 2004; 48).

A large amount of information produced in health care cannot be monitored or analysed in paper form but with the use of information technology in health care. The author presents the benefits of electronic health records in Table 1. (Mavrinac et al., 2006: 6). With numerous advantages mentioned, disadvantages are the initial investments, which are relatively high and demanding, both monetary and in regard to health care workers' training.

Table 1. Special features and differences between paper and electronic records, 2006

Special features	Classic (paper) Health Record	Electronic Health Record
Data availability	<ul style="list-style-type: none"> only one place (for example in a family physician's office) several places (some data remain with the doctor, while patients take some) 	<ul style="list-style-type: none"> in any networked medical institution that is a part of electronic health records system complete (all the data is in one place)
Time of data availability	<ul style="list-style-type: none"> during business hours only 	<ul style="list-style-type: none"> immediately, whenever necessary (for example, during home visits using a handheld PC device)
Data formalization	<ul style="list-style-type: none"> non-formal (possibly due to unreadable hand writing) 	<ul style="list-style-type: none"> formalized, regulated, standardized and transparent
Data stability	<ul style="list-style-type: none"> can easily be lost, damaged, forgotten 	<ul style="list-style-type: none"> permanent, stored in multiple locations in case of an emergency
Data updating	<ul style="list-style-type: none"> incomplete (patients can lose test results) 	<ul style="list-style-type: none"> automatic (the results of each test are directly updated)
Users	<ul style="list-style-type: none"> the most commonly only one (family physician) 	<ul style="list-style-type: none"> everyone with authorized access (a specialist, laboratory manager, etc.) it is possible to simultaneously search multiple data users
Data search and classification	<ul style="list-style-type: none"> sequential and manual search 	<ul style="list-style-type: none"> direct and automatic (required data is obtained directly)
Data transparency	<ul style="list-style-type: none"> small, the data is searched among all papers/test results 	<ul style="list-style-type: none"> significant, entering keywords immediately leads to the desired data
Record size	<ul style="list-style-type: none"> records are increasing (and become less clear) proportionally to data volume increase 	<ul style="list-style-type: none"> a large quantity of data stored on a medium as large as a classical health care cards (image: X-ray, ultrasound, CT, laboratory test results)

Source: Mavrinac et al (2006), <http://www.medri.uniri.hr/katedre/Medicinska%20informatika/assets/EZZ.pdf/>, visited on January 4th 2015

IT allows faster and easier access to health care in order to overcome the gap between space and time in which we live. E-health care benefits the individual, society and economy. (Ostojic et al, 2012: 843). Through the example of e-prescriptions in primary health care makes it easier for patients to come to the necessary medicines, the number of visits to clinics is reduced, saving are

achieved on printing the prescriptions and paper use is reduced. The authors list examples of the most common challenges facing the practice and further development of e-health care as follows:

- insufficient awareness of public administrations and health authorities about the potential benefits of the wider application of IT technology in health and other sectors,
- lack of standardization,
- lack of consistency in the implementation of adopted plans and initiatives,
- lack of involvement of medical experts, as well as IT experts, patients and other health care system stakeholders in the development of e-health care,
- lack of financial resources for the development of e-health care,
- complicated applications,
- lack of legal regulation and fragmentation of e-health care market,
- fear of misuse of private information, unequal access to e-health care for all. (Stroetmann et al., 2011).

Encouraging e-health care has contributed to the creation of a new industry called “e-health care industry”, which may become the third largest industry in the health sector with revenues exceeding EUR 11 billion, or about 5% of the total budget for health care. (Commission of the European Communities, 2007). The goal is to create a European area of e-health care as a framework of joint actions and synergies in e-health care and provide a favourable environment for its development and expansion. (Ostojić et al, 2012: 846).

The efficiency of information flow was also vividly described by Pope John Paul II who said “The Internet is a gift from God”. All this can be called a success if we have acquired computer equipment and created a network, implemented information system, trained medical staff and recruited qualified experts from IT field.

2. E-RECORDS FOR NURSING DOCUMENTATION

Nursing documentation is a collection of data that is used for controlling the quality of planned and implemented health care and is an integral part of patients’ medical record (OG 57 / O7.11; Article 3). Nursing documentation consists of mandatory forms and those forms that are used depending on the needs of pa-

tients (OG 79/11; Article 2). Nursing documentation, based on the consent of the Croatian Nursing Council (CNC), can be kept in electronic form. Working Group for IT Technologies in Nursing of International Medical Informatics Association has in 1998 defined nursing informatics as a solid link between nursing and informatics via the management procedures and the use of IT as a contribution to raising the quality of human health. American Nurses Association has amended the above definition by linking nursing informatics with computer science, informatics and nursing with the purpose of administration, data collection, data exchange, exchange of information and knowledge in nursing practice. From nursing practice collected data are processed and returned to the practice-based research. Today's nursing documentation is internationally important topic of research. The standardization of nursing practice and nursing terminology began to develop in the seventies with the aim of describing nursing practice. In the US, 63% of nursing documentation is kept in written form, and since 2014 all health institutions should have made a switch from written records to electronic records. If the quality is meeting the needs and fulfilling the expectations of people who use our services, we can perceive it through the conceptual framework of quality based on Donabedian. Donabedian's framework of quality tells us about the quality of the three constructs: structure - process - outcome. All this implies the absence of losses or wastage and continuous elimination of costs that have no value for people who use our services. The most commonly quoted elements of a "good" health care system relate to Donabedian's concept of quality which includes:

1. The structure and organization of care - the availability of human, financial and technical resources (investment), fair distribution of costs and benefits (equity).
2. The process - how the funds are used (control), use of time and resources (efficiency), avoiding the loss, reduction in risk (safety), evidence-based practice (appropriateness), care focused on patients (durability), public information (transparency, accountability) .
3. Outcome - the results achieved (implementation), population health (improved health), clinical outcomes (effectiveness), fulfilling the expectations of the public and employees (satisfaction), the value obtained for the investment (cost-effectiveness). (Stavljenić, 2008: 307-8).

Since 2001, Norwegian nurse must document their work in the patient's file, and the purpose of that is to ensure continuity of care, demonstrate nurses'

independence and to provide administrative data. (Moen, 2003; 40-1). WIPS model (well - being, integrity, prevention, safety)

was scientifically developed in Sweden, published in 1991, with a revised version in 1996, in order to support the systematic documentation of nursing care and providing care tailored to the needs of the individual. (Ehrenberg, 1996; 853-67). Nurses in Norway find it difficult to use and understand those templates because of underdeveloped computer skills. (Rykkje, 2009; 9-13). Much effort has been invested into the development of nursing documentation, systems of electronic documents brought new challenges since many nurses do not have experience working with computers.

2.1. THE IMPORTANCE OF NURSING E-RECORDS IN VUKOVAR GCH

With the implementation of Hospital Information System (HIS) nursing has received its place and importance in the hospital information system as an important segment. Scientific methods in nursing computerization are based on the preparation of nurses for the reception of computerization, analysing, formalizing and shaping information practices and knowledge in all areas of nursing - from nursing practice, clinical practice and management in nursing through education and research factors, conditions, parts, models and procedures that affect the effective and successful implementation of ICT in nursing practice and studying the effects of nursing informatics when there is already applied information and communication technology. (Kern, 2014; 3-5). The introduction of IT in health care and in the daily work of health workers leads to changes related to the organization of work, modernization and standardization of processes in that work at all levels of health care. For the implementation of IT an important prerequisite is the attitude of health workers and whether they accept information technology. The authors of the study have obtained the following results: health workers have positive attitudes but with an emphasis on IT education that fosters the development of a positive attitude. (Brumini, 2004; 113-14). Education is an important step forward in order to dispel the fear of new technologies and to stay up to date with new information insights. Nursing documentation in management is the process of working through the help of others in order to achieve the objectives of the organization and the management team also includes management work. Coordination of human resources promotes reaching strategic, tactical and operational goals of the or-

ganization with an aim of achieving a continuous balance of effectiveness and efficiency. Successfully performed task is effective, and efficiency constitutes the effective use of organizational resources. Management through its elements and functions includes planning, organizing, leadership, human resources management and control. Process control presupposes the definition and implementation of standards, measurement and elimination of deviations from the agreed standards and plans. Control includes control of quality, finance and efficiency. As a process of information gathering, interpretation, observation of performance, taking corrective measures, comparing actual results with expected results defines control as a cycle that allows input and output. Input as input resources, nurses' labour, energy, are ultimately transformed into the output, quality service in health care through the management process. (Ljubičić, 2010: 10). Providing care through nursing documentation takes into account the individual characteristics of the patient and holistic approach, so that all clinical decisions are guided by the patient's values and attitudes.

2.2. IMPLEMENTATION OF NURSING E-RECORDS IN VUKOVAR GCH

Information system in nursing is special in its field of action, taking into account that as a whole it is independent in medical informatics. Collected information, clinical data are the foundation on which we build nursing practice. The authors note that the use of information systems in nursing should:

- Contribute to increasing the level of knowledge, including defining the importance of data in nursing,
- Ensure systems for supporting decision-making in nursing,
- Inform patients about the care received,
- Ensure easier communication (access to patients' database),
- Ensure to patients a health care based on scientific knowledge. (Kern, Petrovečki, 2009: 335).

Nurses / technicians (N=190) in Vukovar GCH completed the training on the application of the nursing documentation in electronic form. The system was introduced in December 2011 with the aim of faster and easier data entry compared to the written form of documentation. Research conducted in the form of a questionnaire among 120 nurses revealed that nurses have accepted changes in the system and have obtained satisfactory results, but the survey gave

rise to the consideration of how to animate other members of the health care team about the appropriateness of documenting procedures. The head nurse of the hospital by means of E-care has the ability to control health care quality, and nurses and technicians received the opportunity of education and research using databases offered by E-care. (Aleksijević, 2012: 132). Nurses use health care informatics in practice, administration, education and research.

The authors emphasize the purpose of records in nursing through good communication between all team members and terminology aimed at describing nursing practice, quick and easy flow and access to information, and serves as legal protection, confirming the facts and claims in the event of a dispute, enables tracking of costs in relation to effectiveness, is a source of information for research and represents standard of nursing practice. (Ilić, Čukljak, 2013: 34). Good communication skills are of great importance in nursing.

Opportunities provided by nursing record in e-form were presented by Orthopaedics Department in Vukovar GCH for the specified period and the number of hospitalizations, average age, average length of hospitalization, the categorization of patients, the risk of decline, the need for continuous care – discharge letter, and parameter of need for other health professions. (Aleksijević, 2013: 25). Nurses collect patient data from primary and secondary sources using interviews, observations, measurement and analysis of the documentation. The data collected is use to identify a problem for planning health care with a high degree of safety. After discharge from the hospital the patient receives a discharge letter, in which should briefly and clearly be presented the received health care during hospitalization with recommendations for follow-up care. Nurses must continue to acquire new knowledge and skills to contribute to the development of nursing profession. Using e-records in nursing and database nurses are able to follow all the relevant health care data.

CONCLUSION

E-records give us a standardized approach to meet the individual needs of the patient and provides practice enriched by the evidence which allows us to improve the quality of overall health care with the presentation of expertise. The purpose of IT in health care is that the data, methods, organizations, technical resources provide information via data collection, archiving, processing and

communication for decision making with the aim of better and more efficient functioning of the health sector.

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