ELECTRONIC MEDICAL RECORD - SUCCESS OR FAILURE IN THE MEDICAL DECISION FROM THE ROMANIAN HEALTH SYSTEM ?

Assist. Adina Bălan Ph. D
University of Craiova
Faculty of Economics and Business Administration
Craiova, Romania

Abstract: The investments in informational and communicational technologies in the health field represent a for of investing in human capital because health and medical services will exceed the physician – patient relationship and the improvement of the physical and emotional condition of the individuals of a society will become a prioritary problem of the community. In Romania is noticed a high degree of data fragmenting, with a negligible communication, often inexistent, within and outside the system, and the decision makers of the health system hold exclusivity on their own data, fact that makes them unavailable to the other participants to the system. The software-s, the formats and supports used differ both inside the system and outside it. And because a patient is given a diagnosis without complete and safe medical data, the medical error is one of the causes for the incorrect diagnosis of the patient. The decision makers from the health system must take on responsibilities for the efficient and safe management of these data, to represent a desired issue for all medical institutions. Only the interconnected and standardized electronic medical files will be able to improve the medical decision and the care given to patients. The care will be safer, more efficient, the medical information will be also useful to other clinic physicians in time and space by using the informational and communicational technologies. The complete electronic medical record must include all types of information connected to the patient`s health (medical, family history, health file, hereditary-collateral antecedents, treatments, prescriptions, allergies) and they must be protected, shared by physicians, patients and those interested in a safe and extended environment. It is necessary to computerize the medical information specific to patient and the clinical processes, and performance in the health system will depend on the transformation of the medical services system by bringing the benefits of the medical science and technology to all individuals.

1. INTRODUCTION

The ageing of the population, the low birth rate, transborder health, threats or diseases connected to unhealthy life styles determine new health politics [**3**], so that the

health system needs performance, the transformation of the medical services by bringing the benefits of medical science and technology to all individuals [**3**] from every community.

In order to improve access to medical information from the health system it is necessary that all components that form it to see it as a whole and to bring improvements to the quality of health services at an unprecedented level.

The clinic physicians, the organizations of health care that support the supply of health must adopt a new set of principles that aim at reprojecting health processes [**7**] and bringing the change in an informational infrastructure based on innovation.

2. OBJECTIVES

If the organizations of health care, the professionals in the health system, the institutions, the decision makers would work together to project and implement an efficient management system in a more performant environment using the information and communication technology by preparing the work foce in a world of extended knowledge and rapid changes, then the patient, situated at the hearth of the health system would have access to quality health services. The quality of the medical service means a better health state, less pain, less disabilities [7] a bigger longevity and a much more productive work force.

In Romania, the lack of relevant data, the oversized volume of redundant or contradictory data, the lack of informational flow "from top to bottom", of feedback to data producers, and the fact that the data interpretation does not return in the system have as an effect a medical decision lacking information at the level of the basic data sources [3].

The prolonged waiting to benefit from a consultation, the excessive bureaucracy, the incoherent and restrictive legislative regulations which provide the periodical renewal of the prescription by the physician in case of long time treatments, lead to the agglomeration of patients at the physician`s door. Increasing the waiting time, the medical service becomes inefficient and of poor quality, and the physician wastes some time filling in scripts instead of giving consultations.

3. THE INFLUENCE OF ELECTRONIC MEDICAL RECORD (EMR) ON THE MEDICAL DECISION

The medical file, the most important instrument of the clinic physician, is formed of the totality of records, medical graphics, is the totality of documents that contain the individual medical antecedents, the health history, all the medical information of each patient.

The informational content of the medical file refers to the name, date of birth, residency, contact data, sex, blood type, date of the last examination, data on physicial examinations, results of laboratory tests, major diseases, surgical interventions, list of medicines, doses and length of prescription, allergies, chronic diseases, antecedens of diseases in the family.

As medicine is a field in a progressive development, the volume of circulating data increased, so that a problem that appears is to rediscover the necessary information in order to interpret them and deliver them to the patient in the management of his disease [3].

In Romania, in the medical office, all these data are written by the general practitioner in different formats, and the documents, the evidences and reporting are hand or automatically written. The drawing up of medical documents (prescriptions, sending

notes, registers) take up a great deal of the consultation time, subsequently reducing the time allocated to the actual medical act.

In the entire world the most important instrument on the table of the physician became the computer connected to a wider network, with a big and well maintained computational background. In these conditions, a process of functional computerization is absolutely compulsory in Romania too, and the generation of a unique standard for the projection of electronic medical information of the patient could be a solution.

It is obvious that any attempt to model an electronic information system should be fulfilled around the users [8] the medical personnel and any measurement of the system efficacy must take place based on its capacity to satisfy their information needs.

In the system the medical information regarding the clinical investigations are few, other than those for the patient`s identification, and those written in the past cannot be rediscovered. If unpleasant and laborious clinical transcriptions are electronically recorded, adequately archived, they can be rediscovered in the future, becoming useful to other clinic physicians too in taking the correct decisions to establish a quality diagnosis.

Another problem which determines the imperative necessity to use the medical electronic record in the entire health system refers to the fact that there is a time discrepancy, measured in days between ordering a clinical investigation and the return of its result to the clinic physician`s office, so that meanwhile, the greatest part of the patient`s history and his examination is possible to be forgotten, neglected by the physician. This analysis strengthens even more the idea that the *information about the patient must be done electronically and in real time*.

The electronic medical record – a basic component of any electronic health file is an evolutive concept, is defined as a systematic collection of electronic medical information about patients or population [15].

Superior to the manual registers, the electronic medical record is the totality of longitudinal and structured medical information, in a digital format, shared with all the participants to the system of medical care of the patient and integrated in the global informational infrastructure of the health organization.

In this interconnected network all *the relevant information about an individual`s health in a digital format from birth to death must be found* [3].

The purpose of the data transfer pursues the support of integration and share of all electronic records. Only these information can offer a complete image of the profile and of the medical history of any patient, so that the clinical decision will be correct if the medical data is administered in an integrated, interoperable, standardized, sophisticated decision support system easily to select the best treatment option. An interoperable efficient system must assure the data sharing and transfer at organizational and global level, the integration and transfer of medical knowledge and terminology, structured data and standardized messages between the clinical applications so that the requests between the applications should consult the same server of data bases.

But in order to rediscover all the clinical information the use of a common standard to all applications is needed and for the transfer and sharing of interoperability data, CDA - Clinical Document Architecture 2.0 may be the optimum solution because it is a standard which offers a model for the exchange of clinical documents, brings medical services closer to the accomplishment of an electronic medical record. Using the XML, HL7 Reference Information Model (RIM) standard and the condification of the medical terminology, CDA makes possible the reading of documents [6] which contain clinical information about the patient, easily to be electronically processed, analyzed and used by

the professionals from the health system so that the documents that observe the CDA standard may be shared through Web browsers which allow the manipulation of the XML documents. This product is based on the HL7 standard and can be successfully used in the most sophisticated clinical systems of decision support.

Especially in *the semantic representation area of clinical events*, CDA is a standard which allows the transfer and exchange of definite documents which contain complete information in a text , image, sound format and other multimedia content, and the intention is to facilitate the adoption at large scale of this standard, offering at the same time also a mechanism of elementary semantic interoperability [11].

Although the patient is not allowed to be a "spontaneous apparition" in front of the physician, he has a history which contains previous and present diseases, malformations, hereditary-collateral, professional, social-economic data, medications administered and the response to these medications, the dynamics of the results of the laboratory analyses accomplished during the years, etc. All these data, secret and rightfully and exclusively belonging to the patient or his tutor – according to case – must be presented in need to the competent medical personnel, in a minimum time, "on-line", to be clear and complete. The dusty files from the archives of a medical office or policlinic are of neglectable use on the spot and totally useless remotely. Today, no system of clinical information is sufficiently relevant and complete to serve as a model for the projection and implementation of a computerized system of medical information in the future. One of the immediate beneficial results of a unified medical file will be the disparition of certain diseases connected to the old bureaucracy of the medical system. The electronic medical record is the central piece of computerization of the health system and must include a few integrated components: electronic medical charts of patients, data bases with the best practices, medicine based on evidences, medical literature and communicational technologies. The sharing, standardization and integration of these components on a unique platform would facilitate the data exchange between users. The electronic medical record is efficient in the medical decision if the decision support system which uses it is conceived to make case analyses in order to generate diagnoses differentiated according to signs, symptoms, and tests results (figure no. 1).

A set of multiple and differentiated data entered in the system will allow the physician to generate efficient treatment plans specific to any patient through the identification of the medicine interactions, the monitoring of antibiotics use, of immunizations and the elaboration of a set of measures of preventive care.
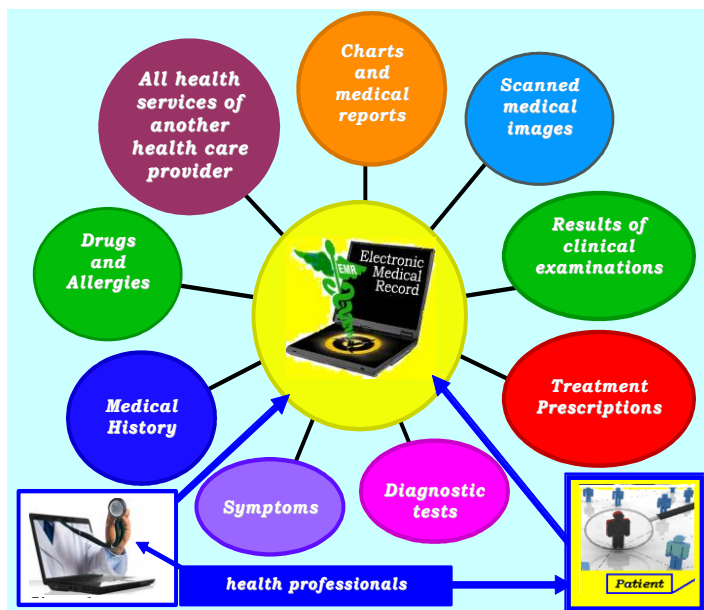

Figure no. 1 The electronic medical record: a conglomerate of data

4. CHALLENGES IN THE ARCHITECTURE OF THE ELECTRONIC MEDICAL RECORD

– THE UNIFORM AND GLOBAL STANDARDIZATION FOR THE HEALTH SYSTEM -

The big problems of medical information management can be solved by the informational and communicational technologies through their exchange in an electronic environment with the purpose to prevent the medical error, to reduce bureaucracy and improve the quality of health care.

It is imperative that these electronic information be transmitted to all the participants to the health system so that the medical history, the clinical results, examinations, symptoms, diagnostication tests, treatment methods, all prescriptions and services of medical assistance of other suppliers of medical services be "written" in a unique electronic health file.

The challenges the suppliers of medical assistance face and especially the physicians from the health system regarding the application of the electronic records must answer the question: TIC is the only means that reduces the medical error?

Not only the construction of an information infrastructure that could sustain suppliers of health care is a necessity, but also the architecture and the exploitation modality of the applications must facilitate the manipulation and administration of information in the computerized system.

A system easily to be used, in which more technologies cross, provided with alerts which validate the format of data written in a free text, image, sound, medical error, references not conforming to reality, values of the evaluation indicators of health condition must offer a considerable flexibility for all users and the necessary standards for data transfer and exchange.

The standards regarding data formats, their introduction in the system, messages, communication and security standards must be uniform.

Because the need of data availability and transparency increased [10], in order to apply these systems, the universities, the schools of health care and professional organizations should consolidate the educational programs for students and practitioners in using the computers.

Because the lack of data uniformity in an integrated network at national level [12], will hinder their use in all the institutions of medical assistance.

Without a standard of the electronic medical record, the interoperability of applications cannot be possible. Because for establishing a diagnosis a detailed description of the types of data that will form the record, of the subcategories of data is needed, it is essential that every medical information be defined in a standard at a very fine granularity level [18].

Each record field must be defined by length and type of date. It is very difficult to build a electronic medical record from disparate information, from non standardized data sources (pharmacies, laboratories, written notes of the physicians), isolated and with structures, codifications and different granularity levels.

Thinking that a complete codification of all information from the medical record would be necessary, this means that all the observations of the physician (even the free text) will have to be codified, fact that complicates things a great deal.

The biggest challenge in building a standard of the medical record will be the identification of the information that has to be codified [16] and what granularity level of data is necessary to establish a diagnosis.

But an excessive structuring of medical data that must enter into the system would limit the time of the physician and would lead to an abuse regarding the set of questions to which the patient should answer in order to establish a diagnosis.

Then, the data must be available in the entire system so that arises the problem if patients, with exclusive and access right to their own medical information can offer their consent regarding data availability. Only them will decide what parts of the electronic medical record can be published in the World Wide Web environment or used in a system.

Therefore the availability degree of medical information can also be a problem if we see things from the perspective of the patient`s consent and of the legal norms that regulate the confidentiality of medical data.

Consequently a system needs security levels for a electronic medical record.

A solution would be the authentication modality to the system by which the identity of the patient is verified, using more keys, so that the access rights of those who need certain information from the medical file are established by an identification code only with the patient`s consent.

The securization of information can be done by observing certain rules determined by the data content. Here a very small granularity degree of data is needed, so that by using searching engines in the system, the data be easily traced, and the data subcategories should allow the access of those who need it.

It is necessary that the system manage data on categories (cardiac, serological) and offer access to the finest granularity degree [17].

The data granularity request supposes also the control of the access to the individual elements of the electronic medical record [17] so that in the identification and authorization process as well for the data access, the user is denied if the security requirements were not fulfilled.

A medical record should contain electronic medical registrations with a very fine granularity degree. A model of structured information types included in EMR is presented in figure no 2.

An excessively structured data generates a quality diagnosis, however the time spent to register these types of data regarding diagnosis, medical history of the patient is significantly greater in the system than on the paper.

The shortcoming can result from the fact that the excessive entrance data structuring leads to a cognitive concentration loss of the clinic physician.

Another risk of an excessive standardization is that it could transform a medical report (which must be argumented) in an empty report, lacking content, containing only standard phrases. Too many standard phrases will diminish the value of the information and the legibility of a report of this kind [1].

And because the human error is frequent, people tend to delete, move, copy and modify erroneous data introduced in the system, so that the clinic physician finds himself in the situation of making a report which lies at the basis of the medical decision based on erroneous data.

The support systems of a medical decision permanently need "surveillance" in order to determine if their suggestions correspond to a certain case [14], so that the number of ramification conditions becomes too high and impossible to use.

Administrative data on patient

- The complete name, the patient`s ID, CNP, address, citizenship
- The written and scanned authorization of the patient for the use and stocking of his medical data in the form of an electronic record
- Age
- Occupation
- Place of work
- Number of the health insurance policy
- Phone number
- Marital status
- Other contacts in case of emergency
- Previous diagnoses
- The patient`s condition: active, inactive, exceeded or deceased
- The guarantor or the responsible party
- Name of the family physician
- Language spoken
- Date of the last medical examination
- Allergies
- Patient`s photo
- Patient`s e-mail
- The registration date
- Chronic diseases
- If he is deceases, the death date
- Blood group

Data on medical history

- Previous surgical interventions
- Family antecedents
- Registrations from the prenatal period
- The birth history
- Other information taken from suppliers of previous medical services
- Actual medication and chronic problems
- The medical history from the past, the social history, of the family, surgical interventions, immunizations, habits, infections, traumatisms.
- Psycho-social history
- Family history
- Report on the medications with adverse effects
- Blood group, allergies
- Previous diagnoses according to ICD
- The date of data updating in the system
- The digital signature of the medical data supplier
- Further comments
- Actual medication, immunizations.

Encounter Data Elements

- Symptoms
- Disease indicators
- Opinions, data for elaborating the clinical record
- Information with the patient's complete audit
- The attending physicians
- Procedures and therapies offered until this moment
- The diagnosis class
- The transfer of information from another data base
- Name of the department which offers further information on the patient (information of mental health, HIV, drugs, alcohol)
- The identity of the supplier of information external to the organization
- The identity of other suppliers of medical services in the care episode
- Diagnosis code according to ICD
- Failed treatments / therapies
- Name of the supplier of medical services.
- Actual medicines (codified)
- Allergies

Provider Data

- Names of the attending physicians and all the adequate information on them
- If they are active or inactive
- Practitioners` titles: MD, FNP, MSW, PA,
- Other contact information (e-mail, phone number, fax number)
- The supplier is always identified through specialty and his role: specialist, primary, family, general
- The name of the physician involved in the care episode.
- Specialty consultant and consultants during a care episode
- Care type (name, procedure, consulting data, duration, consulting report)
- Type of decision taken (sending to another specialist / consulting)
- Information about the medicines supplier
- Name of the supplier of other medical services during the care episode (radiology, imagery laboratory)

Diagnostic Data

- Name of the physician who interprets the results and tests.
- Authentification with password and username for the introduction of data in the system
- The graphic representation of examinations and results.
- Ordering the results to another supplier
- Order date, order number
- Test number, test date, hour
- Further comments written in a free text
- All results must be kept

Types of data in Electronic Medical Record

Figure no. 2 Types of data in EMR

5. EMR – EXIGENCY IN THE RESPONSIBILITY DEGREE OF HEALTH WORKERS AND SOLUTION IN THE REPROJECTION OF THE HEALTH SYSTEM

EMR is seen by many physicians as a panacea. Even if the electronic medical record allows the communication of physicians with other professionals of medical assistance, having as purpose the clarification of diagnoses and the achievement of further information, the use of EMR will continue to increase and modify the responsibilities of health workers, who must be familiarized with the computerized systems, but also with the standardized data which must be introduced in the system (standardized terminology, diagnoses, symptoms, laboratory tests, prescriptions), they must observe ethics regarding the confidentiality and security of medical data of the patients from the global data flow.

The efficiency of the electronic medical record also depends on the facilities offered by the implemented system of decision support, on the codification modality of data, according to the medical specialty (for instance the medical record of cancer suffering people will refer to specific records, to data bases of cancer patients, patology reports, diagnosis codes and treatment. This information can identify the participants to the clinic studies of medicines, can localize geographical areas with a great incidence of a certain type of disease, serving as a storage of clinical data, diagnosis tests[2], treatments results for future demographic reports.

Thus, if the health information is available at any time, in any place, but if they are not immediately introduced, during the consultation, a lot of the operations efficiency is lost and errors appear regarding the genuine nature of information when entering into the system. The marks and notes on the paper can be lost, and the paper in the pocket usually ends up in the garbage.

The medical records on paper support are still used in Romania, so that their gradual replacement with electronic records on computer will be a slow and developing process.

If the penetration of EMR in the medical assistance systems reached over 90% in Norway, Sweden and Denmark, in Romania they are at the opposite pole and the plan to build an integrated and interoperable computational system for health care with an informational structure based on electronic medical records is imperative.

It is true that the medical personnel of nowadays faces an unprecedented explosion of information, that on the quantity and complexity of the patient`s data, on the level of medical knowledge of the professional in the system depends the quality of patient`s care, but the fact that the manipulation of digital medical data is a difficult task for the health organizations is the consequence of the reduced level of digital competences of the system workers, fact not allowed in the century of informational and communicational technologies.

The application of the management systems of information connected to the patient`s health in the health organizations is a difficult process which supposes at the same time the organizational change, the change of technology adapted to the user type and the redefinition of the health worker with new competences.

The implementation of such a system contributes to the transformation of the organization [4] and is possible if it is sustained by future users.

A solid basis is needed for the organizational transformation in the administration and control of processes from the health system [4].

The notions of failure and success are mutually accepted if we analyze the fact that these systems can reduce the medical error, which produces deaths and high costs.

From another perspective, in the information systems of health organizations, errors can be rediscovered in the process of entering and searching for information as well as in the communication and coordination process.

Undesidered, these errors can be removed if in the computerization process of the management systems of medical information, the decision makers and informatics specialists in their projection and implementation become aware of the fact that users must be educated regarding the employment and utilization modality in order to avoid severe consequences of these errors [1].

The great number of deaths provoked by medical errors and the high costs should be an alarm signal for the patients` safety. A safe system is needed, which could allow a high degree of accessibility to electronic medical records and instantaneous access to medical knowledge bases. The lack of information is the cause of taking erroneous medical decisions. A system of electronic medical records can also be a failure because the behaviour of the system as a whole in any new situation [1] cannot be predicted. For the health professionals it is a complicated technology which can be destined to failure without an adequate instruction of the user.

The electronic medical record must be a component of delivering a medical service of high quality from any health system, and in order to improve the administration of medical electronic records and the reduction of errors caused by users in the system a few solutions could make this measure efficient:

- The existence of alerts with reminder messages;
- The possibility, by means of an interface, of the user to easily go from one medical record to another;
- The integration of instruments for the representation of medical data in a graphic form and as a report;
- The validation and verification of the information entered in the system from the global flow of medical data;
- The improvement of communication between all users;
- Automatized memento systems which would remind professionals of the actions that must be undertaken.

These solutions can contribute to the prevention of abuses of therapeutical or diagnosis interventions, but would also bring further working tasks to the health professionals, who are already burdened [5].

Such a system has shortcomings as well, even if the computer offers support to the quality medical decision and this is: it can trouble the work relationships and communication procedures.

The cause of errors may also be the disfunctionalities in the projection or application of a system of this kind, errors that could be the result of certain programming flaws or of other technical problems.

The establishment of clear rules within a health organization and of the precise roles in such a system can eliminate errors. Even if the reasons of the lack of budgets assigned to the instruction of health workers for the administration of these systems are real, still the decision makers from the health system must find solutions in order to eliminate the inconsistencies between the functioning of these systems and the real work requirements from the health system.

Thus, the work norms must be standardized and adapted to the requirements of the electronic systems of health care to all organizations from the system. Only this way the informational and communicational technologies will succeed to accomplish their mission,

and the possibility for a physician to refuse to search information in the computational system "because this is not his task" would be eliminated.

At the same time, the shortcomings of the administration applications of the electronic medical records can affect the medical decision of the clinic physician. A few of these are:

- The application does not return information in useful time, and this disfunctionality cannot be neglected;
- The information are not easily accessible, and their search is difficult; it is imposed that the system offers the user a high quantity of true information in the shortest time possible;
- Non suggestive and unfriendly interfaces that make the system navigation difficult and consumes much of the time of the medical assistance professionals .
- Incompatibilities between software and hardware which do not optimize the processes of the system;
- The non standardized medical terminology does not allow the data exchange between organizations and the communication with other professionals is essential (laboratory, ambulatory, hospital, insurer)
- The laboratory tests, diagnoses, medical history, prescriptions of non standardized medicines and not correlated with all the information in the system in order to take the best medical decision leads to serious errors in the medical care with disastrous effects on health.
- The entering and taking erroneous information from the system, the negligence of professionals without establishing the responsibilities of every health worker led by a legal norm in the exploitation of these systems leads to serious inadvertences and errors producing confusions.
- The different formats of the medical data from the system can create confusions and incompatibilities, so that restrictions are imposed in sharing data which do not observe standard formats. The data codification and structuring can be the solutions for this situation. There is also the negative part of the solution: due to the excessive structuring a lot of time is assigned to introducing data in the system as opposed to the clinic physician`s time assigned to researching the diagnosed case. This way the time spent with the patient becomes much more reduced than the time assigned to the introduction of his medical data in the system.
- The excess of data structuring brings benefits in the establishment of a diagnosis, in the construction of a model for the physician to understand the complexity of the case studied, as opposed to the time assigned to introduce data in the system.
- The excessive interfacing and the multitude of screens can lead to the loss of the case studied as a whole, so that in intensive care, where there is the need to simultaneously visualize graphics, images, reports, laboratory tests, list of medicines, hinders the possibility of physicians to be well informed [13].
- A system easily to be used is the one in which all data are saved in a data base and can be interrogated in any moment to consult previous data or to make future researches.
- Performance depends on the interaction with the user, on the abilities of the physician to use a Web browser. The instruction of the medical personnel will need the modification of the curriculum, the development of postuniversity programs of continuous formation, as well as the preparation of the future graduates of medical

schools in using the digital information systems. It is also a problem the availability to instruct the health workers. But this can be legally regulated.

6. Solutions to make the EMR systems more efficient for the rapid and efficient access of physicians to the digital information

The gathering of data using a defined vocabulary is needed, the selective extraction of data from the clinical evidence of the patient from various formats and time periods, the supply of clinic physicians with instruments for the analysis and evaluation of the risks necessary to the medical decision integrated in the system .

A minimum data set which applies to all EMR is needed, necessary to transmit complete or partial records of the patients` data, essential for the aggregation of information from several sources, either for the longitudinal records of individual patients or for the data bases with secondary records used for research or epidemiological purposes.

It is also needed a standard regarding the content of the records, the sets of data included, what data must be collected in order to obtain the same coherent and compatible information in all the EMR systems.

Data must be produced with the same technologies and in the same formats in order to be shared and transferred to various organizations, and the procedures, treatments, clinical observations, medical terminology and vocabulary must be included into a unique standard and used in all EMR. Standards are also necessary to assure the integrity of data from these systems.

For physicians EMR changes not only the way they manage the patients` files, the way they communicate, but increases the responsibility degree at the work place. The cost, the lack of tested systems, the obstacles in introducing the data in the system, the lack of certain uniform standards, the problems connected to the confidentiality of the patient`s data and the security problems will postpone the decision to implement such systems in the medical assistance.

If the technical performance of the system is not assured and it is not integrated with an organizational context (efficient leadership), the availability of instructing the EMR users and of adequate resources, the EMR systems could be a failure that would make the physicians` work more difficult.

Thus, the benefits that TIC can generate cannot be accomplished without profound changes in the management systems of the health organization, without the modification of responsibilities in the working flow of the workers, without acquiring digital abilities and competences, without profound modifications in the structure of all participants in the system and without an improvement of communication and of the team spirit. The success of this system resides in extremely powerful collaborations between professional and organizational groups [19].

The success and the failure factors of such a system result from the coherent management directions, from the opening degree to the organizational change [4] and from the solid control base of the processes from the medical care in a safe care system.

The inadequate use of these systems could rather *favour* errors, than *reduce* them, and a wrong link in an informational chain leads to serious mistakes with disastrous consequences.

The professionals need rapid access to relevant data for the case consulted. At the same time, they must be able to register a maximum amount of information in a minimum amount of time, useful to other professionals too who are involved in the trajectory of the patient`s medical data.

Without the implementation of such a system in Romania, the wrong diagnosis and the incorrect treatment of the patient`s condition will be the cause of deaths increase due to medical error.

According to a report in 2006 of the American Institute of Medicine, the medical errors were the eighth cause of death in the United States [20], contributing to 7.000 deaths annually, at an estimated cost of 37.6 billions dollars (USD) annually. Approximately 17 billions dollars from these costs, the report said, is associated to errors that can be prevented [9].

An informational structure more efficient than paper, more capable to manage in a centralized, robust and flexible way the patients` data is absolutely necessary in Romania, too.

7. CONCLUSIONS

To incorporate in an electronic file, accessible to anyone, the entire medical history of a patient named EMR, transmitted through a laptop or PDA in a network in order to be taken by all who need this information is a process which offers physicians valuable information in real time in order to take the best medical decisions directly at the care delivery point.

Professionals need fast access to data that are relevant to the case at hand.

No simple formula will assure the EMR success. The EMR success or failure depends on the management methods from the system, on the detailed analysis of the types of users and on the definition of the new optimization possibilities to use this system.

An optimum EMR system must be built using standards to manage the data bases, the stocking, acquisition and recovery of data, the texts processing, the images processing and stocking, the data exchange and standards for terminology and vocabulary, in a unique system of communications and network infrastructure.

Subsequently a electronic medical record is of good quality and efficient if the totality of the medical information in a digital format which determines it is according to the interoperability standards, have a very fine granularity degree, are managed and consulted by clinic physicians and authorized personnel from more health organizations and produce significant changes in the meaning of reducing the values of indicators that measure the patients` disease condition (or the patient`s safety) from medical errors caused by the lack of data from the health system.

The success of such a system brings forward the building and secured and protected management of the medical history, data exchange and transfer between all the participants to the system (physicians, laboratories, patients, state institutions), the updating in real time of the data base immediately after a consultation, the data gathering from more suppliers of medical services in a unique file, accessibility to medical information in time and space, the possibility of representation of the evolution of the health condition by specialized graphics.

The patient still waits for an answer if these platforms of informational and communicational technology would bring the success or failure in solving complex disease problems.

There are no final solutions to these problems until the decision makers from the health system create a collaborative environment in which all participants to health system will work together with the most brilliant minds in the academic environment.

The resistance of health workers to this change will be obvious taking into account their lacks connected to the digital knowledge and competences, even if the

system on paper support no longer works efficiently and even if the health organizations are overwhelmed by the huge amounts of the patient`s data, frequently incomplete and distorted.

The professionals in the medical field will see the benefits of holding the correct, relevant and opportunistic data in patients` care.

In Romania the implementation within the health system of EMR will be a very slow process. As long as the state politics will not invest in the education of patients, of health workers regarding the use of the new informational and communicational technologies the traditional systems of recording on paper will prevail.

The success of such a system depends mainly on the time assigned by users to searching data from the system, on the patients` possibility to allow access to their medical data. Leaving aside the obstacles created by EMR in the system, if the EMR systems based on standards would be implemented in Romania, of course with huge costs, the health expenses could be dramatically reduced at a level greatly below the value of investments in this infrastructure.

However, in Romania the HIT field (Healthcare Information Technology) is almost inexistent, so that the main barriers in adopting these solutions is the lack of political will, the lack of expertise, of the analysis capacity and of the qualified personnel of suppliers of computational solutions, besides the submination effects of the health workers on the system due to their lack of responsibility, for the reason it would harden their work. These systems will not be implemented soon in Romania because the suppliers of computational solutions will not succeed to develop interoperability and networks of solid information exchanges.

REFERENCES

1. Ash, J. S., Berg, M., Coiera, E — Some Unintended Consequences of Information Technology in Health Care: The Nature of Patient Care Information System-related Errors, Journal of the American Medical Informatics Association, Volume 11, Issue 2, March-April 2004, Pages 104-112.

2. Afrin, B., Oates, J.C., Boyd, C.K., Daniels, M.S. — Leveraging of Open EMR Architecture for Clinical Trial Accrual, AMIA Annual Symposion Proceeding, pp: 16–20, 2003.

3. Bălan, A. — The Management of Medical Services in the Informational Society, Universitaria Publishing House, ISBN 978-606-510-723-6, Craiova, 2009

4. Berg, M. — Implementing information systems in health care organizations: myths and challenges, International Journal of Medical Informatics, Vol. 64, Issue 2, Pages 143-156, December 2001

5. Berg, M., Goorman E. — The contextual nature of medical information, International Journal of Medical Informatics, Official Journal of the European Federation of Medical Informatics, Vol. 56 , pp. 51–60, 1999 [PubMed]

6. Clinical Document Architecture — http://www.hl7.org/implement/standards/cda.cfm

7. Committee on Quality Health Care in America, Institute of Medicine — Crossing the Quality Chasm: A New Health System for the 21st Century", NATIONAL ACADEMY PRESS, Washington, D.C, ISBN 0-309-07280-8, pp.34-35, 2001.

8. Committee on Maintaining Privacy and Security in Health Care Applications of the — For the Record: Protecting Electronic Health Information, National Academies Press (NAP), ISBN-13: 978-0-309-05697-7, 1997.

	National Information Infrastructure, Commission on Physical Sciences, Mathematics and Applications, National Research Council	
9.	Corrigan, J., Kohn, L., Donaldson, M., Institute of Medicine	To Err Is Human: Building a Safer Health System Washington, DC: National Academy Press, 1999.
10.	Committee on Improving the Patient Record, Division of Health Care Services, INSTITUTE OF MEDICINE	Editors: R. S. Dick, E. B. Steen, and D. E. Detmer, „The Computer-Based Patient Record: An Essential Technology for Health Care, Revised Edition", NATIONAL ACADEMY PRESS, Washington, DC, 1997
11.	Dolin, RH, Alschuler L., Boyer, S., Beebe, C, Behlen, FM., Biron, PV., Shabo, A.S.	HL7 Clinical Document Architecture, Release 2, Journal of the American Medical Informatics Association, Vol.13, Issue 1, pp. :30-9. Jan-Feb 2006, Epub 2005 Oct 12.
12.	Eastman, P.	IOM Report Calls for Standardized Electronic Patient Data Framework to Reduce Medical Errors, Oncology Times: Vol. 25, Issue 24, p 34-3625, December 2003.
13.	Faber, MG.	Design and introduction of an electronic patient record: how to involve users?, Methods of Information in Medicine, Vol. 42, Issue 4, pp. 371–5, 2003. [PubMed]
14.	Goldstein MK, Hoffman BB, Coleman RW	Patient safety in guideline-based decision support for hypertension management: ATHENA DSS", Journal of the American Medical Informatics Association, S11–6, Vol. 9, Nov-Dec suppl 2002.
15.	Gunter,T. D, Terry, N. P.	The Emergence of National Electronic Health Record Architectures in the United States and Australia: Models, Costs, and Questions, Journal of Medical Internet Research, Vol.7, Issue 1, pp: e3, 2005 Jan–Mar, Published online 14 March 2005.
16.	McDonald, C.J.	The Barriers to Electronic Medical Record Systems and How to Overcome Them, Journal of the American Medical Informatics Association ,Vol. 4, Issue 3, pp: 213–221, 1997 May–Jun;
17.	Schoenberg R, Safran C.	Internet based repository of medical records that retains patient confidentiality", British Medical Journal, Vol. 321, pp :1199-1203, 11 November 2000
18.	Watzlaf, V.J.M, RHIA, F., Zeng, X., Jarymowycz, C., Firouzan P.A.	Standards for the Content of the Electronic Health Record", Perspectives in Health Information Management, Vol.1: 1, Published online 2004 January 7
19.	Westbrook, J., Braithwaite, J., Gibson, K. Paoloni, R. Callen J., Georgiou A., Creswick, N., Robertson L.	Use of information and communication technologies to support effective work practice innovation in the health sector: a multi-site study, BMC Health Services Research, 2009, 9:201, The electronic version of this article can be found online at: http://www.biomedcentral.com/1472-6963/9/201)
20.	***	Medical Errors: The Scope of the Problem (www.ahrq.gov/qual/errback/htm).