Chapter 11

HOSPITAL INFORMATION SYSTEMS AS MANAGEMENT TOOLS

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Abstract: The chapter presents an outline of conditionings in which closed health care institutions function nowadays. On this basis information flow has been characterized with division into subjective and objective elements of this flow. Selected sample hospital information systems as tools responsible for information management in health service units have been described.

Keywords: information, medical informatics, hospital information systems

Introduction

Information is a representation of reality, which leads to changes in the behavior of the recipient [1, p. 43]. Information in business includes all flows of data within an organization and between the organization and external parties (e.g. customers, suppliers, governmental institutions, etc.) [9, p. 9]. From the popular perspective Greniewski describes information as a message about something obtained on the basis of observation or reflections as well as something conveyed by human to human [2, p. 17]. Currently in the world of Internet information has gained a broader context. The information is analyzed and converted to a simple form of data and messages whose task is to inform the recipient about specific situation to help him in decision making process [11, p. 204].

Observing stages of economic development one can notice an increase of information significance. At present everything what is conveyed orally or in a graphical, sound or textual form is a piece of specific information which can be used to carry out particular activities. An organization which properly collects and then uses a store of information increases its opportunity to obtain and maintain competitive advantage. It is so due to lack of realization of unnecessary actions resulting from an incoherent or illegible announcement. Availability of modern technologies creates new possibilities which allow organizations to make more and more effective decisions. In this context also closed health care institutions should be treated as a living organism - organization.

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The subject of information management in company is not a new issue; however these days at the stage of technological development a greater significance is attributed to it. The organization of the channels through which information can be exchanged are compared to the bloodstream in the human body. Due to the growth of the internet you can see a tendency to move away from direct communication to indirect communication - using technical means of communication. Therefore becoming increasingly important to use tools including on-line to the process of communication between employees [6, p. 33-34]. The problem of skilful information management with the use of currently available technologies grows in importance especially with reference to hospitals. Each single health care unit has in its structure a number of organizational units which are forced to take daily cooperation between each other but also cooperation with external subjects which are often characterized by other procedures and guidelines in the communication process. From the perspective of hospital which is often burdened with necessity of a skilful quick adaptation to changes occurred in the surroundings, efficient and effective information management seems to be a key issue. If one wants to raise the issue of information tools used in the process of information management he should become familiar with conditionings in which current hospitals function.

The aim of the article was first of all focusing the reader's attention on the aspect of information flow with the use of hospital information tools and identification of dependences between information flow and used information systems in hospital. In order to introduce this issue it was necessary to present an outline of current functioning conditions of closed health care institutions. The second aim of this study was to demonstrate significance of providing compatibility of information flow between each area of hospital operation i.e. between its administrative part, management and fundamental activity which is providing medical services. In the article the issue of information flow with using information tools was discussed as well as selected sample hospital information systems responsible for collection, conversion and availability of hospital information were presented.

11.1. Outline of operational conditions of closed health care institution

According to a definition given by the act from 1991: health care institution (hci) is a separated organizational group of people and property assets, which was established and maintained in order to provide medical services and health promotion [18]. Term health care facility is used to separate organizational units whose main activity is the provision of health services and health promotion [20, p. 137-140]. A specific feature of hospital treated as health care institution is necessity to provide medical services to each person individually or particular group of people, especially in case of life threat.

At present on the Polish market there are non-public and public health care institutions. Public hospitals are established and maintained by minister or central government body, provincial governor, public medical university and local authority unit. They can conduct their activity in two forms i.e. as independent or dependent

health care institutions. On the other hand, non-public health care institutions (nhci) are organizational form of carrying out activities but the legal form of conducting activities is a subject setting up a particular non-public hci [15, p. 51]. A body which forms nhci might be for example church, foundation, association, local authorities, legal or natural person. Non-public hospitals have a capability to function according to organizational and legal forms consistent with commercial law.

Each health care institution exists in strictly specified economic and social surroundings. These surroundings are the collection of all changeable elements and processes occurring in macro and micro spheres, which must be taken into account by organization to provide its efficient operation [17, p. 66-71]. According to a definition presented by R.W. Griffin the surroundings are divided into external and internal; external surroundings is everything which is beyond organization borders and can have influence on it. Analogically to the definition of external surroundings one can present internal surroundings, which can be understood as the set of conditionings and impact forces functioning inside an organization [5, p. 75]. J. Leowski distinguishes the following elements participating in the Polish health system and at the same time making the surroundings for hospital:

- Patient: who is the subject of the system,
- Medical personnel: a group of people obliged to provide medical help,
- National Health Service: represents client as well as payer,
- The State: imposes method and form of functioning of individual or unit,
- Society: generates the demand for medical services; is an indirect source of keeping hospital in the system of social solidarity.

In his book titled 'Zdrowie publiczne - wybrane zagadnienia ('Public health - selected issues') J. Klich defined determinants affecting goals of hospital functioning. Among them he detailed:

- legal regulations concerning hospital activity,
- location of hospital in the Polish health system,
- subjects cooperating with each other within the sector of health protection,
- groups of hospital subjects: patients and their families and employees [8, p. 323].

Many factors have influence on proper functioning of hospital. The primary ones are political and legal factors. Contrary to appearances, the changes in health care have been connected with political sphere. This phenomenon can be visible best during both parliamentary and local elections. Each ruling party has a partial impact on a final shape of acts or reforms within health service, what results in organizational and legal changes of hospital functioning. This subject is also difficult because of the pressure area of local authorities on the way of carrying out activities of their subordinate health unit. Therefore in this article it will be treated marginally. Legal factor affecting hospital activity is manifested in legal acts which impose upon hospital adjustment to issued laws [4, p. 23] and requirements of National Health Service which determine a possibility to enter a contest for contracting medical services. In the second place a board has influence on the way of hospital operation. The board is responsible for supervision and arrangement

of processes occurring in hospital as well as for efficient adaptation of procedures and structures to changes occurring in the surroundings. Another influence group consists of employees who are - in large measure - responsible for the quality of provided services. They are the driving force of hospital and their interests are represented by particular trade unions, which must be held in high esteem by hospital board, especially at the moment of implementation of change schedule. Employees and the board are forced to move skillfully between political and legal spheres. Against all appearances the group which has the smallest impact on the way of functioning of closed health care institutions are patients - in this case the demand for medical services exceeds the supply.

11.2. Information flow in hospital

Information circulation for every company is an indispensable and crucial element determining efficiency of organization activity; therefore each information system should be formed in a way when all information reaches a final addressee quickly and unchanged [10, p. 64]. In the subject literature it is assumed that the company management system consists of two main subsystems i.e. information and material & energetic [18, p. 76]. Within its range, information system also covers such fields of enterprise existence as: economy, management, computer science etc. Due to such a broad spectrum it is not possible to give one, explicit, commonly accepted definition of information system. A. Nowicki characterized information system as spatially and temporally defined collections of information, senders and receivers and channels of transferring and converting of information, which aim is to manage a company [13, p. 17]. A different definition is given by J. Kisielnicki& H. Sroka. They assume that information system is a multi-storeyed construction, which allows its user to transform particular input information into expected output information with the use of suitable procedures [7, p. 19-23]. In the above shown definition there is an expression of collection of information which means a set of messages transmitted in numerical, textual, graphical or sound forms. In health care institutions all the above mentioned forms of information occur. Another element of information system are senders along with receivers of information by whom we should understand natural persons, organizations and legal subjects. Whereas information channels are understood as paths due to which there is information flow between senders and receivers.

In this article focuses only on internal technical means by which it is possible to process and transfer of information within the hospital. We analyzed hospital information systems used in a multidisciplinary hospital in Silesia. The study was conducted on the basis of personal observation and interviews with employees from different organizational units of the hospital.

The subject elements of hospital information system, which is understood as senders and receivers of a message, are distinguished organization units participating in conveying and exchanging information. Those units might be people from any rank of organization management. In hospital information system we can

distinguish both internal and external subject elements. Internal elements in the characterized hospital may include people who are parts of such organization sections as:

- Board,
- Economic and Financial Department,
- Administration Department,
- Department of Contracting & Supervising Medical Services,
- Legal Department,
- Internal Audit Department,
- Human Resource Department,
- Department of Medical Documentation & Statistics,
- Industrial Safety Department,
- Energetic Department,
- Electric Department,
- Operational & Technical Department,
- Hospital Departments,
- Operating Suites,
- Specialist Hospital Outpatient Clinics,
- Dissecting Room,
- Blood Bank,
- Central Sterilization Lab,
- Department Pharmacy.

In addition, the present health care facility uses the services of outsourcing, which include:

- IT Department,
- Diagnostic Departments,
- Nutrition Department,
- Supply Department,
- Laundries.

In each of the above mentioned elements of the company organization structure there comes to exchange of key information which goal is proper functioning of a particular institution. Depending on a hospital size and a range of provided services the list of subjects which are parts of organization structure within outsourcing will prolong or shorten and thus it will affect organization structure of a particular unit. Particular departments providing specialist medical services should be here also taken into account as well as more and more popular quality department. Among internal elements crucial from the perspective of the system of conveying information there should be trade unions located within hospital and potential beneficiaries understood as patients undergoing treatment in a particular medical unit and hospital's customers. A customer for closed health care institution is also National Health Service, which through a signed with a particular hospital contract purchases a set of defined round-the-clock medical services along with employees and medical equipment of a given hospital as well as its rooms.

In discussed closed multi-specialty health care institutions a number of employed reaches eight hundred persons, and the number of specialist departments is 14. In such a big company which has numerous organizational units everyday there comes to exchange of thousands of information, from which a part has a significant influence on quality of medical institution management. Information is conveyed both inside an organization and outside to cooperating subjects, which might be for example organizational units sectioned within the scope of outsourcing from hospital structures.

The most important external subject elements of discussed hospital information system include:

- petitioners, from whom we can distinguish: future patients, their families and individuals representing interests of patients or their families, sales representatives and future trainees, residents and probationers,
- subjects supporting or financing hospital activity such as:
  - banks keeping hospital accounts,
  - National Health Service: signing contract with it will allow hospital to fund medical services within public health care,
  - donors,
  - paid clients e.g. uninsured people,
  - founding body, which in case of commercial companies has an ability to provide financial help for hospital e.g. debt repayment,
- beneficiaries, who according to the act of health care institutions are patients with the right to use general health insurance [19]. From the perspective of a board all people who make decisions about gaining medical service in a particular health care institution should be treated as beneficiaries; thus those are people who use hospital medical services e.g. staying in a department within inpatient care and using services of outpatient clinics or diagnostic equipment. Among beneficiaries we can distinguish individual and corporate customers. By individual customer we understand a patient provided with general health insurance as well as people without such insurance. Corporate customer is National Health Service (NHS), which on behalf of people provided with insurance purchases a defined amount of services in a particular health care institution,
- supervising and controlling subjects: Ministry of Health, Sanitary & Epidemiological Station, Local Authority, the Founding Body, National Health Service, Bioethics Committee (in specific conditions), Provincial Consultants from a particular field of medicine, Fire Brigade Inspectorate, Construction Supervisory Office, other State Supervising Bodies,
- suppliers of medical equipment, medicines, sanitary materials and disposable devices,
- contractors of outsourcing services,
- other hospitals, outpatient clinics, private medical practices which function nearby,

- other subjects: here we should list bodies as well as institutions which are located in the closest surroundings of hospital and which are senders and/or receivers of information but have not been mentioned above such as:
  - the Social Insurance Institution,
  - Inland Revenue,
  - The Police,
  - Distribution companies (gas, electric energy, water etc.),
  - Public Prosecutor's Office and courts of particular instances.

In the process of information flow the NHS plays a double role. On the one hand it will purchase medical services and thus finance the basic hospital activity, what is connected with information flow concerning contract, requirements for its conclusion, conditions of contracting services, monitoring criteria etc. On the other hand, for hospital the NHS is a customer and controller, which requires realization of contracted services only and monitors the course and legitimacy of providing them.

The subject elements of discussed hospital information system include collections of data from various kinds of documents. They can also be divided into internal and external. Among the most significant external documents we should distinguish:
- legal acts,
- external patient's medical documentation, which includes e.g. medical history of past diseases,
- civil legal contracts (purchase, sale, lease, rental, bailment etc.),
- notarial deeds,
- bank documents,
- financial documents such as bills, invoices etc.

The following documents from internal collections of information:
- medical documentation i.e.: examination results, medical and nursing observations, diagnoses, description and registers of conducted procedures, treatment methods, used medicines, prescriptions etc.,
- documentation of medical statistics,
- regulations of particular hospital units and the entire institution,
- ranges of duties,
- position instructions,
- guidelines and internal orders,
- interpretations of legal regulations regulating hospital activity.

Taking into account a large group of senders and receivers of information and diversity of transmitted messages one should analyze paths of information flow in discussed health care institutions. Information channels are understood as possible paths of flow of particular messages (news, data, information), which together form a communication structure. In discussed hospital information system we can distinguish the following kinds of information channels:
- personal contacts,
- telephone contacts,

- contacts by traditional correspondence,
- the Internet, which is broadly used:
  - makes information available,
  - provides access to e-mail,
- the Intranet, which covers internal computer networks of a particular health care institution. It contains e.g.:
  - documentation of medical systems,
  - internal electronic mail,
  - regulations of particular hospital units.
- additional information channel which can be applied is Extranet, which is a combination of two or more computer networks using WWW servers and thus providing a quick communication between particular organizations [12, p. 143]. Characterized hospital doesn't use the Extranet.

11.3. Hospital information systems determining information flow

In order to analyze thoroughly hospital information systems used for exchange of information it is necessary to start the process of diagnosis from considering which features will distinguish medical computer science from industrial informatics. The first diversifying feature is the circle of users - computer hardware is used first of all by doctors, then by administration personnel and nurses. To a large extent medical personnel is characterized by average technical skills and lack of will to broaden knowledge of technology - mainly because of the dominating view that a doctor has to treat and his duties include improvement of qualifications from medicine, not informatics. In addition, medical personnel is not as scrupulous and exact as for example employees of financial department. Therefore software assigned for health service must be, if possible, characterized by maximal simplicity of use and high resistance to mistakes made by people using it e.g. through the use of option of multiple reverse or possibility of leaving a program at any moment. The second diversifying feature is the subject issue of collected and converted information. In hospital information systems data concerning patients and their diseases - so called sensitive data - are collected and converted. So contents of the above information should not be lost, modified and above all - revealed to outsiders. Another feature is a tool used for collecting a large number of information - specialist equipment - both diagnostic and therapeutic. Medical equipment collects much information about patients recording it not only in the form of texts or numbers but also images (X-ray image, visualization of internal organs with the use of computer tomography or magnetic resonance), video recordings (recording the image of coronary vessels during the flow of contrast - coronarography) and signals (e.g. ECG - electrocardiographic record or EEG - electroencephalographic record). One should know how to efficiently collect, search for, convey or make this kind of specific information available. Making data available not only inside a particular hospital but also sending them to other health care institution is directly connected with information safety and thus requires using special solutions. That being so, special mobile devices

(apparatus, portable medical equipment) and security systems are made for the needs of hospital informatics. Becoming absorbed in the issue of medical informatics we can notice that computers in hospital play three different roles: namely they are:

- used in order to support administrative part of hospital activity - combination of treatment activity with administrative side (e.g. patients' registration, accounting for medical services etc.),
- used for diagnostics, counselling and therapy,
- used in order to collect, convert and make data about patients available [16, p. 13-22].

R. Zajdel distinguishes the following kinds of hospital information systems, which are:

- providing service of ambulatory health care,
- dedicated to the nurses' needs,
- pharmaceutical which support activity of hospital pharmacy,
- hospital - operating closed health care,
- dedicated to blood-donation and hemotherapy centres,
- IT system for National Health Service,
- supporting management,
- dedicated to specialist subjects [14, p. 194].

In this study attention has been mainly focused on hospital systems determining information flow and thus characterized by a larger scale of impact than for instance ambulatory systems and which implementation is very significant for medical personnel.

Before moving to further part of the article it is necessary to explain the issue of hospital information structure: namely each system is based on an appropriate structure. Nowadays the best solution are network technologies which are the most beneficial from the economic and ergonomic perspective. Implemented software should work in the LAN & WAN networks providing at the same time information access control (logging in, password, coding, enciphering), compatibility with other equipment platforms and operation systems as well as it should take into account different network protocols of sending and exchanging data. Hospital information structure in this closed health care facility was presented in Figure 11.1.

In discussed hospital process of exchange of medical information starts at the moment of patient's registration by employee operating the module responsible for collection and conversion of patient's data - registration system. The system task is to recognize patient as a new customer or the one introduced into records earlier and already figured in database. A new patient receives an unique identification number due to which all collected information about him is passed on, exchanged and made available to other modules of information system e.g. analytical laboratories, diagnostic laboratories, hospital departments, hospital administration department etc. In discussed hospital system is divided into two subsystems; one deals with medical aspect, whereas the second with administrative. The first subsystem include the following modules:

- patients' movement,
- registration to outpatient clinic or specialist department,
- single clinics,
- single rooms,
- single departments,
- case history,
- operating suite,
- pharmacy,
- department medicine chest,
- analytical laboratory,
- diagnostic laboratory (separate module per each laboratory),
- feeding,
- storeroom,
- archives,
- orders,
- note of treatment charges,
- calculation of medical procedures,
- settlements,
- management information system,
- budgeting,
- central sterilization lab.

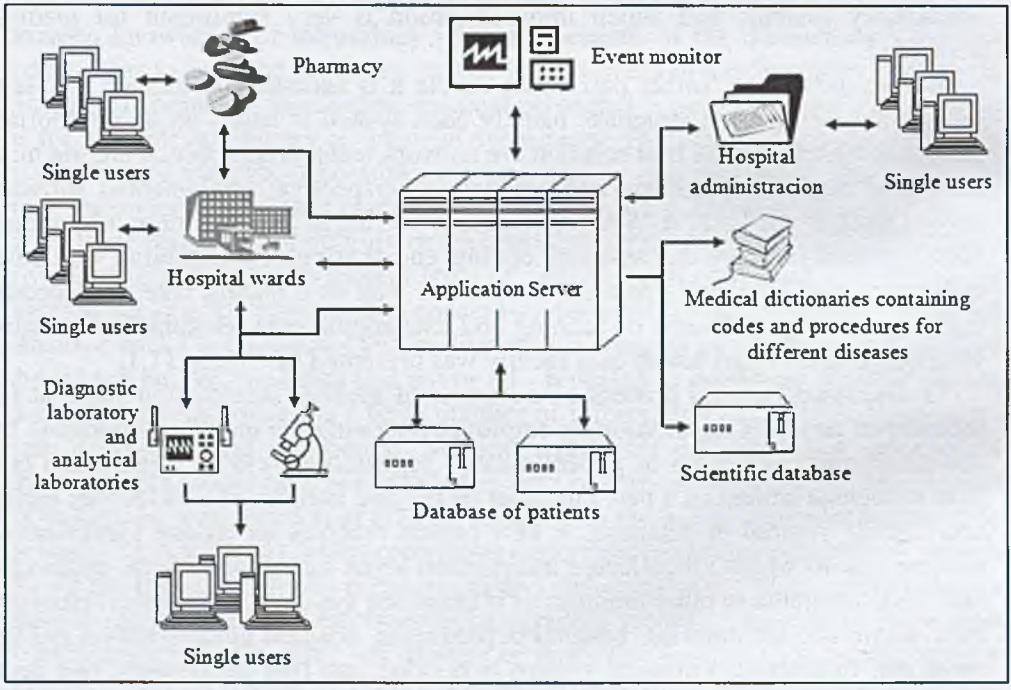

Fig. 11.1. Sample simplified structure of Hospital Information Structure

Source: Own work

Within administrative or administration & management subsystems it is possible to specify the following modules responsible for the process of collecting and converting information:

- accounting,
- human resources,
- salaries,
- capital assets,
- stock management,
- system supporting decisions,
- system of document circulation.

A fundamental task responsible for efficient operation of organization especially the one like hospital should be providing the shortest time to access of information as well as its exchange. In this perspective a task of each information system is an attempt to shorten that time in the conditions of constant increase of data [10, p. 130]. Taking the above into consideration, more and more modern IT solutions are created and dedicated to hospital needs, which range of tasks realized inside hospital is determined by modularity. It should be emphasized here that medical systems are not only solutions closed inside a particular health care institution but also they must co-exist and cooperate with other subjects who are interested in activity of that institution and those with special relations resulting from concluded agreements, contracts, etc.

11.3.1. Hospital administration systems

Computer operation of medical administration is the heart of health care institution, due to which effective and efficient institution management is possible. First of all, tasks of computer hospital administration service in discussed hospital include:

- recording substantial and financial medical services,
- recording fixed and intangible assets of hospital,
- personnel & salary activities.

Two last points mentioned in the above list cover the same activities which occur in other companies not being health care institutions; therefore they will not be discussed in this article.

Currently it is common to use a computer for registration - admitting patient to hospital and collecting basic information about patient, on which basis electronic card index will be made. Another element is creating an electronic queue list of admission, which defines date and procedure of patient's admission. The main advantage of electronic queue list is possibility of constant monitoring of included information by interested party i.e. patients and NHS. Electronic registration is not only a collection of basic data about patient; it also consists of registration systems of doctor's orders and systems of personnel and hospital resources management. It must guarantee access to external systems of knowledge [16, p. 24].

Obtaining funds from National Health Service (NHS) for functioning hospital is inseparably connected with hospital activity. This process is reflected in preparing and sending quality and quantity analytic reports concerning realized medical services. That being so, very often one of hospital administration modules is a reporting system for NHS, which has a precisely defined by payer method of reporting - information included in the report should be conveyed using the XML format. The main problem for suppliers of this kind of module are very frequent changes of reporting requirements from NHS, which is a big impediment to maintain cooperation between other dedicated solutions. Implementation of this module is often accompanied by implementation of module responsible for patients' movement. From the perspective of managing closed health care institution an equally crucial module is the module of hospital pharmacy. This module allows for monitoring of medicine expenditure per single patient, use of medicines for particular groups of patients according to codes ICD10 (international list of codes of disease entities) and determining the demand for medicines on the basis of retrospective analysis from the previous periods. A possibility of forming the above mentioned data sets allows to visualize treatment costs of single patient and particular disease entities. Thus it is possible to carry out optimization of orders for particular medicines and monitoring the level of generated in this aspect costs [14, p. 194-195].

11.3.2. Information systems dedicated to hospitals

Just like in other companies, forming medical information systems is based on information exchange in accordance with guidelines of the structure client-server. A task of the server is operation of demands sent by 'client'. In practice all hospital information systems responsible for information exchange have a modular structure. Such a solution seems to be the only one and possible to use in health service first of all due to a wide range of tasks realized within health care institution, the need of smooth information exchange between particular modules, constant conversion of gathered information and sending it to databases as well as because of a non-uniform level of computer skills among employees. Therefore particular modules should be as simplified as possible from the user's point of view. In discussed hospital IT infrastructure has constant modules such as:

- patients movement,
- reporting,
- hospital pharmacy or department pharmacies,
- specialist modules.

Many from the above mentioned modules function independently. Thus they formulate separate systems. However while working together they form hospital information system responsible for information management. The selected most important information systems dedicated to hospitals mainly due to their functions and range of information have been characterized below:

1. Group of systems produced by Kamsoft PLC
   Kamsoft PLC provides solutions dedicated to medical and pharmaceutical sectors including clinics, laboratories, dentistry, family doctor offices and hospitals. One

of their products is the system KS-MEDIS, which is responsible for complex hospital service. Several dozen modules are responsible for nearly entire informatization of hospital organizational units: from admission room, particular departments, controlling of laboratory, to stock management and financial & accounting department. An interesting solution is also KS-SOLAB (Integrated Laboratory Service), which task is to improve the process of conducting laboratory examinations, preparation of reporting documentation, management of laboratory analysis results, controlling quality and coding samples etc. In discussed hospital, this particular system is used.

2. Eskulap
   The system consists of two integrated subsystems: medical (so called white part) and administration & management (so called grey part). The main system functions include registration, making out orders to clinics, laboratory or consultations, records of case history and made decisions about further treatment of patient, admission to department (patients' movement), keeping temperature card and book of orders & conducted medical procedures, records of patient's results, drug administration, realization of discharges from hospital and calculation of treatment costs.
3. Hipokrates
   It is one of the biggest hospital information systems (HIS), which task is a complex support of hospital service. Within its reach the system covers medical, administration and management areas. Thus it makes collection and conversion of comprehensive information about patient possible and allows to calculate treatment costs, control service quality and account for medical services etc.
4. InfoMedica
   It is a complex software packet, which consists of two groups of software. The first one concerns medical systems; information from the records of medical services is collected and converted here i.e.:
   - patients' movement,
   - medicine turnover,
   - turnover of materials used during treatment,
   - registration of examinations and procedures,
   - recording consultations and medical procedures,
   - register of using diagnostic laboratories,
   - list of conducted laboratory tests.

   The second group of software is responsible for recording economic events; the scope of information concerns here financial & accounting, material and personnel & salary specifications. The main task of software is facilitation of registration and settlements, both quantity and financial medical services, which are provided within the contract with National Health Service, and other commercial payers. In discussed hospital, this particular system is used.
5. NetRAAD/CliniNET
   The system NetRAAD is a solution dedicated to image diagnostics laboratory; it allows for a complete exclusion of plate work. The system allows for integra-

tion of all image devices and access to images and textual information e.g. descriptions of computer tomography results. Access to the data is possible from hospital internal network and through the Internet using WWW browser. The module can be integrated with the hospital module CliniNET forming HIS in the hospital as a result.

6. OPTIMed
   The system combines the operation of medical and administrative activities. Modular structure makes configuration according to user's demands possible; the basic system modules include registration, admission room, hospital pharmacy, particular department pharmacies etc. [14, p. 197-198].

The above presented plain list of solutions dedicated to closed health care institutions has one common feature: comprehensiveness. Each of the above described systems provides operation of both medical and administrative activities and because of that consolidation and coherence of exchanged information is possible. Supplements to particular systems are specialist systems to convert graphic and sound information, which occur as a result of conducted examinations with the use of specialist diagnostic equipment.

Conclusions

Information systems in health protection play a crucial role in solving problems from broadly defined area of management and finances. They find a greater intended use in particular units of health protection, where their purpose is providing necessary databases and converting included information for defined needs [3, p. 493-501]. Information systems as tools used for information management must meet a number of important criteria like:

- providing comprehensiveness of solutions - combining both administrative & management aspect of hospital operations as well as medical,
- guaranteeing compatibility with other systems functioning inside and outside hospital structures,
- not disturbing a sent message - not causing modification of content of sent information,
- taking up data from other systems and combining them into one piece of information,
- converting information: textual, graphical, sound and in the form of video recordings,
- creating network of message receivers.

Using hospital information systems in the process of information flow affects quality of carried out management activities inside an organization but also helps in efficient cost administration of hospital operations. Due to collection of collateral information about patient (by collateral the author means all data not connected with patient's health state) such as administered medicines, conducted services, undergone procedures and carried out diagnostic examinations it is possible

to make an efficient calculation of hospital costs for one customer. Since the moment of patient's registration in Admission Room, the financial department starts collecting all important (from their perspective) data necessary to calculate income and costs but also settlements with National Health Service. The above mentioned example is not the only one which shows importance of information in the process of health care institution management. There are lots of similar examples. Using hospital information systems facilitates information flow to a large extent and thus determines effective institution management and helps in the process of making life-saving decisions as well as those connected with hospital activity. The crucial problem here is choice of an appropriate system based on defining all processes of information flow, their competent grouping and placement in system modules.

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SZPITALNE SYSTEMY INFORMATYCZNE JAKO NARZĘDZIA ZARZĄDZANIA INFORMACJAMI

Streszczenie: W rozdziale przedstawiono zarys uwarunkowań, w jakich funkcjonują obecnie zamknięte zakłady opieki zdrowotnej, na tej podstawie scharakteryzowano przepływ informacji w podziale na podmiotowe i przedmiotowe elementy tegoż przepływu. Scharakteryzowano wybrane przykładowe szpitalne systemy informatyczne jako narzędzia odpowiedzialne za zarządzanie informacją w jednostkach służby zdrowia.

Słowa kluczowe: informacja, informatyka medyczna, szpitalne systemy informatyczne