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Organizational and Methodological Approach to the Description and Standardization of Treatment and Diagnostic Processes in a Multidisciplinary Hospital

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ABSTRACT

Today, there is a tendency to shift the focus of management from structural units to treatment and diagnostic processes in Russian healthcare institutions. To organize effective management of the treatment and diagnostic process, it is necessary to have its formalized description. This article presents the main results of a study conducted on the basis of N.V. Sklifosovsky Research Institute for Emergency Medicine, which was aimed at the development of an organizational and methodological approach to the description and standardization of treatment and diagnostic processes, taking into account the specifics of the activities of a multidisciplinary medical hospital.

When developing the organizational and methodological approach, the methods of system analysis and modeling, factual data on the structure and parameters of the treatment and diagnostic processes of the hospital, as well as the experience and expert opinions of the Institute staff were used.

In the course of the study, the analysis of the organizational and economic characteristics of the treatment and diagnostic processes was carried out and the requirements for the format of their description and the introduction of the notation into the practice of the hospital were formulated. Taking into account these requirements, the authors have developed and presented the format of the modified operogramme, which combines the ability to reflect both the logic of the process and the interaction of its participants, and the resource characteristics of the actions of the process. The article presents an organizational and methodological approach to the description and standardization of treatment and diagnostic processes, developed and tested by the authors, based on modified operogrammes and tables of summary resource characteristics.

The organizational part of the approach is based on the principle of maximum involvement of medical personnel of various categories in the description and standardization of processes through the formation of small groups, as well as on a system of multi-level examination of the developed models, checking them on statistical data to confirm the adequacy of expert assessments.

In N.V. Sklifosovsky Research Institute for Emergency Medicine 15 small groups work on the main profiles of medical and diagnostic care on a regular basis, more than 150 doctors are involved in the description and standardization, 232 models of complex medical and diagnostic processes, surgical interventions, active methods of treatment and diagnostics have been developed.

The operogrammes and summary tables of resource characteristics prepared using the above-described organizational and methodological approach, agreed within the hospital, become the basis for solving various organizational and economic tasks, including the development of internal recommendations, checklists, calculation of standard cost, resource planning, etc.

Keywords: description of processes, process rationing, treatment and diagnostic process, modified operogramme, table of summary resource characteristics, resource characteristics standards, small group, personnel involvement, checklists, economic efficiency

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RELEVANCE

At the present stage of development of the healthcare system in Russia, special attention is paid to the shift of the focus of management within medical institutions from the management of structural units (departments, laboratories, services, departments) to the management of treatment and diagnostic processes.

It should be noted that the transition to the management of treatment and diagnostic processes in multidisciplinary hospitals is also stimulated at the state level, including the tariff pricing system, which provides for the formation of the revenue part of hospitals within the framework of the compulsory medical insurance program based on the principle of payment for a completed treatment case for each patient (treatment and diagnostic process). This fact presupposes the organization by the hospital of accounting, analysis and planning of activities in the context of treatment and diagnostic processes.

Thus, one of the most important tasks in the formation of an effective management system for a modern hospital is the organization of sufficient formalization of management objects - treatment and diagnostic processes - in the context of nosologies and patients, as well as the regulation of resource characteristics of these processes.

It should be noted that rationing is one of the key elements of an effective management system, since the presence of standards is the basis for planning and analyzing activities, it allows to increase the accuracy and validity of organizational and management decisions taken at various levels [1].

Obviously, unlike the processes of production of goods or the provision of services with a strictly regulated production and technological cycle, the processes of providing medical care (treatment and diagnostic processes) largely depend on the condition and history of each individual patient and rely on the art of a doctor. In this regard, the formalization and standardization of treatment and diagnostic processes is possible mainly in terms of repetitive standard operations of these processes and should be based on reliable statistical data.

PURPOSE AND OBJECTIVES OF THE RESEARCH

The aim of the study was to develop an organizational and methodological approach to the description and standardization of treatment and diagnostic processes, taking into account the specifics of the activity of a multidisciplinary medical hospital.

The main objectives of the study were:

— analysis of organizational and economic characteristics of treatment and diagnostic processes in a multidisciplinary hospital;

— development of methodological principles for the description and standardization of medical and diagnostic processes;

— development of an organizational approach to the description and standardization of treatment and diagnostic processes;

— approbation of the organizational and methodological approach on the example of therapeutic and diagnostic processes of a therapeutic and surgical profile.

The article describes a part of the study devoted to the organizational and methodological approach to the description and standardization of treatment and diagnostic processes developed by the authors.

MATERIAL AND METHODS

When developing the above organizational and methodological approach, the methods of system analysis and modeling were used.

The materials used were factual data on the structure and parameters of medical and diagnostic processes of the State Budgetary Healthcare Institution Research Institute named after N.V. Sklifosovsky from the existing automated medical information systems, as well as the experience and expert opinions of the staff of the Institute.

RESULTS OF THE STUDY

In the context of this work, under the treatment and diagnostic process of a multidisciplinary hospital, we will further understand a set of actions for diagnosing the condition and treating a patient from the moment of admission to the hospital until the moment of discharge [2].

The purpose of the description and regulation of processes is to create a sufficient and adequate basis for making managerial decisions in a multidisciplinary hospital.

Based on the results of the analysis of the organizational and economic characteristics of treatment and diagnostic processes carried out at the Institute [2], the following basic requirements for the format of their description and the introduction of notation into the practice of the hospital were formulated:

1. The maximum completeness and detail of the description of the steps / actions of the process, including the most complete accounting of all diagnostics and consultations assigned to the patient on nosology, taking into account their obligation and the place of their implementation.

2. Maximum completeness and detail of accounting for all participants in the process.

3. The ability to reflect the logic of the process with the moments of decision-making and alternative ways.

4. The ability to reflect the frequency and multiplicity of process actions, the schedule for performing actions (if necessary).

5. The ability to reflect regulatory requirements (restrictions) for the implementation of a process action and regulatory and methodological documentation governing the action / process.

6. The ability to reflect the resource characteristics of the process: labor costs of all participants in the process, the number of medicines, consumables, the time of use of equipment, premises, as well as their frequency and multiplicity.

7. Ease of mastering the notation and no requirements for the need for specialized software.

In the practice of business modeling, various notations for describing processes are known: DFD, IDEF0, EPC, BPMN etc. [3, 4]. Each of them has its own purpose, limitations, advantages and disadvantages. Their brief comparative analysis was presented by us earlier [5].

A serious drawback of the above notations is the lack of the possibility of their revision in accordance with the specifics of the medical and diagnostic processes of the medical institution and the above requirements, as well as the problem to be solved of the rationing of the resource characteristics of these processes.

The authors have proposed a modified operogram [5] as the basic notation for describing and subsequently standardizing processes, which combines the ability to reflect both the logic of the process and the interaction of its participants, and resource characteristics for the actions of the process. In addition, modified operograms are simple and intuitive to use, working with them does not require specialized software, and learning the rules for describing processes in this format for a specialist of any level requires minimal time.

The format of the modified operogram is shown in Fig. 1.

№ п/п	Действие процесса	Участник 1	Участник 2	Участник 3	Трудозатраты, мин	Частота	Кратность	Среднее время за случай, мин	Медикаменты					Расходные материалы					Оборудование, используемое в процессе					Помещения, используемые в процессе			Регламентирующие документы
									Наименование	Ед.измерения	Количество (за действие)	Частота	Кратность	Наименование	Ед.измерения	Количество (за действие)	Частота		Наименование	Количество	Время использования (за действие), мин	Частота	Среднее время использования (за случай), мин	Наименование	Время использования (за действие), мин	Среднее время использования (за случай), мин	
		А	Б	В																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		19	20	21	22	23	24	25	26	27

Fig. 1. Format of the modified operogramme

The left side of the operogram is a tabular-graphic form of displaying the logic of the treatment and diagnostic process in the interaction of its participants, as well as its informational and documentary support. In Fig. 2, for example, a fragment of the left side of the operaogram of the therapeutic and diagnostic process according to the nosology "Open chest wound with lung injury" is presented.

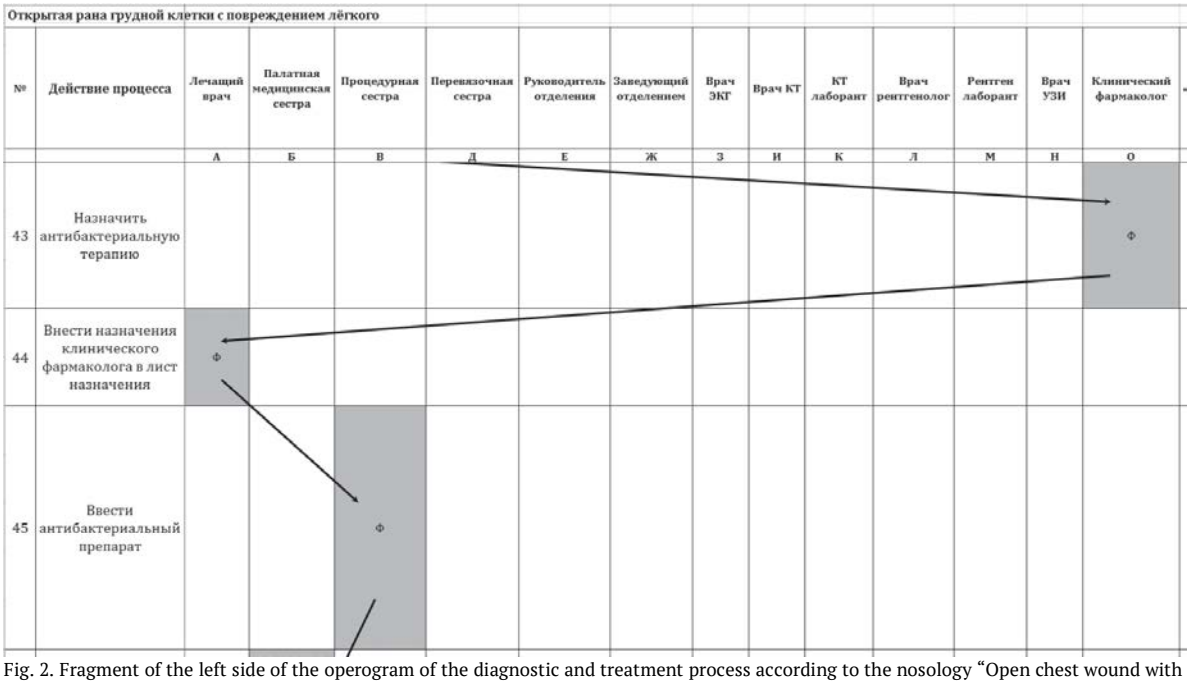

Fig. 2. Fragment of the left side of the operogram of the diagnostic and treatment process according to the nosology “Open chest wound with lung injury”

The logic of the process is displayed by arrows, the varieties of which imply different ways of transferring information, as well as special cells, which reflect the moments of decision-making by the participants in the processes and from which further logical branching begins.

The right side of the modified operogram reflects the most important characteristics of the actions of the therapeutic and diagnostic process from the point of view of the tasks being solved:

— labor costs of participants performing a specific action in a process;

— frequency and multiplicity of a specific action;

— name and quantity of drugs, consumables consumed in a particular process step;

— the name and time of use of the equipment required for a particular process step;

— the name and time of use of the premises in which a specific process action is performed.

As an example, Fig. 3 shows a fragment of the right side of the operaogram of the diagnostic and treatment process according to the nosology "Open chest wound with lung injury".

Открытая рана грудной клетки с повреждением лёгкого

№	Действие процесса	Трудозатраты, мин	Частота	Кратность	Среднее время за случай, мин	Медикаменты					Расходные материалы				Оборудование, используемое в процессе					Помещения, используемые в процессе		
						Наименование	Ед. измерения	Количество (на манипуляцию)	Частота	Кратность	Наименование	Ед. измерения	Количество (на манипуляцию)	Частота	Наименование	Количество	Время использования за манипуляцию, мин.	Частота	Среднее время использования за случай, мин.	Наименование	Время использования за манипуляцию, мин	Среднее время использования за случай, мин.
43	Назначить антибактериальную терапию	15	1	1	15						Бумага	лист	1	1	Персональный компьютер	1	9	1	9	Ординаторская	15	15
											Чернила для принтера	+	+	1	Принтер	1	1	1	1			
											Ручка шариковая	+	+	1								
44	Внести назначения клинического фармаколога в лист назначения	10	1	1	10						Бумага	лист	1	1	Персональный компьютер	1	9	1	9	Ординаторская	10	10
											Ручка шариковая	+	+	1	Принтер	1	1	1	1			
45	Ввести антибактериальный препарат	5	1	10	50	Цефтриаксон	г	1	1	1	Шприц одноразовый 20мл	шт	1	1	Отсос почковидный	1	5	1	5	Процедурный кабинет	5	50
						Физиологический раствор	мл	20	1	1	Перчатки латексные	пары	1	1	Жгут венозный	1	5	1	5			
											Шарик марлевый	шт	4	1								
											Раствор антисептика	мл	5	1								
											Бинт	м	0,5	1								

Fig. 3. Fragment of the right side of the operaogramme of the diagnostic and treatment process according to the nosology “Open chest wound with lung injury”

In fact, the operogram reflects a rational version of the organization of the treatment and diagnostic process "as it should be", taking into account the specifics of the work of a particular hospital.

Further, all the characteristics presented in the operogram are consolidated in the table of summary resource characteristics of the treatment and diagnostic process (hereinafter referred to as the summary table). The pivot table format is shown in Fig. 4.

Наименование лечебно-диагностического процесса (комплексной медицинской услуги):			раздел Реестра	Код медицинской услуги по Реестру:
Модель пациента				
Краткое описание технологии выполнения медицинской услуги:				
Категория возрастная:				
Вид медицинской помощи:				
Условия оказания медицинской помощи:				
Форма оказания медицинской помощи:				
Средние сроки лечения (количество дней):				
Коды по МКБ-10:				
1.	Время участия персонала в лечебно-диагностическом процессе			
1.1	Врачи	Специальность (сертификат)	Ед. измерения	Количество
1				
2				
1.2	Средний медицинский персонал	Специальность (сертификат)	Ед. измерения	Количество
1				
2				
1.3	Прочий персонал	Специальность (сертификат) (если необходим для выполнения работ в процессе)	Ед. измерения	Количество
1				
2				
2.	Перечень медицинских услуг, используемых при выполнении лечебно-диагностического процесса			
№ п/п	Код услуги по Номенклатуре медицинских услуг (Приказ МЗ № 804н)	Наименование услуги	Код услуги по Реестру МГФОМС	Количество
1				
2				
3.	Лекарственные препараты, обязательно используемые при выполнении лечебно-диагностического процесса			
№ п/п	Торговое наименование лекарственного препарата	МНН лекарственного препарата	Форма выпуска лекарственного препарата	Ед. измерения	Количество
1				
2				
4.	Изделия медицинского назначения и расходные материалы, обязательно используемые при выполнении лечебно-диагностического процесса			
№ п/п	Наименование медицинских изделий, расходных материалов		Ед. измерения	Количество
1				
2				
3				
5.	Лечебное питание			
№ п/п	Наименование (вариант) диеты	Частота предоставления	Количество дней предоставления	
1				
2				
6.	Время использования оборудования, необходимого при выполнении лечебно-диагностического процесса			
№ п/п	Наименование оборудования		Ед. измерения	Кол-во
1				
2				
7.	Время использования помещений, необходимых при выполнении лечебно-диагностического процесса			
№ п/п	Наименование помещения		Ед. измерения	Кол-во
1				
2				

Fig. 4. Format of the table of summary resource characteristics of the treatment and diagnostic process
Notes: INN — international non-proprietary name; MCCMIF — Moscow City Compulsory Medical Insurance Fund

In the table of summary resource characteristics, all process parameters are grouped into the following categories: duration of personnel participation in the treatment and diagnostic process, a list of medical services (instrumental and laboratory tests, surgical interventions, active treatment methods, etc.), drugs, instruments and consumables, duration of use of equipment and premises, applied medical nutrition.

This table is an integral document reflecting the most important regulatory parameters of the treatment and diagnostic process. All quantitative characteristics in the summary table are indicated taking into account the frequencies and frequency of use of various types of resources.

It should be noted that the more detailed all the actions of the process are described, the more complete and adequate the model will be, and the more accurate the management decisions with its use will be made.

The experience of applying the above-described methodological approach in the N.V. Sklifosovsky Research Institute for Emergency Medicine testifies that with a sufficiently detailed description of the treatment and diagnostic processes, the number of actions in one model can exceed 250, the number of participants in the process can exceed 55 roles, and the number of individual medical services in the treatment and diagnostic process can reach more than 120 items. All this reflects the high multiplicity and complexity of the treatment and diagnostic processes of a multidisciplinary hospital.

It is obvious that such a detailed description of the treatment and diagnostic process in the presence of professional specifics can only be qualitatively carried out by its participants who understand the process "from the inside".

That is why the work on the description and regulation of processes should be organized according to the principle of maximum involvement of medical personnel of various categories in it. The particular importance of involving employees in the continuous improvement of enterprise processes is widely covered in the literature [6].

The experience of the authors testifies to the high efficiency of creating a system of small groups [5, 7] of 3-4 doctors by medical profile (for example, toxicology, abdominal surgery, vascular surgery, neurology, etc.) with the involvement of moderators in each group who have the skills to describe the processes and teaching small groups participants the basics of modeling. Thanks to an intuitive format for describing processes, initial training takes a minimum amount of time (no more than 1 hour) and allows all group members to discuss the treatment and diagnostic process in a single format in the future, which translates the discussion into the most substantive and constructive direction.

The organizational chart of the approach to the description and standardization of processes is shown in Fig. 5.

Fig. 5. Organization of work on the description and standardization of treatment and diagnostic processes

A doctor from a small group who has been trained in the basic principles of developing operograms (hereinafter referred to as an analyst doctor) develops the first version of the model. This model, as noted above, includes the logic of the interaction of participants in the implementation of the treatment and diagnostic process, as well as the proposed standards for resource characteristics (labor costs, expenditures of medicines and consumables, equipment and premises).

The prepared version of the operagram undergoes a multilevel examination and, if necessary, is corrected in part:

— logic of interaction of process participants;

— the composition, frequency and f multiplicity of prescribed consultations and studies at various stages of the treatment process;

— normative labor costs for the implementation of process actions.

Such an examination is carried out sequentially at several meetings of the small group: by the members of the small group, representatives of the profile department, representatives of related departments (diagnostic services and consulting departments), the leadership of the profile department.

It is necessary to note an important additional effect of small group meetings, which consists in the exchange of experience between doctors and self-training of the participants of the meetings, including new medical approaches and tactics for treating patients.

Based on the results of the examination, in the event of a significant discrepancy in expert estimates on the labor costs of specific actions of the process (for example, examining the attending physician, preparing an appointment sheet, filling out the examination protocol, installing a catheter, etc.), the members of the small group are timing these actions. Further, on the basis of actual measurements, after appropriate discussion, the norms for the time characteristics of the process are adjusted.

The next stage after the examination and approval of the operogram is the filling out by the analyst of the table of summary resource characteristics of the treatment and diagnostic process: the duration of personnel participation in the treatment and diagnostic process, the list of medical services used in the implementation of the treatment and diagnostic process, medicines, medical products, and others sections. All sections of the pivot table are filled in in accordance with the agreed operogram.

To check the correctness of the primary expert assessments on the structure, frequency, frequency and amount of resources required for the implementation of the described treatment and diagnostic process, they are compared with the actual data unloaded from the existing automated medical information systems (MIS).

The possibilities of such a check depend on the functionality and level of implementation of the MIS in a particular hospital.

At the N.V. Sklifosovsky Research Institute for Emergency Medicine, the current MIS allows obtaining data for checking the frequency of performing various medical services (instrumental and laboratory diagnostics, surgical interventions, etc.) as part of a medical and diagnostic process for a specific nosology, as well as those used in the treatment of drugs and consumables.

If significant discrepancies between expert assessments and actual data for a statistically significant period are identified, a small group analyzes the possible reasons for such discrepancies and makes one of the alternative decisions:

— on the need to adjust the characteristics in the pivot table based on the analysis of actual data;

— on the absence of the need to adjust the resource characteristics in the pivot table due to the fact that the revealed difference in actual data is due to objective reasons (faulty equipment, lack of specific medicines and consumables in the warehouse, forced termination of contracts with suppliers, etc.)).

After the analyst makes adjustments based on the results of the comparative analysis, the summary table undergoes an examination organized by analogy with the above-described examination of operograms, in part:

—frequency and multiplicity of the provision of certain medical services as part of the treatment and diagnostic process;

— composition and standard costs of medicines (in kind), consumables for the implementation of the process;

— composition and standard time of use of equipment and premises in the implementation of process actions;

— compliance of these standards with the current regulatory documents on nosology, including federal and regional standards, clinical guidelines and criteria for assessing the quality of medical care [8].

If necessary, the analyst makes final adjustments to the summary table.

In fact, the oprogram and the summary table for each treatment and diagnostic process undergo an examination of the entire internal medical community of the hospital: from the specialized department to the service of the chief physician.

DISCUSSION

Currently, in the N.V. Sklifosovsky Research Institute for Emergency Medicine, 15 small groups are working on a permanent basis: abdominal surgery, thoracic surgery, vascular surgery, cardiac surgery, neurosurgery, neurology, traumatology, resuscitation, kidney and pancreas transplantation, toxicology, gynecology, arrhythmology, liver transplantation, treatment of computer diseases and magnetic resonance imaging.

The formation of small groups was carried out in stages, from the moment the project was launched to develop models for the admission department to the current moment when comprehensive work is underway to describe and standardize complex medical and diagnostic processes for all the above profiles.

More than 150 medical analysts are involved in the development and examination of the models. To date, 232 models of complex medical and diagnostic processes, surgical interventions, active methods of treatment and instrumental and laboratory research have been developed.

Operograms and summary tables of resource characteristics prepared using the above-described organizational and methodological approach, agreed within the hospital, become the basis for solving various organizational and economic problems, such as:

— development of internal recommendations in the context of medical and diagnostic processes;

— development of checklists (a set of mandatory studies and consultations within the framework of medical and diagnostic processes) for their subsequent automation;

— calculation of the standard cost of the treatment and diagnostic process, which is necessary to analyze the economic efficiency of the work of departments and the hospital as a whole;

— determination of the required volume of resource provision (medicines, consumables, personnel of various categories, etc.) in accordance with the projected patient flow within the framework of annual and current planning, etc.

The solution of the above tasks makes it possible to increase the efficiency of quality management and the economic component of treatment and diagnostic processes, as well as to increase the accuracy and efficiency of resource planning.

Of particular interest is the possibility of accumulating knowledge and improving models of treatment and diagnostic processes, based on a wide range of practicing specialists of the hospital.

Any doctor can contact the appropriate small group with a proposal to make changes to the treatment model, and in accordance with the above approach, after the examination, any new approaches and methods can be included in the model.

CONCLUSION

The authors have developed and tested in the activities of a multidisciplinary ambulance hospital an organizational and methodological approach to the description and standardization of treatment and diagnostic processes, which allows in a single format of modified operograms and summary tables to represent the composition and structure of processes with their key resource characteristics (labor costs of participants, drugs used, expenditure materials, tools, equipment, etc.).

One of the key advantages of the presented approach is the involvement of various categories of medical personnel in the process of creating models, the formation of a special set of competencies of medical analysts and the organization of a multilevel examination of the models, which ensures the reliability, practical significance and effectiveness of the implementation of the developed models of treatment and diagnostic processes.

In addition, the proposed format for presenting the key characteristics of the treatment and diagnostic process made it possible to begin the formation of a knowledge base on a wide range of nosologies, taking into account, in many respects, the unique experience of the Institute's specialists.

The developed models (modified operograms, tables of summary resource characteristics) are the basis for increasing the efficiency and effectiveness of solving various organizational and economic problems.

Approbation of the presented organizational and methodological approach is carried out on the basis of the N.V. Sklifosovsky Institute.

On the basis of a constantly growing knowledge about medical and diagnostic processes, the Institute is developing and automating a system for supporting the implementation of standards, as well as a system for analyzing the economic efficiency of the work of departments and the hospital as a whole.

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