MANAGEMENT BASED ON THE PRINCIPLES OF LEAN PRODUCTION

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Currently, the priority task of the national project "Digital Economy" for the citizens of Russia is the management of medical services and data. The digital economy should give citizens new opportunities to control the state of their health and the health of their loved ones.

Table 1 shows the expected opportunities for citizens and results of implementing lean principles.

Table 1
Opportunities for Citizens and Results of Implementing Lean Principles

Opportunities for Citizens	**Opportunities for Citizens and Results of Implementing Lean Principles**
Online access to your medical data, service of their analysis and information	100% of citizens have access to their electronic medical record, research and analysis results
Online consultation services with doctors	100% of medical organizations are connected to videoconferencing services with patients
Online monitoring of the state of individual health parameters	100% of people at risk are provided with wearable personal telemedicine monitoring devices
The use of artificial intelligence in the process of making diagnoses and choosing a treatment trajectory	100% of medical information systems use artificial intelligence technologies within the framework of clinical protocols

Today, the current situation is such that one of the reasons for the high mortality rate is the untimely access to doctors of citizens, the low availability of high-quality medical services in remote regions. And also the habit of taking care of their health is not formed among citizens. Problems are still raising the efficiency of health care, improving the quality and accessibility of the provided medical care. The opportunity to provide the population with high-quality services at lower costs and elimination of losses will help to increase the efficiency of health care.

With close attention, studying various aspects of defects in the provision of medical care in the domestic health care system, there is a growing understanding that it is necessary to carefully analyze such losses as the irrational use of resources. In the course of the implementation of the national project for the digitalization of the healthcare system, the methodology of effective management based on the principles of lean production is being actively implemented.

Prospects for the implementation of the principles of lean production in health care suggest to increase the efficiency of medical care, rationalize the use of all resources in health care, while providing high-quality medical care to the population, guaranteeing the safety of medical activities,

determining the high efficiency of approaches both in the production sphere and in the field of medicine service to the population [4].

Research and implementation of the principles of lean health care seems to be relevant within the framework of the national project for digitalization of healthcare.

According to the reporting documentation and feedback from the population, the implementation of the principles of lean production in medical institutions had a favorable effect on their activities.

1. Study of the concept of lean manufacturing as an integrated approach to process optimization

Lean manufacturing is a conceptual management for a manufacturing enterprise, which is based on the rational use of resources and the elimination of risks and losses that can be avoided without reducing the quality of the product (service).

Lean manufacturing as an integrated approach, consisting of process optimization, provision of management infrastructure with relevant and high-quality information, aimed at modifying the way of thinking and behavior of employees. Gradually, lean manufacturing went beyond manufacturing enterprises and formed the basis for optimizing the service sector, the process of communication between the consumer and the supplier, delivery and service of products.

The concept of lean manufacturing is attractive because the system includes 80% of organizational measures, and investment in technology is only 20%. Lean ideas have come to be used in commerce, services, utilities, construction, healthcare, education, the military, the state and municipal government, and many other activities. The main idea of the concept is that at each stage of creating a product (service), the quality and its value for the consumer are assessed. Significant anticipation of customer requirements by products (services) is the key to success. In accordance with the concept of lean manufacturing, all activities of an enterprise are divided into two types: operations and processes. These are operations and processes that add value to the customer and those that do not add value to the customer.

2. Methods, approaches and tools used in lean manufacturing

The concept of lean manufacturing integrates many elements, each of which represents a specific method:

- the production of one-off items involves a method of working with the flow of one-off items, providing a departure from the production of products in batches;
- pull production system, when raw materials and intermediate products are not supplied to the next stage until they are requested there (implementation of the “just in time” principle);
- Kanban is a system of organizing production and supply, which makes it possible to implement the principle “just in time”;
- total care of equipment or total production service (TPM) - a set of ideology, methods and tools that are aimed at the smooth operation of technical means to ensure the continuity of production processes. The TPM concept assumes the stabilization and continuous improvement of maintenance processes, a system of planned and preventive repairs, work based on the principle of "zero defects" and the systematic elimination of all sources of losses;
- the 5C system approves the effective organization of the workplace based on visual control. The 5C system integrates five principles of organizing an optimal workspace, each of which begins with the letter "C": sort, create your own place, keep it clean, standardize, improve in work to achieve the best results;
- quick changeover - a rapid procedure for changing molds or tools for changeover of production equipment or process;
- kaizen - continuously improve activities with the involvement of all employees in constant work to reduce losses and eliminate risks, embodied and addressed to employees in specific forms, methods, technologies;

- jidoka - embedding quality in all production processes and recognizing quality as the main criterion for production efficiency [2].

It is possible to reduce defects, rejects, reduce waste and rework or correct rejects using the lean manufacturing methodology

3. Implementation of the project "Lean clinic" in the concept of lean health care

Lean healthcare is a concept of reducing the time spent by healthcare personnel not directly related to patient-facing services, but which affects the comfort and convenience of healthcare services. The main losses in the processes of medical care are the lack of information data, defects in the treatment and diagnostic process and unreasonable expectations [1].

A lean clinic should provide more medical services and improve their quality, while reducing waste and labor costs. As in manufacturing, in healthcare, the foundation for efficient use of resources is the value stream.

The processes of providing services in health care systems begin from the moment the patient chooses a medical institution, then the patient enters the territory of the medical institution or calls the doctor at home, and an end is made at the moment the patient leaves the territory.

Patient satisfaction is the main criterion for the work of a medical institution. The service component of medical services or direct attention to the patient by the service personnel plays an important role. Currently, customer focus and service standards are coming to the fore not only for commercial, but also for budgetary medical institutions. The official website of a medical institution plays a significant role in creating a favorable information space and increasing the efficiency of processes. At the same time, some operations can be excluded and given for analysis or execution to the patient. With proper structuring of the site of a medical institution, you can exclude some of the calls to the registry, familiarization with the schedule of reception of specialists and the work of offices. Answers to frequently asked typical questions of patients and consultations with a doctor can be conveniently classified and posted on the website.

The image of a medical institution increases with a fully functional website, while it is important that the website design is attractive, the navigation is user-friendly, the website reflects accessible and useful information for patients, and the website design should evoke empathy.

It is recommended to leave reviews with small remarks to the medical organization. At the same time, comments from the administration on the actions taken and gratitude for this feedback are required. It should be noted that a positive image of the organization is extremely important not only from the point of view of the patient. The image of the organization directly affects the loyalty of staff (both existing and potential).

Waiting time is the biggest waste in the clinic.

The waiting line starts from the reception. The patient interacts remotely (from the website or by phone), or directly with the registrar. At this stage, it is extremely important to remove the negative background, or at least not add it.

Registrars have two types of clients: patients or their relatives who came from outside the clinic and medical personnel and administration of the medical institution. To increase productivity, reduce errors in the work of doctors, laboratory assistants, nurses, to raise the motivation of medical staff, it is necessary to improve the work of the registry. Since this key step will lead to a reduction in the waiting time for an appointment at the doctor's office, diagnostic and treatment rooms, and will entail the elimination of other losses in the value expectation stream.

Therefore, it is necessary to divide the patient flows in the temporal, spatial and structural fields, while it is important not to forget about the principle of alignment in order to reduce the waiting time. It is necessary to start with a clear management of the queue of patients, it is necessary to carry out work in the direction of planning the movement of patients, increasing the organization and discipline of the patients themselves. Uneven loading at individual stages should be analyzed with the elimination of "bottlenecks" in working with them.

To eliminate losses in solving these problems, two options for organizational measures are used:

- separation of patient flows by color;
- introduction of an electronic queue.

For the next stages of implementation of tools and principles of lean manufacturing, a choice of solutions should be made, an information and software environment for consultations in the clinic should be prepared and measures should be introduced to eliminate losses in the value stream in a consultative clinic, stabilizing and leveling the load of diagnostic equipment of a medical institution.

4. Stages of implementation of the project "Lean Clinic"

The quality of a product or service implies the quality of the entire production process, provision and conditions of consumption and is determined by a set of criteria. Achieving high quality products or services is possible when organizing the organization's activities in accordance with the principles of lean innovation [5].

Consider the main tool in value creation - a flow control method for implementing the concept of lean manufacturing in order to create value and minimize losses.

The processes of transforming products (information, services, etc.) in accordance with the needs of the consumer (client) are integrated into the streams of value creation. On the example of a polyclinic, the value is the receipt of a quality service by the patient.

We divide the following actions into three categories that make up the value stream:

- creating value, such as the performance of a service;
- organizing value, for example, quality control;
- interfering with the creation of value, which must be excluded from the process.

Further, events are carried out that organize the process of managing the value stream (Value Stream Mapping - VSM) - this is the planning and transformation of processes in order to optimize the use of available resources. A group (team) of 3 - 7 specialists is created to implement VSM, which are selected taking into account various areas of activity (production, technological and financial field).

The VSM implementation program in practice includes eight steps, or eight groups of activities. The first stage involves setting goals and identifying resources. In accordance with the development strategy of the organization and with the current pressing problems, an area requiring changes (improvements) is determined.

The necessary resources are allocated for the implementation of the program:

- for training group members and staff of the institution, organizing meetings, external consulting;
- to obtain the information, materials and equipment necessary for the team's work;
- to monitor the work of the team;
- for moral and material encouragement of initiative team members;
- to inform the parties interested in the relevance and need for the implementation of the program, on the progress and results of the implementation of VSM. The interested parties include both the founders and management of the organization, and the entire staff of the institution.

The second stage looks like the choice of the application area. At the same time, a process is selected that will be analyzed and optimized using the VSM. When choosing a process, the team should consider the following conditions:

- the scope should be relevant for the strategic development of the organization and correspond to the tactical and strategic goals and objectives set by the management;
- the scope should cover the most resource-intensive and critical processes;
- the analysis should begin with a consideration of simple, easily transformable processes;
- to begin with, we recommend that you apply VSM to only one process. And only upon obtaining the necessary experience, distribute it by analogy to optimize other processes;

- further we recommend to apply VSM simultaneously to no more than three processes (or for a short period of time).

Difficulties may arise in reconciling changes and adjustments when applying VSM to more than three processes at the same time. This can lead to difficulties in managing changes and losing their managed state. At this stage, organizations that have analyzed and defined processes in the development of other projects of the quality management system will have an advantageous position, for example, when organizing work in accordance with the requirements of ISO 9001: 2015.

When choosing a process to which changes will be applied, it is necessary to first determine its potential significance. The following can be selected as priority targets for change:

- the effectiveness of the process is significant in the structure of the general results of organizing the activities of the institution;
- the cost is significant for the resources consumed;
- labor input (cost) is high for the input and output streams of the process;
- during the functioning of the process, a considerable number of inconsistencies appear;

When analyzing the complexity of the process, it is necessary to consider the following:

- there should be only one processing cycle per process;
- no more than three suppliers of raw materials and materials should be involved in the process;
- the process should contain no more than 12 technological operations (or process steps).

At the third stage, personnel training is carried out; it can be carried out both inside the building of the organization itself and outside it. It is necessary to understand the importance of implementing changes, the goals and objectives, the main provisions of the VSM, terminology and conventions for all team members and all involved personnel. All team members must understand the processes under consideration, understand the essence of the applied technologies, methods and tools. It is advisable to involve experts in the work of the team who have successful experience in implementing VSM.

The process mapping in aspects takes place at the fourth, fifth and sixth stages, it is understood: “how it is and how it should be”. Descriptions of the process using the VSM standard notation system is a value stream mapping technology, which consists of two stages:

1) graphic display of each element of the process in material and information flows from the beginning of the process to its end (as it is);

2) a graphical representation of the process in the future (as it should be). Only after the analytical processing of the data is the second stage carried out.

When mapping processes, the Lean Management metric system is used - this is the standard notation adopted in VSM - a standard process characteristic that is used in process measurements. When mapping the process, a comparison is made between the real and planned values of the metrics.

The seventh and eighth stages include the development and implementation of plans (activities) according to the "kaizen" (continuous improvement) system. The goal of the kaizen methodology is the complete elimination of waste and continuous improvement, which is achieved through process improvement, as well as the establishment and implementation of ever higher standards of work.

The kaizen methodology used in projects is a structural component of VSM and is carried out by the team. No more than five days are allotted for each project. In the sixth step of mapping the "how it should be" process, goals for the implementation of "kaizen" projects are defined [3]. For projects to be completed, a schedule is drawn up for the implementation of activities. Such a plan can be drawn up several months in advance. The form of the action plan is similar to the forms of tactical and current planning plans. The plan includes the definition of activities within the framework of the "kaizen" projects, planned results, deadlines, distribution of responsibilities and authorities, types and timing of control

Conclusion

The healthcare modernization system is focused on improving the quality indicators of medical care and increasing the efficiency of resource use. The successful achievement of these goals presupposes the widespread use of scientifically grounded methods for analyzing problem situations and the development of systemic recommendations for health care management, as well as the use of modern management methods based on lean production in the provision of services.

Having completed all the tasks and ensuring optimization, the lean clinic becomes the basis for the following positive changes:

- improving the efficiency of the registry with the ability to make an electronic appointment with a doctor;
- redistribution of the flow of patients with an increase in the load on nursing staff;
- a significant reduction in the waiting time for the patient in the queue;
- a decrease in the doctor's time for filling out documents and an increase in the time for a patient's appointment;
- elimination of functions uncharacteristic for a doctor (registration for procedures and studies, solution of organizational issues, coordination with the authorities);
- optimization of the doctor's workplace.

With the successful completion of the Lean Clinic project, the implementation of the Lean Clinic project should be expected in the future. The expected effect for the citizens of Russia from the national health care project in digital format:

- guaranteed (100%) availability of basic medical care to citizens;
- the formation of 50% of the population's interest in constant monitoring of their health, timely seeking medical care, when choosing the best treatment option and reducing the number of medical errors.

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