

St. Petersburg University  
Graduate School of Management

The Role of Information Systems in the Implementation of Care  
Delivery Value Chain Methodology in Russian Hospitals' Quality  
Management

Master's Thesis by the 2nd year student  
Concentration — Master in Urban Management and  
Development  
Dmitrii Leonidovich Fefelov

Research advisor:  
Associate professor, Andrei Evgenievich Ivanov

St. Petersburg  
2022

## АННОТАЦИЯ

Автор	Дмитрий Леонидович Фефелов
Название магистерской диссертации	Роль информационных систем при внедрении методологии цепочки создания стоимости в управлении качеством в российских медицинских организациях
Образовательная программа	Менеджмент и развитие городских агломераций
Направление подготовки	38.04.04 Государственное и муниципальное управление
Год	2022
Научный руководитель	Андрей Евгеньевич Иванов
Описание цели, задач и основных результатов	В настоящей работе рассматриваются особенности внедрения информационных систем в цепочке добавленной стоимости, разработанной М. Портером. Данная концепция может быть использована как для повышения качества медицинской помощи, так и для совершенствования стратегического планирования деятельности клиники и ее отделений. Внедрение концепции требует пересмотра применения информационных систем в рамках отдельных звеньев цепочки и оценки применимости информационных систем различной конфигурации для создания ценности для пациента и/или сокращения затрат медицинской организации.
Ключевые слова	Здравоохранение, цепочка добавленной стоимости, информационные системы

## ABSTRACT

Master Student's Name	Dmitrii Leonidovich Fefelov
Master Thesis Title	The Role of Information Systems in the Implementation of Care Delivery Value Chain Methodology in Russian Hospitals' Quality Management
Educational Program	Master in Urban Management and Development
Main field of study	38.04.04 Public Administration
Year	2022
Academic Advisor's Name	Andrei Evgenyevich Ivanov
Description of the goal, tasks and main results	The present paper discusses the features of the implementation of information systems in the Care Delivery Value Chain developed by M. E. Porter. This concept can be used both to improve the quality of medical care as well as to help in the strategic planning of the clinics and their departments. The implementation of Care Delivery Value Chain requires to review the use of information systems within individual links of the chain and to assess the applicability of information systems in various configurations to create value for the patients and / or reduce the costs of a medical organization.
Keywords	Health care, Care Delivery Value Chain, information systems


## ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ

### ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

Я, Фефелов Дмитрий Леонидович, студент второго курса магистратуры направления «Менеджмент», заявляю, что в моей магистерской диссертации на тему «Роль информационных систем при внедрении методологии цепочки создания стоимости в управлении качеством в российских медицинских организациях», представленной в ГАК для публичной защиты, не содержится элементов плагиата.

Все прямые заимствования из печатных и электронных источников, а также из защищенных ранее выпускных квалификационных работ, кандидатских и докторских диссертаций имеют соответствующие ссылки.

Я ознакомлен с действующим в Высшей школе менеджмента СПбГУ регламентом учебного процесса, согласно которому обнаружение плагиата (прямых заимствований из других источников без соответствующих ссылок) является основанием для выставления за выпускную квалификационную работу оценки «неудовлетворительно».

 (Подпись студента)

01.06.2022


## STATEMENT ABOUT THE INDEPENDENT CHARACTER OF

### THE MASTER THESIS

I, Fefelov Dmitrii Leonidovich, (second) year master student, MUMD program «Management», state that my master thesis on the topic « The Role of Information Systems in the Implementation of Care Delivery Value Chain Methodology in Russian Hospitals' Quality Management», which is presented for the public defense for the Official Defense Committee, does not contain any elements of plagiarism.

All direct borrowings from printed and electronic sources, as well as from master theses, PhD and doctorate theses which were defended earlier, have appropriate references.

I am familiar with the study process regulations at Graduate School of Management of Saint-Petersburg State University, according to which finding of plagiarism (direct borrowings from other sources without appropriate references) can be the reason for master thesis to be evaluated as «unsatisfactory».

 (Student's signature)

01.06.2022

# Table of Contents

<b>Introduction</b> .....	<b>6</b>
<b>Chapter 1. Technical and Managerial Innovations in Health Care</b> .....	<b>10</b>
1.1. Current innovations in health care and their implementation .....	10
1.2 Value-based Health Care Delivery.....	21
<b>Chapter 2. Implementation of information systems in CDVC methodology</b> .....	<b>40</b>
2.1 Information systems and resource management in health care.....	40
2.2 Integrated Information Systems in Health Care .....	45
2.3 Information systems in Value Care Cycle management.....	55
<b>Conclusion</b> .....	<b>65</b>
<b>List of References</b> .....	<b>68</b>
<b>Appendix I. Questionnaire</b> .....	<b>76</b>
<b>Appendix II. Figures and Tables</b> .....	<b>78</b>

## Introduction

The situation in health care domain causes people around the world to stay unsatisfied with it. As data indicates, only 34% of respondents around the world were satisfied with the quality of health care they were delivered<sup>1</sup>. This problem also significantly concerns Russia. Although Russia's public medical organizations provide free care services to all residents through a compulsory state health insurance program, the public healthcare system faced much criticism from the population because of the long queues to specialists and diagnostics services, lack of proper attention during medical examination and uneven quality of care in different clinics. (Khamidullina, 2013) The results of a survey conducted by authorities as of 2019 indicate that over 45% of Russian patients were unsatisfied with the quality of care they received<sup>2</sup>.

During pandemic, the burden onto health system has increased even more. Both doctors and patients voice concerns about formal attitude to care and existing system of outcome measurement takes into account interests of patients very little<sup>3</sup>. The sharp increase in demand for medical equipment and medicines has revealed long-standing problems of the industry. These are the prices and lack of stocks of finished products, which raises the problem of low efficiency of resource planning. The hospitals additionally faced such problems as decrease in funding and increased data flow. Altogether, it affects quality of care received by patients very negatively<sup>4</sup>.

In light of this, yet again the approaches of work organizations used in health care are urged to be reconsidered by policy makers and first of all those who operate clinics right on the spot – their managers. Traditionally, care delivery is quite a difficult process that includes a lot of bureaucratic barriers and strict rules of care delivery. The managers of private clinics try to achieve fiscal excellence, but it is not the case of public health care organizations, whose aim is to satisfy the needs of people as well as to make their life easier, longer and help them stay economically active. This requires a review of existing position, concerning the position of patients in health system in general.

---

<sup>1</sup> Percentage of respondents worldwide who were satisfied with their country's national health system as of 2019, by country. Statista. URL: <https://www.statista.com/statistics/1109036/satisfaction-health-system-worldwide-by-country/> (accessed:27.04.2022)

<sup>2</sup> Современные тенденции в системе здравоохранения Российской Федерации. Издание Государственной думы. 2019. URL: <http://duma.gov.ru/media/files/otTeY7Kh7jQrYiz92JbKmbymxb6971xF.pdf> (accessed:27.04.2022)

<sup>3</sup> Ibid

<sup>4</sup> Лекарства кладут в стационар. Коммерсант. 2022. URL: <https://www.kommersant.ru/doc/5283991> (accessed:27.04.2022)

Previous attempts to reform health care did not have great success. In the report of the special commission of the Accounts Chamber of the Russian Federation, the healthcare reform in Russia that started in January 2015 was recognized as a failure: it has not improved the quality of medical services provided to the population<sup>5</sup>

According to public statements of the State Duma members, Russian public health care is free for all its citizens, but it has difficulties with providing positive results. Today's system rather 'treats' diseases than 'cures' them. Managers of clinics are rather interested in drawing new patients but not ensuring best outcomes for them. This formalistic and processual approach has little value for patients, which urges health care to get reorganized<sup>6</sup>. At the same time, it also rises an important question: "How can health care be reorganized?" There is no answer found yet. But there are some theories worth regarding them.

In 2006, Michael E. Porter, a Professor of Harvard Business School in collaboration with Elisabeth Teisberg proposed a new approach of care delivery the essence of which was creation of 'value'. As it was stated that value-based (which means result-based) competition is the only solution to the lack of efficiency and quality problems that undermine the health care system from within. (Porter, 2014)

This idea had revolutionary significance in the USA, where competition and getting competitive advantage is a mean of reaching financial goals. As a result, there is less concern attached to patients and thus less positive outcomes. At the same time, wellness of citizens cannot be neglected as it not only influences longevity but also keeps citizens capable to work longer. In Russia where social approach to care delivery is still preserved and care delivery process is less fragmented than in the USA, there is vast potential for implementing the idea of 'value'. However, real implementation would require vast structural reorganization and first of all maximization of integration between numerous services and clinical divisions. In light of that, an 'enabling IT system' as Porter and Teisberg call it, becomes of primary importance. Numerous applications that exist on market in abundance may improve certain performance indicators but they will not integrate the operational processes. Moreover, such approach rather can damage care delivery value chain implementation. Furthermore, Porter does not suggest using any of available IT systems that can be in abundance found on market. He only lists a certain number of qualities that such system must possess. This creates difficulties for managers in terms of operating IT systems

---

<sup>5</sup> Счетная палата проанализировала оптимизацию здравоохранения. Российская газета. 2015. URL: <https://rg.ru/2015/04/14/optimizacya-site.html> (accessed:27.04.2022)

<sup>6</sup> Реформа здравоохранения: панацея или проблема. Государственная дума. 2016. URL: <http://duma.gov.ru/media/files/q7QeBHNYDQy0lgMjYZFs4iUC9xFH7nFJ.pdf> (accessed:27.04.2022)

and also identifying what value its services can produce. Taken this into account, there is a theoretic gap that concerns methods of value creation through such indispensable in modern health care tool like information systems (Porter, 2014).

It must be mentioned, that Russian government understands the importance of implementation of information tools in health care. Information systems are mentioned in the national project "Healthcare" and it is planned that by 2024, a system of electronic prescriptions and automated management of preferential drug provision will be launched throughout Russia. Additionally, information systems will introduce access to the patient's personal account "My Health" on the portal of public services, as well as making online appointments with a doctor and applying for documents possible, regardless of the region where the patient is located. Such tendencies indicate that Russian government is on the way to create a network to integrate health care on regional level<sup>7</sup>. For the government such an opportunity represents automatic and convenient collection of essential information and statistics, which can be used for planning and determining possible strategic opportunities or weak points.

Nevertheless, it must be mentioned that initially integration begins within individual clinics. Thus, success of this goal largely depends on whether the integration on clinical level was successful or not. Additionally, integration on clinical level is not only about getting data for statistics. Properly integrated information systems are capable to support day-to-day operations in health care domain, making daily routine of medical personnel easier and eliminating probability of errors.

Taken this problem into account, the **goal** of this thesis is to study how information systems influence Care Delivery Value Chain implementation and find out peculiarities of their use.

Within the framework of the research goal the following **research questions** are relevant to be posed:

- What is understood by information systems in health care?
- What are the success factors of implementing information systems into Care Delivery Value Chain?
- How can information systems influence the creation of 'value' within care delivery cycle components?

In order to answer these questions as well as to achieve the goal, the objectives of the study include:

---

<sup>7</sup> Национальные проекты "Здравоохранение" и "Демография". URL: <https://minzdrav.gov.ru/poleznye-resursy/natsproektzdravoohranenie> (accessed:27.04.2022)



- Review of literature devoted to technical and managerial innovations
- Review of Care Delivery Value Chain principles and comparing it with the situation in Russia

These objectives get the reader acquainted with core topic this research is devoted to. Next set of objectives concerns information systems directly.

- Establishment of the objects of information systems in health care
- Classification of information systems from the point of their object
- Surveying and interviewing representatives of management in clinics and developers of information systems. (3 deep interviews were conducted. The questionnaires were sent to 50 chief officers and managers of divisions of St.Petersburg hospitals. 24 answers were collected.)
- Theoretical reasoning about how information systems affect value care cycle

The research has qualitative methodology and represents the view on the problem from the point of management, not from IT specialists. The conclusions are done basing on literature review and results of surveys and interviews. This master thesis consists of an introduction, two chapters and a conclusion.

## Chapter 1. Technical and Managerial Innovations in Health Care

### 1.1 Current innovations in health care and their implementation

In The Decree of the President of the Russian Federation of 06.06.2019, No. 254 "The Strategy for the Development of Healthcare in the Russian Federation for the Period up to 2025" there is significant importance attached to information management as well as innovations in health care management. Creation of unified digital "circuit" based on a unified state information system in Russian public health care sector is declared to be one of the top priorities stated among many others in this document. Achieving this goal implies following objectives<sup>8</sup>:

- The development of an unified state-controlled information system in health care, which would ensure the interconnection of medical care delivery organizations and the management of health care resources
- The development of state-controlled information systems in health care sector of the Russian Federation in order to consequently integrate those systems into one unified state-controlled information system
- Implementation and development of medical information systems in all medical organizations; creation of centralized digital platforms for the diagnosis of diseases, including the implementation of artificial intelligence

Those objectives are definitely connected to technical innovations and digitization processes, which can be observed not only in health care sector but within other public institutions as well. Russian platform of "Gosuslugi" is a vivid example of a successful digital innovation. It integrates many different services provided by public offices into one system and any registered citizen is able, for example, to pay taxes or get an appointment at public office<sup>9</sup>. Apart from this Presidential decree coming into effect, the most recent trends indicate massive change to innovation approach and new digitization framework in health care domain. The researchers distinguish innovations into two groups. These are supporting innovations and explosive innovations. Supporting innovations are short-to-medium-term investments the aim of which is to support and improve the operational processes conducted in clinics on regular basis, while explosive innovations represent venture investments into promising ideas and the creation of new

---

<sup>8</sup> Указ Президента Российской Федерации от 06.06.2019 г. № 254. URL: <http://www.kremlin.ru/acts/bank/44326> (accessed:27.05.2022)

<sup>9</sup> Госуслуги – Официальный сайт Администрации Санкт-Петербурга. URL: <https://gu.spb.ru/> (accessed:27.05.2022)

services and products that replace those solutions that were used before. (Gusev, 2019). The latter segment of innovation takes a lot of time to develop and implement not to mention that success of such products is usually very prominent, revolutionary and cannot be left unnoticed by society. Thus, support innovations prevail in health care domain. Such information products are implemented to improve efficiency, care quality and safety through digitization of document management and some other types of work that the staff have to do manually. Supporting innovations also can introduce control and enhance organizational capabilities. After having enabled this, it becomes possible to accumulate and process data and simplify some existing processes doing them more convenient for patients (e.g. making an appointment with a doctor, searching for medical records, billing the completed services). In overall, it improves not only administrative efficiency, but health outcomes as well. (Mäenpää et al., 2009) It can be seen that information products in health care field are not about bringing drastic changes into the processes of treatment but rather about improving existing practices and supporting the existing management structure. This is equally applicable both to public and private clinics. The products below are the examples of such an approach (Gusev, 2019):

- Hospital Information Systems (electronic medical record)
- Telemedicine system
- Medical organization website, patient's personal account
- Appointment to a doctor via the Internet, aggregators
- Automation of Management Accounting (as an internal service)
- Integration with co-related information systems (EGISZ, MDLP, Socstrah, etc.)

The introduced technological solutions are powerful tools that allowed to establish a simplified and convenient form of communication between patients and those who are involved into care delivery. First it was the transition from concentration of medical information system around the service to the concentration around Electronic Health Record (рус. электронная медицинская карта), which consequently transformed into information systems that concentrate around patients as well (since 2015). It can be said that the latest supportive innovations indicate progress on the way to patient-centricity. Health care system driven by patient-centric approach allows the patient to be more aware and responsible of their own health and well-being. In such system it is possible to deliver care based on the preferences, beliefs, and values of the patients. And modern information tools help generate and manage data that can be useful in drawing information on how to improve the positive outcomes. (Pankomera and van Greunen, 2020). Another trend point it is necessary to highlight is standardization and optimization of the treatment and diagnostic process. It requires continuous support of a patient throughout all service delivery

period (not simple control of the outcome when it is too late to fix something) and moving away from "mega-products" (the products that concentrate too many features in one product) towards specialization in Electronic Medical Records and integration (external specialized products and services) (Gusev, 2019).

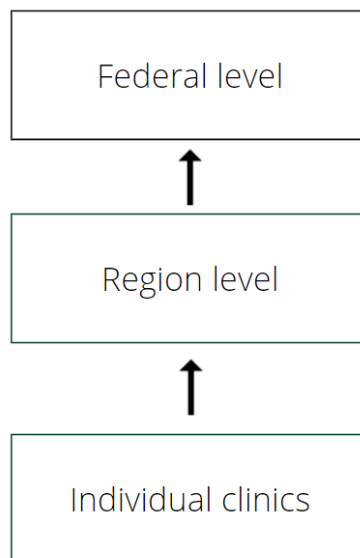


Table 1. The hierarchy of integration

Some of the solutions go beyond their initial scale of one medical organization and can bring support on government level. For example, to regulate health care effectively, the government requires stable flow of actual data gathered directly by medical units (clinics, hospitals and so on). To fulfill this demand, the "Unified State Information System In the Field of Healthcare" (rus. Единая государственная информационная система в сфере здравоохранения) was designed. Conceptually, it is a large-scale set of information technology the aim of which is to provide information to support the activities executed by the participants of health care system. They include, in the first place, ensuring interaction between medical organizations, electronic health card, automated collection of various statistics (especially that about medical conditions), human resource database, registration of patients, general information about clinics, monitoring of procurement activity. Thus, such system consolidates information flow of all medical organizations into a single information network<sup>10</sup>.

Integration can occur on multiple levels: these have vertical hierarchy (it is presented on table 1) starting from the bottom (single clinic level) with the end on the top (federal level).

---

<sup>10</sup> Федеральный закон "О внесении изменений в отдельные законодательные акты Российской Федерации по вопросам применения информационных технологий в сфере охраны здоровья" от 29.07.2017 N 242-ФЗ. URL: [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_221184/](http://www.consultant.ru/document/cons_doc_LAW_221184/) (accessed:27.05.2022)

Territorial extension happens gradually and begins with each single clinic, uniting them on regional level. Here the responsibilities are shared among its actors. The health care authorities develop regional services, while clinics implement information systems. Ultimately this allows to get an appointment at doctor's office via internet portal (like "Gorzdrav.spb.ru" in St.Petersburg), create a shared data storage that keeps patient's data necessary to manage their flaws (e.g. queues for diagnostics that is on high demand) and possibilities to collect statistics.<sup>11</sup> The ending of its development is completion of a single information network the aim of which is to exchange medical data between medical institutions, health authorities and citizens.

This is why it is important to pay attention to automatization of service integration and data collection in clinics (and also ensuring that they get collected properly and uploaded in sorted state). So, to complete integration on regional level it is necessary to equip all clinics with proper information tools and arrange them in such way so they will aggregate necessary data and integrate clinics into one big network, eliminating distance and simplifying information exchange.

To make it true, some clinics design their own information systems. At the same time, some small and medium clinics do not have needs and powers to support their own information system, which is why they resort to outsourcing very often. Another trend that we see is market consolidation. Since the beginning of 2000s the number of Hospital Information Systems dealt on market dropped from 100-120 to 40 in 2019 (Gusev, 2019). The market shrinks and there are both positive and negative aspects of this point. On one hand, the decrease in competition will lower the competition between the producers of systems, on the other hand this means that the share of medical organizations that use one system will increase, which can be beneficial for patients (the benefits will be discussed in this paper later).

At the same time, it is important to keep in mind that the goal of support innovations is, as it follows from their name, to support activities of health care organizations. Also, they allowed to make care delivery more patient-centric. However, the activities and the manners of how they are performed in many senses reflect existing organization structure. In other words, the success of implementation of technological innovations depends on how they are used and how they work as parts of the system. In light of that, while the previous examples were all about technological innovations, it must be noted, that health care innovations are not limited only by technological and medical innovations, which are understood as new medicines, medical equipment and new

---

<sup>11</sup> Regional fragment of the unified state healthcare system of St. Petersburg. Netrika. URL: <https://netrika.ru/project/regionalnyy-fragment-edinoy-gosudarstvennoy-informacionnoy-sistemy-v-sfere-zdravoohraniya-sankt-peterburga> (accessed:27.5.2022)

diagnostic methods. Implementing technological innovations is never successful without strategy and having clear vision of implementation purpose. Managerial methods that are used to operate an enterprise can be innovations as well, as they require implementing them first. In fact, as the analysis of technological innovations in health care showed, innovations became more patient-centric but does it really help reform health care? Is technology a solution by itself? Patient-centricity as concept has eight principles. These include: acting out of the interests of patients, care delivery coordination, informing and engaging patients, making patients feel comfortable, psychological support, letting patients communicate with their social environment, continuous care delivery and finally proper care quality (Shahabov et al, 2020). Although, technologies alone can help improve and support both care and service quality it works much better when it fits patient-centric organization of a clinic. In other words, this is not technology that considers patient interests but the clinic itself, provided that its management uses right methodology. An appropriate managerial methodology is capable of ensuring a better, less costly and more valuable care delivery, while the aim of technological innovations is to support and connect organization. Considering this paper's topic, it would be reasonable to take a look at the factors that concern health care managerial approaches. In the USA, where Porter is from there business principles penetrate the whole health care sector. These are vividly described in Regina Herzlinger's article, which is called "Six Forces That Can Drive Innovation—Or Kill It". Herzlinger, who is called "Godmother of consumer-driven health care" presents a theory based on the six forces model, a concept used to assess an industry and determine drivers' structural emphasis on profitability and competition. (Herzlinger, 2006) The forces are presented and described below:

- Players

The players are stakeholders that play significant role in implementation success or failure.

- Funding

Funding is related to methods that ensure revenue generation and help accumulate capital. This process differs much from that in other industries.

- Policy

Policy is about rules and regulations aimed to protect the industry from fraud activities, set quality standards and protect the consumers.

- Technology

Technology is what advances industry and created technical opportunities to make services more efficient and less costly.

- Customers

Customers represent those who consume health care services. It must be noted, that Herzlinger attributes engagement and activity to customers. It differs them from the passive term “patient”, which she finds outdated.

- Accountability

Accountability represents demands from various stakeholders that reflect their interests. It means that while customers desire to use safe and effective products, the producers and those who deliver care would like to boost cost-effectiveness and gain competitive advantage against other products.

The strategy proposed by Herzlinger is strongly aimed to drive service consumption and give competitive advantage to those who implement it. In the USA business practices quite naturally fit into real situation with insurance companies being private companies.

Some authors criticize such an approach arguing that Herzlinger's proposed ideas are no longer effective for the USA, namely the reinforcement of competition and adding more business methods to health care management. (Mintzer, 2017) And of course, such approach is aimed to bring financial excellence, and it is not necessarily that "customers" will greatly benefit from that.

Such critic has its reasons. Although it is supposed that clinics compete for providing the best care quality and drawing more patients, in reality it some clinics may compete for the care payment. Some researches indicate that current volume-based reimbursement model may provide excessive care to patients as a way to produce additional income or pursuing to keep up with lowered reimbursements. This is one of the ethical and financial questions for clinics who want their services to be paid at a rate that would ensure their functioning, but without providing excessive care or increasing the volume of patients to unmanageable levels.<sup>12</sup> Also, another problem is that in America care delivery process seems to be fragmented. It means that patients have to attend different practitioners who may be good specialists but they lack coordination and no one is in charge of patient's condition. As a result, this leads to decrease in care effectiveness and increased costs. Thus, the problems aroused by business methodology used in health care urged clinic managers and researchers to find other ways to operate clinics<sup>13</sup>.

In light of this, it is necessary to notice that Russian and American health care organization is different. The biggest difference is the dominant share of public sector in Russian health care and American private health care financing model, which is based on market principles. The

---

<sup>12</sup> Value Vs. Volume Based Care. 6 Critical Issues. URL: <https://healthinfoservice.com/value-vs-volume-based-care-6-critical-issues/> (accessed:27.5.2022)

<sup>13</sup> P. Valentijn. Fragmentation of care: its causes and what we can do about it. URL: <https://www.essenburgh.com/en/blog/fragmented-care-the-causes-and-what-we-can-do-about-it> (accessed:27.5.2022)

private model is characterized by the provision of medical assistance mainly on a paid basis at the expense of the consumer of medical services and the lack of a unified state health insurance system. The government becomes the main provider of services required to fulfill needs that are not met by the market (the low-income population, the retired, the unemployed). In that case the state develops, funds and guarantees public health care programs (Omelyanovskiy et al., 2014). The Russian legislation financing in health care field differs greatly from that of the USA. The sources are listed in the Federal Law No. 323-FZ dated November 21, 2011 "On the Fundamentals protection of the health of citizens in the Russian Federation" and provided below (Budarin, 2011).

- The Federal budget;
- The budgets of the subjects of the Russian Federation;
- Local budgets;
- Compulsory medical insurance funds;
- Funds obtained directly from patients and organizations;
- Other funding sources not prohibited by Russian legislation.

As it can be seen, Russian legislation combines features of both private and social models. The state plays the role of a guarantor that satisfies needs of citizens in medical care, permitting the paid services and admitting the market principles for medical services at the same time. This allows to assert, that Russia has combined model based on insurance coverage and government donations. But what is the ratio of both components in that model in case of Russia? Also these facts make us suppose that Russian care model can be more patient-oriented than the American one as it is supposed not to concentrate on profit. Is social model patient-oriented?

Historically, in terms of funding, the Russian Federation health care system is based on Soviet health care system, mandatory insurance system (rus. OMC) and private health care. In 1991, there was established Federal Compulsory Health Insurance Fund and Regional Funding Centers as auxiliary source of funding. There is also Voluntary Health Insurance (rus. ДМС). Compulsory insurance system covers primary medical care, ambulance care, specialized medical care (insurance cases), preventive measures and medical examinations of particular categories of patients. Federal budget funds services that are not covered by insurance, treatment of particular diseases, treatment in institutions of federal significance, diagnostics and treatment that require advanced medical equipment, providing medicaments in case of severe diseases and providing care for disabled and other groups of patients. (Madyanova et al., 2016)

As compared to the US model, Russian citizens can use social guarantees that cover some of their medical expenses. Compulsory medical insurance covers almost all Russian citizens,



which is around 98,74%. Those who are engaged in military service, officials and particular categories of population are exempted from this category of insurance. Its policies are regulated by Federal and Territorial funds of compulsory medical insurance (рус. Федеральный и территориальные фонды обязательного медицинского страхования). The same fund also decides the category of care, conditions and ways of its delivery, list of diseases. The employers contribute insurance premiums to the fund according to fixed tariffs. The Executive authorities play the roles of insurers and employees for the unemployed and contribute into funds for them. (Obuschenko, 2014)

Compulsory medical insurance, as we can see, majorly depends on incomes of those whom it covers and the number of economically involved citizens. At the same time insurance system experiences shortfall caused by "gray" payments and situations when a payer earns more than limit value (Obuschenko, 2014). Insurance companies also allow patients to freely choose clinic to become attached to. Theoretically, this may cause patients to neglect clinics that deliver unsatisfactory care so the importance of quality improvement becomes extremely important at this point.

Some researchers point out that average insurance coverage in Russia is low and is about 3446 roubles for an unemployed and 6269 roubles for an employed. (Obuschenko, 2014). At the same time it was possible to observe the development of paid services, that were not covered by insurance, even though there was no legal document that would have regulated them. It was in 1996 when proper legal ground was adopted, which allowed to set the rules of acquiring paid services as well as fix their prices. Public organizations can offer paid services, provided that they have special certificate, license and permission granted by competent authority. Thus, the rules regulated by Decree №27 as of 13.01.1996 make the basis of functioning of paid services in the Russian Federation. (Madyanova et al., 2016)

Another document, the Federal Law No. 323-FZ of November 21, 2011 claims, that if a patient decides to refuse from the paid medical services, this cannot be a reason to reduce the volume, range and quality of medical care granted by insurance. Practically, this means that only specialized divisions can provide paid medical services in strictly selected hours. Thus, Russian legislation protects service quality and that share of patients that prefers to use insurance<sup>14</sup>.

---

<sup>14</sup> Федеральный закон от 21 ноября 2011 г. № 323-ФЗ "Об основах охраны здоровья граждан в Российской Федерации". URL: <https://minzdrav.gov.ru/documents/7025-federalnyy-zakon-323-fz-ot-21-noyabrya-2011-g> (accessed:27.04.2022)

However, some evidences point out that sometimes clinics do not have enough personnel and equipment to provide care in proper volume.<sup>15</sup> This puts patients in such situation that they have to turn to private clinics to receive the type of care (usually it is diagnostics) they need.

If we trace the latest changes that concern budgetary regulations, we can find peculiar fact that the newest reforms that concern the federal budget for 2022-24, include a reduction in spending on healthcare, the economy, and social policy. Despite the ongoing pandemic and new records in the number of deaths, it was decided to cut funding for the healthcare system from the federal treasury by 117 billion rubles - from 1.362 trillion in 2021 to 1.245 trillion this year<sup>16</sup>. This raises risk of inability to maintain the existing level of care, which is not so good as surveys indicate<sup>17</sup>.

Such news rather cause concerns as this means that public health care will have to reorganize allocation of finances and there is no doubt it will not be in favor of patients. The need to cover the expenses will inevitably urge managers to regard such options as raising the share of paid medical services provided by public medical institutions together with getting more money from insurance companies.

And some clinics have a good position to start doing that. Some evidences suggest that sometimes public organizations that provide health care services can compete with private clinics. Federal Antimonopoly Department did proposition in 2014 that concerned the problems of competition on medical care market. In fact, the department expressed concerns about the provision of paid services in hospitals and clinics. They assert, that mixture of paid and free service put private clinics in an unequal position as public medical organizations have multiple channels of funding, while private medical organizations have only one source and that puts them down in terms of competition. As an exception, the department proposed to let provide paid services only in frame of individual Voluntary insurance. It means that private clinics consider public organizations as competition threat when advanced properly<sup>18</sup>.

---

<sup>15</sup> ОНФ: 86% россиян пожаловались на нехватку врачей. Егор Четвериков. 2019. Вадемекум. Деловой журнал о здравоохранении. URL: <https://vademec.ru/news/2019/05/21/onf-86-rossiyan-zhaluyutsya-na-nekhvatku-vrachey/> (accessed:27.04.2022)

<sup>16</sup> Правительство пустит "под нож" расходы на экономику, медицину и социальную поддержку россиян. 2021. Финанц.ру. URL: <https://www.finanz.ru/novosti/aktsii/pravitelstvo-pustit-pod-nozh-raskhody-na-ekonomiku-medicinu-i-socialnuyu-podderzhku-rossiyan-1030835685> (accessed:27.04.2022)

<sup>17</sup> Современные тенденции в системе здравоохранения Российской Федерации. Издание Государственной думы.2019 URL: <http://duma.gov.ru/media/files/otTeY7Kh7jQrYiz92JbKmBymxb6971xF.pdf> (accessed:27.04.2022)

<sup>18</sup> ФАС предлагает запретить платные медуслуги в госклиниках. ТФОМС КБР. URL: <https://tfomskbr.ru/news/fas-predlagaet-zapretit-platnye-meduslugi-v-gosklinikah> (accessed:27.04.2022)

Moscow, the capital of the Russian Federation, has advanced in terms of creating good environment for further development of paid services and is a good example of compensating own budgetary lacks at the expense of other public organizations. For example, public institutions like schools, kindergartens, specialized clinics and so on could get diagnostics services for free until 2014. However, since abolition of Municipal Order №1228, dated by 28.12.1999 in 2014, public institutions have to pay for these kinds of services<sup>19</sup>.

However, some experts believe that big funding is not the key success factor in health care. The low efficiency of healthcare spending in Russia is the result of a number of reasons, among which it is worth highlighting (Nazarov and Avksentiev, 2017):

- An unbalanced free government guarantee program of medical care

Yes, there are programs of social guarantees in Russia, the goal of which is to deliver care to everyone. However, despite the humanistic nature of such respect, the application of necessary guarantees in the field of protecting the health of citizens are not feasible. The main reason is the inability to comply with the needs of all population in terms of health services because of the limited funding.

- Structural disproportion in the sources of financing of health care expenditures

A significant shortcoming of the current social guarantees system is its prohibition on the collection of additional payment for the provision of services provided for by the SGBP. In theory such a procedure is intended to create a complete protection of the population from the financial risks associated with the need to pay for medical care in case of illness, but in practice this is not the case. There is evidence that the population must co-finance receiving some types of public health care, and the participation of the population in payment is too high.

- Lack of formalization of the program of outpatient medication support

Another drawback of the current social guarantees program is its imbalance in terms of the ratio of guarantees in the field of medical care and guarantees in the field of drug supply. Guarantees for the provision of medical care are somewhat comprehensive, while drug provision for outpatients is generally carried out at the expense of citizens' personal funds. As a result, the population is forced to pay the full cost of medicines on their own, which leads to their insufficient consumption and, as a result, to a decrease in the effectiveness of the medical care provided.

- Insufficient motivation of professional participants in the healthcare system.

The main actors in the health care system traditionally include patients and professional actors: public authorities responsible for organization of medical care within the framework of

---

<sup>19</sup> О признании утратившим силу постановления Правительства Москвы от 28 декабря 1999 года N 1228. URL: <https://docs.cntd.ru/document/537949484> (accessed:27.04.2022)

public health care, medical insurance organizations, medical organizations and the medical community. At the same time, none of the professional participants in Russia is currently interested in the effectiveness of the healthcare system. In particular, the income of doctors in Russia practically does not depend on their competencies. The development of related specialties could potentially improve the efficiency providing medical care, but doctors do not have sufficient financial motivation to improve their skills. The amount of funding for medical organizations also does not depend on the results and quality of their activities, since in most constituent entities of the Russian Federation, when planning territorial programs, there is a strict distribution of the volumes of medical care, and the redistribution of volumes during the year is possible only in exceptional cases.

Another reason for high private spending is the fact that the government guarantee programs do not involve co-financing of health care by the population, even if such co-financing is voluntary. The population is unable to pay more to increase quality of service and is forced to choose between full payment for such a service in private health care or refusing an upgraded service and getting what is actually available in public health. As a result, the cost of quality medical aid is too high. (Bokarev et al., 2017)

For patients, it is generally unimportant who exactly transfers money to a medical institution, patients are concerned about the possibilities of obtaining medical care, which worsened. People have to pay for what they used to receive free of charge, and from their point of view it is better to spend public funds on medical care than for the maintenance of insurance funds and companies. (Shishkin, 2000)

From the previous analysis we can see that public authorities responsible for organization of medical care within the framework of public health care, medical insurance organizations, clinics and the medical community are not interested in improving efficiency of the health care system.

In particular, the income of doctors in Russia practically does not depend on their competencies. Learning related specialties could potentially improve the efficiency of care delivery, but doctors do not have sufficient financial motivation for professional development.

The amount of funding for medical organizations also does not depend on the results and the quality of their activities, since in most subjects of Russia, with planning of territorial programs there is a strict distribution of volumes of medical care, and the redistribution of volumes during the year is possible only in exceptional cases. It urges health managers to look after new ways of management and funding.

In America market mechanisms in healthcare financing lead to an uncontrolled increase in the cost of medical care, a decrease in its availability for the general population (13.4 % of the uninsured in 2014) and disintegration of the process of providing medical care to patients.<sup>20</sup> Russia, to the contrary, has adopted a lot of policies that protect socially vulnerable parts of society and ensure more or less equal service delivery.

As one can see, there are some conclusions that can be made for this sub-chapter. First of all, the current approach to healthcare management does not encourage service providers to be patient-centric. Meanwhile, it is precisely such a strategic goal that both public and private clinics should strive for. First of all, for the very reason that the perception and evaluation of the quality of their work directly depends on the competence of clinics to consider interests of their patients. For public clinics, this means ensuring the availability of medical care and improving the efficiency of medical services, bringing their volume and quality in line with the needs of patients, advanced medical science and the epidemiological situation and improving financial performance in light of budgetary reductions. Meanwhile, private clinics are characterized by slightly different goals of work. As we know, private clinics exist in the form of a business, and profit maximization is typical for any business (however, as mentioned earlier, there are regulatory requirements, such as, for example, consumer protection, according to which medical organizations are required to maintain a certain minimum level of quality of services. In the context of falling incomes of the population and increasing competition in the market, it becomes important for private clinics to gain a competitive advantage, and in terms of quality, value creation can be such an advantage. In this regard patient-centricity becomes a good way to improve the quality of care because patients/customers will prefer those clinics that can satisfy them better. In this sense, the concept of Care Delivery Value Chain represents a convenient two-way leverage on both the quality and costs of the medical organization, which will be discussed in the next section.

## **1.2 Value-based Health Care Delivery**

In 1985 Michael Porter, professor of Harvard University issued the book called 'Competitive Advantage', where he first suggested the value chain concept and explained why it is necessary to reach competitive advantage.

According to Porter, value chain is a collection of discrete activities that a company performs in designing, producing, marketing, delivering and supporting its product and thus create

---

<sup>20</sup> Inc., Gallup (July 10, 2014). "In U.S., Uninsured Rate Sinks to 13.4% in Second Quarter" URL: <http://www.gallup.com/poll/172403/uninsured-rate-sinks-second-quarter.aspx> (accessed:27.04.2022)

value for its consumers. All these activities can be represented using a value chain. To be more precise, value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation, which, according to Porter, is directly linked to competitive advantage. (Porter, 1985)

In Porter's original concept, value is the amount buyers are willing to pay for what an enterprise provides them and it is measured by total revenue. Strategically speaking, creating value that exceeds product costs is the main goal of a firm.

Each stage of the value chain adds more value. However, the idea of competitive advantage gained through value chain is to gain it through value provided to customers, but not costs, as some firms raise their cost in order to command a premium price through differentiation. (Porter, 1985)

The value chain displays total value and one of its elements is value activities. Value activities are the physically and technologically distinct activities a firm performs and every value activity requires resources to work on.

These include purchased inputs, human resources, and technology. Each value activity also uses and generates information, such as buyer data (order entry), performance parameters (testing), and product failure statistics. Value activities may also create financial assets such as inventory and accounts receivable or liabilities, such as accounts payable. (Porter, 1985)

According to Porter, value activities can be divided into two groups, primary activities and support activities. Porter's value chain involves five Primary activities: inbound logistics, operations, outbound logistics, marketing and sales, and service. On the table 2 we can see them in vertical columns. The Support activities are depicted in those that are horizontal. These are procurement, human resources, technology development, and firm infrastructure (Porter, 1985).

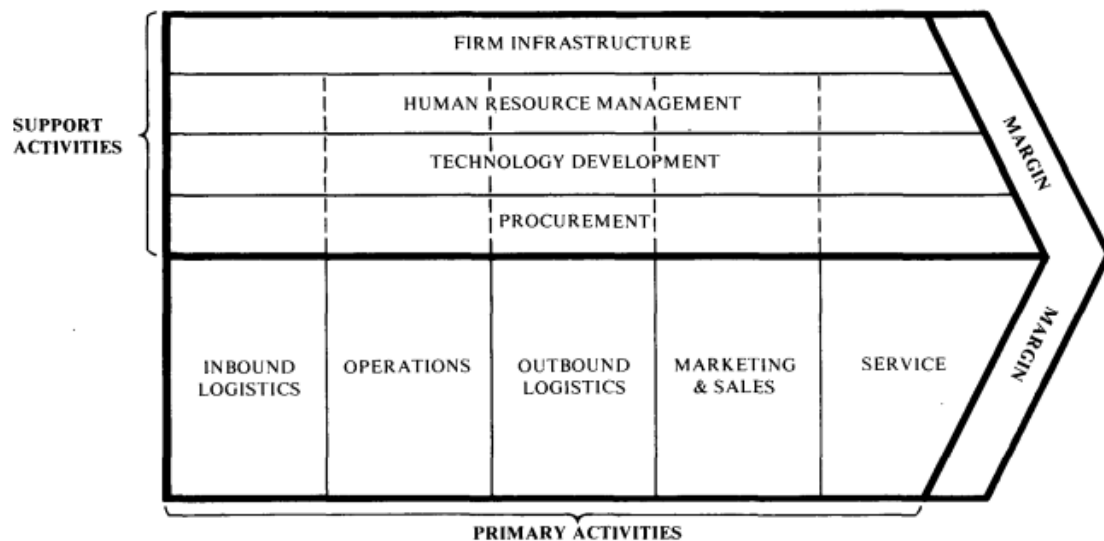


Table 2. Value Chain Activities (Porter 1985)

The original Value Chain concept applies to following situations:

- for current operating costs, for example, to deliver goods by own transport or use the services of specialized structures;
- to make financial decisions of the current nature, for example, in relation to the management of accounts receivable;
- to make and carry out investment decisions, for example, when assessing options for possible capital investment, etc. (Porter, 1985)

Apart from creating value, another useful and important feature of Value Chain is that it helps decrease costs. Guided by the information received, in the future it is possible to plan the sequence of a particular type of activity most effectively, choose a method to minimize costs, and determine ways to increase the competitiveness of the company in terms of costs. It is worth mentioning though, that only one variable (either value or costs) can be optimized at one moment. (Kaplinsky and Morris, 2000)

The disadvantage of applying the concept in this way is that it is always quite difficult to obtain information about the costs of other companies, since it is confidential. In addition, comparison of information on costs is not always possible due to the fact that competing companies try to use different accounting methods for determining costs.

To draw brief conclusion, the Value Chain Concept is a comprehensive and holistic approach to acquiring competitive advantage and taking control over formation and management of the costs, which proposes to collectively take into account the cost-generating mechanisms of

the company's activities, from the initial sources of raw materials to finished products or services received by end users.

The company's value chain is a necessary element of strategic cost analysis designed to compare the costs of major competitors and determine the company's competitive cost position relative to competitors.

The original 'Value Chain' has proven to be effective and efficient in fulfilling the needs of business. However, yet again, it is necessary to keep in mind that public health care is not about gaining money, but about satisfying the needs of patients and helping them remain economically active in the first place. This fact resulted in rethinking the concept of original 'Value Chain' putting the needs of patients in its center.

It was in 2006 that Michael Porter and Elisabeth Teisberg published the book 'Redefining Health Care: Creating Value-Based Competition on Results', which became a theoretical ground that helped put the system of Value-Based Healthcare into practice. Value-Based Healthcare has since become a popular topic in the healthcare sector, as the academic circles accepted it as a brand new approach capable to change the situation in health care in the most positive way. Consequently, this practice was also implemented in some medical organizations. (Teisberg, 2020)

The main idea proposed by this concept is that the core issue in health care is the "value of health care delivered" to the patients. Elizabeth Teisberg, one of the co-creators of the concept describes it as following: "Value in health care is the measured improvement in a patient's health outcomes for the cost of achieving that improvement. The goal of value-based care transformation is to enable the health care system to create more value for patients. As value is created only when a person's health outcomes improve, descriptions of value-based health care that focus on cost reduction are incomplete. Although reducing costs is important it is not sufficient: If the real goal of value-based health care were cost reduction, pain killers and compassion would be sufficient.", writes Teisberg, emphasizing the most important in her opinion part of Care Delivery Value Chain. (Teisberg, 2020)

Consequently, this means that health care sector will need to work constantly on what value it delivers and how to improve it. Improving value becomes a mutual process that unites all stakeholders as they are interested in reforming health care in such way that it would allow following possibilities: to cut costs of services, concentrate on the needs of patients in more effective way, restrict services or reduce provider compensation (Porter, 2013).



Although the idea of 'value' seems abstract, Porter and Teisberg's studies also provide a way to measure it. The formula below, which explains what exactly value is has two variables. These are 'health outcomes that matter to patients' and 'costs of delivering the outcomes'. Value is measured for the care of a patient's medical condition over the full cycle of care. The outcomes are the full set of health results for a patient's condition over the care cycle and costs are the total costs of care for a patient's condition over the care cycle (Porter, 2013).

**Value = health outcomes that matter to patients / costs of delivering the outcomes**

Those health outcomes that matter to patients include health status, clinical measures patient-reported outcomes (e.g. perceived diabetes control), patient experience (e.g. feeling engaged in decision making), and quality of life. Some researchers define the 'outcomes' as 'quality of care'. And value is increased when there is more care quality for less cost. (Leung and van Merode, 2019) From the point of this research paper, which in many ways concerns quality management, this is essential to understand what value is and how its components can be managed. To do that, in this chapter there will be studied the principles of Care Delivery Value Chain organization and its activities.

Implementation of Care Delivery Value Chain is a difficult task. It has following challenges (Garber et al., 2012):

- Abundance of methodologies caused by implementation of many care delivery ways
- Reaching network effects of health information technologies
- Quality and price competition among providers often ineffective
- Little competition on convenience or price transparency
- Fee-for-service payments fail to reward cost-effective activities and offer more revenue for bad outcomes
- High-margin activities tend to encourage competition that may not be value enhancing
- Awareness and compliance with Medicare and Medicaid rules require substantial resources
- Scope of practice laws can impede cost-effective staffing
- Use of innovative methods can increase medical malpractice exposure
- Short-sighted decision-making can preclude cost-effective investment
- Outcome evaluation

They address the typical problems of US health care that were discussed in previous chapter like ineffectiveness of business approaches widely implemented in health care and excessive

competition, as well as fragmented health care delivery, which affected care health outcomes and thus quality negatively.

The last point, which is called 'outcome evaluation' is of extreme importance as without it Care Delivery Value Chain loses its sense. When we measure treatment outcomes (by which we may understand both immediate and long-term result), we can clearly say what value we brought to a patient. So, the question is what can be counted, as outcome criteria?

First of all, outcomes should be measured by medical condition or primary care patient segment not by procedure or intervention. Secondly, outcomes should reflect the full cycle of care for the condition. Outcomes must always be multi-dimensional and should include the health results most relevant to patients. Finally, measurement must include initial conditions/risk factors to allow for risk adjustment. After that it is possible to standardize outcome measures to enable comparison and learning (Porter, 2014).

In light of that it would be necessary to see how health care service quality is measured in Russia. In Russia, the quality of medical care is considered to be a set of characteristics that reflect the accuracy of medical care, the correct choice of the method of prevention, diagnosis and treatment and the level of achievement of the expected result. (Murashko, 2015)

Order No. 381n of the Ministry of Health of the Russian Federation was dedicated to its control and was hoped to become a "new quality management system". It was to organize and provide quality medical care, which was aimed at achieving noticeable results in terms of improving the health of patients and reducing the level of risk from medical exposures. The Order No. 381n was abolished in 2021. As of now, the main regulatory document of quality management is the Federal Law of the Russian Federation of November 21, 2011 No. 323-FZ "On the Fundamentals of Protecting the Health of Citizens in the Russian Federation". In accordance with its paragraph 2 of Art. 64, the criteria for assessing the quality of medical care are based on the groups of diseases or conditions based on the relevant procedures for the provision of medical care, standards of medical care and clinical recommendations (treatment protocols).<sup>21</sup>

From the point of Care Delivery Value Chain it is necessary to organize conditions into groups and this is why it is proposed to pay attention to this aspect. The features of care quality criteria based on certain groups of diseases are generalized in the following way<sup>22</sup>:

---

<sup>21</sup> Реформа здравоохранения: панацея или проблема. Государственная дума. 2016. URL: <http://duma.gov.ru/media/files/q7QeBHNyDQy0lgMjYZFs4iUC9xFH7nFJ.pdf>

<sup>22</sup> Критерии оценки качества медицинской помощи ФГБУ «ЦЭКМП» Минздрава России URL: <https://rosmedex.ru/kk/> (accessed:27.04.2022)

- The criteria represent the mandatory volume of medical care and the mandatory results that must be achieved as a result of the provision of medical care for a given group of diseases or conditions
- The criteria are developed in accordance with the International Classification of Diseases of the 10th revision (ICD-10). For each group, specific codes are indicated in accordance with ICD-10, which cannot be duplicated
- The criteria are unified for all medical organizations, regardless of their level
- The criteria do not take into account the form of medical care
- The criteria do not regulate how long care is delivered to the patient
- The criteria are formulated in such a way that they can be assessed when analyzing a specific medical history. After evaluation a supervisor must be able to give unequivocal answer about the effectiveness / efficiency or lack of effect / result of the treatment)

As we can see, the criteria are aimed at solving the tasks, one of which is to ensure and assess the compliance of medical care delivered by medical workers with the criteria for assessing the quality of medical care, as well as considering the reasons for the discrepancy between the quality of medical care delivered and these criteria. From the point of the Care Delivery Value Chain, this approach to quality assessment satisfies the requirement of measurement to be based on groups of diseases. However, at the same time, this approach is overly formal, and it must be remembered that the assessment should mean the most significant results relevant to the patient. Some experts point out that it is not “quality assessment criteria” that must be observed when delivering medical care, the basis on which they are formed. The criteria themselves represent only a system of guidelines for conducting an examination of a case of medical care and obtaining reasonable and formalized results. (Guseva and Berdutin, 2016)

Another claim which concerns the reason of the "lack of result" is that it is impossible to merge compliance with established regulatory requirements and the need to act according to the interests of a particular patient in their unique clinical situation. Thus, it is not lack of compliance with the specified criteria of quality that should be considered, but the causes of defects in the delivery of medical care, which include both violations of the requirements established in the healthcare system, and inability to deliver the care in such way to achieve the ideal outcomes for a particular patient. (Guseva and Berdutin, 2016)

Thus, we can draw the following conclusion about the quality assessment system in Russia:

- Reliance on criteria for assessing the quality of care in the form of compliance requirements and compliance monitoring and analysis of the reasons for non-compliance is fragile. Moreover, as follows from most indicators of treatment outcomes, they can evaluate the process of care, not the results for each patient individually. This is primarily due to the inability to comply with regulatory requirements and an individual approach to the patient.

As for the private clinics, there is no unified approach to assessing non-financial indicators (that can be interpreted as 'patient outcomes'.) As the analysis shows, private clinics use medical indicators, social indicators, environmental indicators and other indicators. Medical indicators, which are the most important element, indicate only the volume of medical care (which in turn is formed only on the basis of the facts of visiting the clinic), ignoring, for example, the patient's condition after treatment. There are also criteria that allow the patients to express their attitude to the treatment provided, among them there is an assessment of the quality of treatment, an assessment of the service, the number of complaints, as well as the number of new patients for a conditional period who have chosen a medical organization. Meanwhile, this approach, although being client-oriented, does not provide an exhaustive understanding of what exactly a clinic needs to work on, since such criteria are collective and give a very generalized assessment. (Zenkina and Hojaev, 2019)

For example, when receiving a low rating for the quality of treatment, it is not very clear what exactly led to such a result, because this could have happened both as a result of the objective unprofessionalism of doctors, and as a result of a discrepancy between the results of treatment and the expectations of patients, who, by the way, may not always formulate them adequately. As for the number of attracted new clients, this criterion can also turn out to be rather misleading, as the increased attention of clients may rather indicate the success of the marketing campaign (especially in combination with the good location of the clinic, since according to the all-Russian survey, for 49% of Russians, close location of the clinic may be a more significant factor influencing their choice than the quality of the services provided and not a signal that a clinic has increased the generated 'value'.<sup>23</sup>

Apart from correction in the approach of outcome evaluation and making it more patient-centric, that they are nowadays in Russia, implementation of Care Delivery Value chain requires

---

<sup>23</sup> Современные тенденции в системе здравоохранения Российской Федерации. Издание Государственной думы.2019 URL: <http://duma.gov.ru/media/files/otTeY7Kh7jQrYiz92JbKmbYmxb6971xF.pdf> (accessed:27.04.2022)

massive reorganization within a medical structure to make transit from old way of management to the new form of organization.

While Porter and Teisberg's care delivery value chain proclaims a new vision of care delivery, different to that, which we have now, where the needs and wants of doctors, hospitals and associated health care units have prevailing significance, in Russia we see little support in this field. For example, as it was described previously, Russian health care legislation does not take health care outcomes into account, when funding medical organizations. Compulsory Medical Insurance, for example calculates amounts of insurance using per capita calculations as standards, without considering the value a patient obtained.<sup>24</sup> It presents another threat which means that public clinics may try to drain more money from insurance through keeping patients longer than necessary and thus keeping other patients away from using medical services. Thus, there may be less access to health care services.

Porter and Teisberg, considering American reality, where patients can truly be called customers, criticize such approach and the very model of rewarding medical organizations just for service and time taken from doctors. They believe, that this results in neglecting patient and insufficient attention and interest to finding the best possible problem solution in terms of costs and patient satisfaction.

To enable transit from the old state of organization, Porter suggests following steps of creating a Value-Based Health Care Delivery System (Porter, 2014):

- Organizing Care into Integrated Practice Units (IPUs) around Patient Medical Conditions (For primary and preventive care, organizing to serve distinct patient segments)
- Measuring Outcomes and Costs for Every Patient
- Moving to Bundled Payments for Care Cycles
- Integrating Care Delivery Systems
- Expanding Geographic Reach
- Building an Enabling Information Technology Platform

The first point suggests introducing Integrated Practice units, which by itself is based on 'Integrated Care' concept. Integrated Care (also can be found such terms as 'Coordinated Care' and 'Seamless Care') is proclaimed by some researchers to be an innovative approach to medical care that should replace existing 'fragmented' and 'episodic' care organization practices.

---

<sup>24</sup> The procedure for paying for medical care under compulsory health insurance.URL:  
[http://www.consultant.ru/document/cons\\_doc\\_LAW\\_324740/4be1dbd7a93293bd302a6e9b001748fa8eba4ffa/?](http://www.consultant.ru/document/cons_doc_LAW_324740/4be1dbd7a93293bd302a6e9b001748fa8eba4ffa/?)  
(accessed:27.04.2022)

'Integrated Care' is a multisided concept the essence of which depends on how its stakeholders understand it. That is the reason, why academic society has not derived a single definition to 'Integrated Care'. As of now there are three major definitions used by national governments, regional WHO structure in Europe and specifically by the UK government. The author of this work proposes to use definition proposed by WHO office as he finds it more corresponding to value creation, which is a major topic of this paper<sup>25</sup>

“Integrated health services delivery is defined as an approach to strengthen people-centered health systems through the promotion of the comprehensive delivery of quality services across the life-course, designed according to the multidimensional needs of the population and the individual and delivered by a coordinated multidisciplinary team of providers working across settings and levels of care. It should be effectively managed to ensure optimal outcomes and the appropriate use of resources based on the best available evidence, with feedback loops to continuously improve performance and to tackle upstream causes of ill health and to promote well-being through intersectoral and multisectoral actions”<sup>26</sup>.

So, to put it briefly, IPU is a team of specialists that concentrates its efforts around a certain group of diseases. Conceptually, this term fully reflects ideas proposed by Porter and Teisberg. We can see that 'Integrated Care' is about grasping and uniting all fragments of similar disease treatment into one facility. Additionally, care delivery also implies providing attentive assistance or treatment to people in need. Integrated care, then, results when the integration is required to optimize care. (Valentijn et al., 2013)

Integration by itself is a complex thing. It depends on many factors and their collection determines what exactly integration will be built around and in what practice units will be organized. This fact urges us to differentiate between different integration types. Those below are the most basic. (Goodwin, 2016)

---

<sup>25</sup> Integrated care models: an overview. 2016. WHO. URL: [https://www.euro.who.int/\\_data/assets/pdf\\_file/0005/322475/Integrated-care-models-overview.pdf](https://www.euro.who.int/_data/assets/pdf_file/0005/322475/Integrated-care-models-overview.pdf) (accessed:27.04.2022)

<sup>26</sup> Ibid

Organizational	Integration of organizations are brought together formally by mergers or through collectives and/or virtually through coordinated provider networks or via contacts between separate organizations brokered by purchaser
Functional	Integration of non-clinical support and back-office functions, such as electronic patient records
Service	Integration of different clinical services at an organizational level, such as through teams of multidisciplinary professionals
Clinical	Integration of care delivered by professional and providers to patients into a single or coherent process within and/or across professions, such as through use of shared guidelines and protocols

Table 3. Types of integration (1) (Goodwin, 2016)

The researches also distinguish more specific 'key' types that more narrowly correspond to the integration process. These represent more sophisticated but precise types of integration.

Horizontal integration	Integrated care between health services, social services and other care providers that is usually based on the development of multi-disciplinary teams and/or care networks that support a specific client group (e.g. for older people with complex needs)
Vertical integration	Integrated care across primary, community, hospital and tertiary care services manifest in protocol-driven (best practice) care pathways for people with specific diseases (such as COPD and diabetes) and/or care transitions between hospitals to intermediate and community-based care providers
Sectoral integration	Integrated care within one sector, for example combining horizontal and vertical programmes of integrated care within mental health services through multi-professional teams and networks of primary, community and secondary care providers;
People-centred integration	Integrated care between providers and patients and other service users to engage and empower people through health education, shared decision-making, supported self-management, and community engagement;
Whole-system integration:	Integrated care that embraces public health to support both a population-based and person-centred approach to care. This is integrated care at its most ambitious since it focuses on the multiple needs of whole populations, not just to care groups or diseases.

Table 4. Types of integration (2) (Goodwin, 2016)

When suggesting their vision of the structure of the Integrate Care, Porter and Teisberg put forward following principles (Porter, 2006):

1. “Virtual” IPU even if providers practice at different locations
2. Increasing consistency of protocols/processes across sites
3. Creation of mechanisms for relationships and communications
4. Case management structure spanning units where appropriately

On practice, all of the types presented in the table 4 correspond to those principles. The aim of Porter's concept is to achieve best outcomes for patients throughout the whole care cycle. This is impossible without client participation and multidisciplinary teams. Thus, organizational, functional, service and clinical dimensions suit the concept. From Porter's perspective, his imperative to organize primary and preventive care to serve distinct patient segments seems to fit into horizontal integration. (Goodwin, 2016)

To put theory into practice, there were developed 'Integrated Care' models one of which is mentioned by Porter and is called 'Case Management'. (Porter, 2014) Speaking specifically of 'Case Management', it is, According to American Case Management association, a 'collaborative process of assessment, planning, facilitation, care coordination, evaluation and advocacy for options and services to meet an individual's and family's comprehensive health needs through communication and available resources to promote patient safety, quality of care, and cost effective outcomes'.<sup>27</sup> Its goal is to deliver personalized services to patients to improve their care through appropriate utilization of resources supported by the patients will and involvement. Care delivery is based on following principles (Kanter, 1989):

1. Referral of new patients (perhaps from another service if the client has relocated to a new area out of previous jurisdiction, or if client no longer meets the target of previous service, such as requiring a greater level of care.
2. Planning & delivery of care
3. Evaluation of results for each patient & adjustment of the care plan
4. Evaluation of overall program effectiveness and adjustment of the program

To ensure the control over process, a case manager needs to be assigned to ensure control and coordination of a patient's care. Practically any qualified with or without medical education person can become a case manager.

Crucial components of case-management include (Kanter, 1989):

---

<sup>27</sup> What is case management? American Case Management Association. URL: <https://www.acmaweb.org/section.aspx?mn=&sn=&wpg=&sid=22> (accessed:27.04.2022)



1. Defining and selecting target individuals for which case management is most appropriate, e.g. patients with multimorbidities, patients frequently admitted to hospitals or patients needing coordination within and across health and social care;
2. Assessment and individual care planning
3. Regular monitoring of patients;
4. Adjustment of care plans if necessary.

The primary tasks of a case manager are therefore to assess the patient's and care deliverer's needs, develop tailored care plan, organize and adjust care processes accordingly, monitor quality of care and maintain contact with the patient and doctors.

After having studied general definition of 'Integrated Care' we can proceed to what is called 'Integrated Practice Units'. These are the elements that are structurally and functionally organized around the patient's medical condition over a full cycle of care with a comprehensive range of services delivered by dedicated multidisciplinary teams. They represent a set of principles used Originally, Integrated Practice Units have been developed for chronic orthopedic conditions, such as hip and knee osteoarthritis, relatively little has been explored in relation to orthopedic trauma. For better understanding there will be given an example of how Integrated Practice Units work to create value for a patient. (Porter and Lee, 2021)

Let us decompose the structure of Integrated Practice Units to what elements contribute to its function. These are on the table 5. The first component is focused on certain group of conditions that can be characterized by high incidence, disease burden, cost of care, opportunity to improve value, and suitability for team-based care. The second component concerns determination of the population segment. From the very theory of Integrated Care it follows that the integration has multiple dimensions and segmentation of conditions as well as population can range largely (e.g. older people with complex needs). Thus, these two points determine what the full cycle of care would look like, which is the third component of Integrated Care Units because the nature of conditions and category of patients determine what it would take to organize the care. This includes the range of resources and treatment stages. The fourth component called 'team' regulates human resources involved into the process and their roles and responsibilities within the care units. The fifth component called the organization describes the standards of how unit should function. This must include clinical pathway, performance and outcome measurement metrics, accountability. Component six points out what facilities treatment process will take place at. As a rule, they are located in one physical place and sometimes care cycle may include virtual activities such as telemedicine. This type allows to provide care on cross-border scale. The final seventh component describes what assets will be used to ensure the work of Integrated Practice Units. These can be

technological assets (outcome, measurement platform, messaging system, telemedicine) as well as non-technological tools such as shared decision-making protocol. (Jayakumar et al., 2019) What is peculiar is that this description lacks services that are used in IPU and clinics that treat diseases by groups. Information systems contain a lot of supportive features that can be widely used by clinic management. This idea will be discussed in the second chapter together with augmented care cycle.

Below there has been put an example of an Integrated Care Unit organized around Orthopedic conditions and its components. As it had been mentioned before, the first units were organized around this group of conditions. Apparently, it was vertical integration they chose in that case, to form the group of conditions and patient segment, namely adults who suffer fractures and injuries connected to musculoskeletal system. Orthopedic conditions are diverse and may have different reasons, and this is why we need to create multiple Integrated Practice Units that would deal with specific orthopedic cases of conditions. A single practice unit that would treat all orthopedic condition is not enough because in such situation it will break the structure of units and decrease efficiency.

Definition	IPU Ambulatory Orthopaedic Care	IPU Fragility Fracture Care	IPU Complex Polytrauma
1. Condition	Fractures and associated injuries managed on an outpatient basis (ie, walking wounded), for example, closed fracture of the distal radius	Fragility fractures related to osteoporosis after low-energy injury (eg, osteoporotic fractures of the proximal humerus, wrist, hip, tibial shaft, spine)	Two or more severe injuries in 1 or more body areas after high-energy injury (eg, open/closed fractures of axial/appendicular skeleton, concurrent head, chest, abdominal injuries)
2. Population segments	Broad range of adult patient populations ± complex psychosocial needs	Elderly patient population with osteoporotic fragility fractures ± complex psychosocial needs	Broad range of adult patient populations ± complex psychosocial needs
3. Cycle(s) of care	First specialist outpatient clinic review till discharge from clinic	Initial hospital admission—lifelong surveillance	Initial hospital admission—long-term review (variable, patient-provider designated)
4. Organization	ED information flow, prework, briefing (team huddle), clinic, debrief, follow-up	ED information flow, prework, briefing (team huddle), rounds, debrief, follow-up	ED information flow, prework, briefing (team huddle), rounds/clinic, debrief, follow-up
5. Core team and support services	Orthopaedic surgeon Associate provider (midlevel) Physical therapist	Orthopaedic surgeon Associate provider (midlevel) Physical therapist  Orthogeriatrician Anesthesiologist  Nurse (advanced nurse practitioner) Social worker	Orthopaedic surgeon Associate provider (midlevel) Coordinator (advanced nurse practitioner) Physical therapist General/vascular/neuro/plastic surgeon Anesthesiologist/Intensivist Social worker
	Psychologist/behavioral health specialist Social worker  Nutritionist Risk factor modification	Psychologist/behavioral health specialist Primary care practitioner (remote access)  Nutritionist Risk factor modification* Pharmacist	Psychologist/behavioral health specialist Risk factor modification Pharmacist
6. Key location(s)	Outpatient clinic	Inpatient trauma unit Outpatient clinic	Inpatient trauma unit Outpatient clinic
7. Key assets	Outcome measurement platform Dynamic costing system Real-time activity tracking Shared decision-making solution	Outcome measurement platform‡ Dynamic costing system Real-time activity tracking Shared decision-making solution	Outcome measurement platform Dynamic costing system Real-time activity tracking Shared decision-making solution
<p>*Injury/falls prevention; Secondary fracture prevention, for example, pharmacological.  †Injury prevention.  ‡Aligned with national/international benchmarking/key performance indicators, for example, length of stay, discharge disposition, complication rates (ie, hospital acquired infections, pressure ulcers).</p>			

Table 5. An example of an IPU (Jayakumar et al., 2019)

According to Porter and Teisberg, the integrated treatment cycle begins with monitoring and preventing followed by diagnosing, preparing, intervening, recovering, rehabbing, monitoring and managing. In case of the first unit 'IPU Ambulatory Orthopedic Care' the cycle is not full as we do not see 'preventing' stage. It starts immediately from 'diagnosing' (specialist review). It can be assumed, that these first stages depend on diseases. For example, to monitor tuberculosis it is necessary to do fluorography at certain intervals. In case of fractures that are mostly connected to accidents it is hard to predict when they may happen. To the contrary, IPU Fragility Fracture Care (especially that related to osteoporosis) can be prevented at early stages. However, this case starts

with diagnostics as well. Complex Polytrauma Unit does not include any 'preventing' stage either. Other elements of cycle are not shown in that example. Nevertheless, it must be clear, that fully functionable Care Delivery Value Chain would require augmentation of elements in the cycle. (Jayakumar et al., 2019)

Essentially, defragmentation the cycle(s) of care into elements allowed to divide them into individual units of costs for their further monitoring. However, from the patient's perspective, this cycle of care should be integrated rather than separated. This, according to Porter, raises the question of organizing reimbursement process into 'Bundled Payments'. This would help to achieve best result as now treatment process is mostly about compliance with existing procedures and protocols but not positive outcomes for patients. This problem would require changes in legislative field as well. According to the Methodological recommendations for the calculation of tariffs for medical services, approved by the Ministry of Health of Russia on July 12, 1992, a medical service is understood as a type of medical care provided to the population by health care workers and institutions. From a consumer perspective, medical service (case of medical care) is a certain set of medical measures (preventive, diagnostic, therapeutic, rehabilitation) carried out in relation to one patient on a single (or nosological) occasion of his contact with a medical institution. This makes care delivery episodic and urges patients to visit doctors more. (Parygina, 2011) While such approach seems more lucrative for clinics both private and public ones, it contradicts the concept of care delivery and thus bringing value. Its advantages and disadvantages are listed on table 6. Clinics appreciate it for stimulating patients come more often and for easiness of monitoring care. However, this is precisely what hinders value creation and reaching positive outcomes, as well as drives excessive volume of care and increases costs. Moving from fee-to-service model to bundled payments might need more precise monitoring of results for each cycle element and estimation of costs needed for further billing.<sup>28</sup>

Advantages	Disadvantages
Encourages the delivery of care and maximizing patient visits	Offers little or no incentive to deliver efficient care or prevent unnecessary care

<sup>28</sup> Pros and Cons of Various Payment Models and their Effect on Practices. Medical Billers and Coders. URL: <https://www.medicalbillersandcoders.com/articles/practice-administration/pros-and-cons-of-various-payment-models-and-their-effect-on-practices.html> (accessed:27.04.2022)

Relatively flexible and is employed regardless of the size or organizational structure	Limited to face-to-face visits and acts as a barrier to care coordination and management of conditions via other means
Supports accountability for patient care, but it is often limited to the scope of the service a particular physician provides at any point in time	Patients suffer the logistics involved in this type of model

Table 6. Fee-for-service model

Despite obvious advantages, it should be noted that some researches that affirm 'Bundled Payment' reimbursement model has negative points. For example, it is hard to define the boundaries of an episode. Also, doctors may be selective in terms of serving patients as some of them may represent rather difficult clinical case and it may be tempting to avoid them. All features both negative and positive ones are listed on table 7<sup>29</sup>.

<b>Advantages</b>	<b>Disadvantages</b>
Improves coordination among multiple caregivers	How to define the boundaries of an episode
Flexibility in terms of place and timing care can be delivered	Can create barriers to patients' choice of provider and/or geographic preferences
Effective management of an episode (reduce treatment/manage costs)	Lack of incentive to reduce unnecessary episodes
Simplicity in billing logistics (one bill instead of many)	

<sup>29</sup> Ibid

	The tendency to avoid high-risk patients or cases that could exceed the average episode payment
Accountability for care for a specific episode	

*Table 7. Bundled payments model*

To put the principles of Care Delivery Value Chain into practice Porter and Teisburg outline a specific role for information technology in promoting the dissemination of results-based information generated in the course of treatment. They argue that such information enables competition to flourish which also places downward pressure on health care costs.

To conclude, it was learned that Care Delivery Value Chain is based on integrated practice units that deliver treatment for specific conditions over a full cycle of care. As patients progress through the treatment value chain it becomes possible to focus on delivering each stage of care in such a way that it would increase the outcomes significant for patients.

We can see that 'Case Management' model makes the ground of 'value care cycle'. The process starts with drawing new patients/customers and then a practice unit team designs treatment plan. Each patient's outcome gets evaluated and adjusted if necessary. In the end of full cycle a person in charge estimates final results and outcomes according to which final reimbursement price is set. More attention will be given to 'value care cycle' in the following chapter.

Another positive feature of Value-based health care delivery system is the possibility to minimize costs. However, like in the original value chain it is necessary to choose between costs and value. Some authors reason that this arouses the problem of maintaining balance between higher quality and lower cost. In order to get there, the orientation of the entire academic quality field from research to implementation needs to be changed to include cost as well as outcome measurement and to understand how to obtain the greatest return for investment. (Brook, 2015)

However, another problem is that the current state of outcome measurement leaves much to be desired. There is no consensus on what constitutes an outcome, and the distinctions among care processes, biologic indicators, and outcomes remain unclear in practice. Outcome measurement tends to focus on the immediate results of particular procedures or interventions, rather than the overall success of the full care cycle for medical conditions or primary and preventive care. Even the best efforts are often limited to one or a small number of outcomes, frequently those that are most easily tracked. (Porter, 2014)

In light of necessity of integration it should be mentioned that coordination is what enables to do that. Information is a significant factor of successful integration. Healthcare sector handles huge amounts of information that it relies on to carry out its services. For example, a hospital handles data from many different departments, some of which must be shared in order to provide services. The information is used differently according to the function of departments, such as controlling and planning. Therefore, it is important to make this information accessible to the appropriate departments at the right time. (Mucheleka and Halonen, 2015)

As information is an important part of the healthcare sector, it is relied on to fulfil the responsibilities of doctors, patients' home care, and chronic diseases. This means, that the integration of different services and processes would bring use to clinics and eliminate the traditional division of processes, which has resulted in the reduced sharing of information. Integrated systems would help clinics coordinate activities and support the efficiency of patient care. (Mucheleka and Halonen, 2015)

Integrated systems are an important aspect of every clinic. The healthcare sector is no exception and integrated electronic information systems can effectively transform the healthcare sector. Some researchers demonstrated the need for the connectivity of clinics, such as those in urban and rural areas, in order to provide quality service and share vital information that might be lacking in remote healthcare centers. Therefore, information systems and other integrated technologies would be important in meeting such challenges because they can be used through web technologies that promote connectivity.

Finally, implementation of Care Delivery Value Chain requires 'enabling IT system that would let IPU unite geographically and be more skillful in estimating costs and outcomes (and thus they are able to measure value). In the next chapter the implication of information systems as an 'enabling IT system' will be discussed.

## **Chapter 2. Implementation of information systems in CDVC methodology**

### **2.1 Information systems and resource management in health care**

According to original view on Information Systems, these are systems that manage the flow and maintenance of information that supports a business and some other types of organizations. They can hold information about various entities that exist within the organization (like personalities, places and things) and the environment that surrounds them. Information is obtained from meaningful interpretation of data. Data consists of the raw facts representing events occurring in the organization before they are organized into an understandable and useful form for humans. Its another definition suggests that Information System can be defined technically as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making and control in an organization. (Avison and Fitzgerald, 1991)

Practically, Information systems have multiple dimensions. They exist on operation level, enabling automatization of operations (sets of processes that have certain rules and needed to be done on certain basis) and getting information that is consequently used by managers of different levels. Ultimately, information generated by systems is used for decision-making, identification of points of growth and strategic analysis<sup>30</sup>.

Sometimes information systems are confused with information technologies. However, they exist independently of each other and irrespective of whether they are implemented well. Information systems use computers or information technologies as tools for the storing and processing of information, which can in the end be used for decision-making and better coordination and control. Hence information technology forms the basis of modern information systems<sup>31</sup>.

It is needless to say that originally Information Systems were not developed for health care needs but were adopted to them afterwards. It is with the development of information systems that the scope of their implementation expands and starts covering even more areas of human activity, including healthcare. Initially, the role of information systems in healthcare was seen more as a way to automate routine bureaucratic procedures. Over time, information systems have become more fully integrated into the industry: from automating medical procedures, to expanding the system of sensors and primary interpretation of information. Additionally, it should be noted that they were used to create solutions in the field of data processing and artificial intelligence to create decision support systems. With the growth in the number of areas of application of information

---

<sup>30</sup> History of Information Systems. URL: <https://uh.edu/~mrana/try.htm> (accessed:27.04.2022)

<sup>31</sup> Ibid



systems, the role of the state as a regulator of emerging new types of relations is increasing.<sup>32</sup> In this regard, it is impossible not to pay attention to how the legislation interprets the concept of information systems in medicine. For these purposes, the federal law No. 149-FZ “On Information, Information Technologies and Information Protection” will be studied.<sup>33</sup>

When studying it, one can notice that in the legislation the object of information systems is "information", other objects information systems work with in health care, include only EHR (Electronic Health Records), electronic registration (including personalized), electronic medical archive and electronic prescription. However, if we dig deeper into related terminology, we may run across definition proposed by International Organization for Standardization (ISO), which says that an 'Information System' is "an information processing system, together with associated organizational resources such as human, technical, and financial resources, that provides and distributes information."<sup>34</sup> This definition mentions resources, namely that the information system can manage data about them (and in a sense manage the resources themselves). In addition, it is reliably known that in medicine, patient information is not the only object of information systems management. This is confirmed by numerous resource management modules, as well as the concept of business information systems called ERP (Enterprise Resource Planning), which has also found application in the work of medical institutions. Moreover, some companies developing information systems for health care position them exactly as ERP systems for health care. As a rule, these companies were originally engaged in the development of information systems for business and their solutions were called ERP, so it is very likely that when they began to design information systems for clinics, their new product was associated and promoted under the concept of ERP.

As we already got acquainted with multiple views on the objects information systems operate, we finally can say that information systems produce information that can be concentrated both around patients and management of resources, which is essential for organizational activities. Thus, the use of information systems raises awareness about internal resources of an organization and helps organize them in the most effective and efficient way. It is extremely important for strategic development of a company and fits the 'Resourced-based view' concept, which is about establishing most effective strategic path basing and achieving competitive advantage (which can be 'outcomes that matter to patients') through identifying company's internal resources and

---

<sup>32</sup> Информационные технологии в медицине. Инфраструктурный центр "Healthnet". 2019. URL: <https://academpark.com/upload/medialibrary/362/36244984677a893f2c2d4a0080de0105.pdf>

<sup>33</sup> Federal Law "On information, information technologies and information protection" dated July 27, 2006 N 149-FZ (last edition)

<sup>34</sup> International Organization for Standardization. ISO/IEC 2382:2015 Information technology — Vocabulary.

realizing what assets, capabilities and competencies management has at disposal and use it for value creation. According to this concept, there are 'tangible' and 'intangible' resources. (Barney, 2001)

Tangible assets are typically physical assets or property owned by a company, such as computer equipment. Tangible assets are the main type of assets that companies use to produce their product and service. Intangible assets don't physically exist, yet they have a monetary value since they represent potential revenue. A type of intangible asset could be a copyright to a song. The record company that owns the copyright would get paid a royalty each time the song is played. (Barney, 2001)

Both types of assets are used to achieve competitive advantage. In terms of health care, and to be more specific, Porter's 'Care Delivery Value Chain' concept competitive advantage is about delivering services in such way that it would result in the most valuable for a patient outcomes. Cost-leadership strategy is another possible advantage gained through efficient resource allocation and their management. In this case, clinics or companies use resources parsimoniously and reduce costs, which helps maintain financial performance (because of the fact that all resources are limited and must be used as wisely and reasonable as possible). (Amit, 1986)

Some researchers suggest considering information as a resource as well, relating it to an intangible resource for the reason that information has value, (productivity, management support, and competitive value), costs money (to collect, store, process and disseminate), has qualities (timeliness, accuracy, form) and is controllable (can be accounted for and managed). (Olaisen, 1991)

Although this differentiation of resources was initially applied, for strategic analysis of an enterprise, to address the problems of a clinic it is necessary to have understanding of what resources the organization has at disposal. In relation to the health sector, the following main types of resources should be identified as follows (Danilova, 2019):

- Personnel (medical workers with a medical or other education, whose labor (official) duties include the implementation of medical activities; or individuals who are individual entrepreneurs directly engaged in medical activities (Federal Law of November 21, 2011 No. 323-FZ, Art. 2, 13),
- Financial (funds at the disposal of the healthcare sector at the federal, regional, municipal level, in subordinate medical organizations)
- Material and technical means (buildings, structures where medical organizations are located, their infrastructure, transport)

- Technological (technologies with the help of which both procedures, manipulations, operations are carried out during diagnostics, treatment, rehabilitation, prevention, and the complex organization of these processes as a whole)

Here we observe that this list lacks another very important components, which is consumables. The consumables are present in the documentation suggested by World Health Organization. To provide different service outputs, a considerable number of inputs is required. Few, if any, manufacturing processes match the variety and rate of change of production possibilities in health. WHO identifies three principal health system inputs: human resources, physical capital, and consumables, with financial resources to purchase these inputs belonging to capital investment and having recurrent quality. As in other industries, investment decisions in health are critical because they are generally irreversible: they commit large amounts of money to places and activities, which are difficult, even impossible, to cancel, close or scale down (World Health Assembly, 2000).

So, in light of that we must add another group of resources to the previous list

- Consumables: medicines and soft medical equipment, food for patients and other funds, the cost of which is transferred to the cost of medical services performed during the year.

They include both objects of labor activity and means of labor, taking into account the finished product (services). Purchases of medicines make up a significant share of the total amount of purchases. In the period from 2019 to 2021, 106 out of 230 contracts concluded by the Ministry of Health are related to the purchase of medicines<sup>35</sup>. This type of resource needs to be regularly replenished and demand forecasting becomes a task of paramount importance. Let us note that it refers to the functionalities of 'Inbound logistics', one of the primary activities of the original 'Value Chain', but it is not reflected in Care Delivery Value Chain. This problem will be studied further in this paper. In health care, resources are a necessary element in the process of providing medical care and the production of medical services. The state spends large financial resources on the preservation, strengthening, restoration of health, which allows us to consider this concept as an economic category, and consider the healthcare system as a resource-intensive area that uses a significant arsenal of both medical and economic methods. (Danilova, 2019)

Ultimately, we can consider information to be a resource used in health care. In this sense, we consider a resource the information that is concentrated around patients as this allows to introduce

---

<sup>35</sup> Monitoring of the procurement schedule of the Ministry of Health of Russia for 2021 and the planning period 2022-2023 URL: <https://minzdrav.gov.ru/ministry/tenders/monitoring-plana-grafika-zakupok-minzdrava-rossii-na-2021-i-planovyy-period-2022-2023-godov> (accessed:27.04.2022)

patient-centricity in the clinic. Through engagement of patients into care process, collecting and administrating the data about them, it is possible to extract meaningful information that would allow to incorporate patient goals in the development of comprehensive care plans. That is why information can also be added into the list of resources. (Butler et al., 2020)

- Information. As it had already been said, it is a valuable resource these days used not only in resource management, but in patient-centric approach as well. First of all, information generated through information systems allows to coordinate operational divisions of clinics. Secondly, providers and health administrators use information to learn more about their patients and the care they provide to them. Consequently, this information can be presented to patient through personal online profile or printed on paper. In any case, this approach makes patients more engaged into the care delivery processes and increases the chances of delivering care with positive outcomes.

Thus, based on the above analysis, the following intermediate conclusions can be drawn regarding information systems in general and in relation to health care:

- a) They digitize and automatize workflow of clinics, which reduces errors and facilitates the work of personnel.
- b) They collect, process and store information, visualize it for decision-making and getting value for patients.
- b) They allow to plan, measure, provide information and manage various resources to achieve strategic goals, improve effectiveness and efficiency of the operations that involve those resources and ultimately affect outcomes and costs.
- d) They allow to concentrate information and tangible resources around patients thus engaging them and providing value for them.

All these conclusions can actually be united through one final conclusion that information systems are supposed to support clinic activities and improve the quality of care delivered. However, simple implementation does not necessarily mean that the positive outcomes of care will double. It was discussed in the previous chapter that patient-centricity is achieved through improved care coordination, decrease in fragmentation and first of all considering interests of patients. This is why Porter and Teisberg developed their Care Delivery Value Chain and suggested to divide care according to disease groups and in frame of a 'care cycle' unified for them. Thus, the information systems needed for this concept's implementation must be able to integrate care, its delivery and information and also be able to 'enable' value creation. Integrity as one of the

indispensable elements of Care Delivery Value Chain has already been mentioned before in this paper. It lies in the basis of IPU concept, which is important in Care Delivery Value Chain, the necessity to overcome geographic barriers, measure outcomes and costs and their aggregation into one indicator as value and finally in the idea of patient-centricity, which is very important. Even organization of payments into bundles reflects tendencies to integration and information systems can simplify this process. However, to 'enable' that it is necessary to unite all activities within one frame, which can be provided, by an information system. The requirements to such system and theoretical implementation will be discussed in the next sub-chapter.

## **2.2 Integrated Information Systems in Health Care**

Porter and Teisberg state quite specific requirements to the integrated system they think would fit their concept. To be more precise, these requirements rather reflect their understanding of 'integrity', which actually is the top requirement for enabling the Care Delivery Value Chain. These are listed below (Porter, 2014):

- Common data definitions
- Combine all types of data (e.g. notes, images) for each patient
- Data encompasses the full care cycle, including care by referring entities
- Allow access and communication among all involved parties, including with patients
- Templates for medical conditions to enhance the user interface
- “Structured” data vs. free text
- Architecture that allows easy extraction of outcome measures, process measures, and activity-based cost measures for each patient and medical condition
- Interoperability standards enabling communication among different provider (and payor) organization

These requirements refer to integrity of systems and availability of enabling modules. From the point of suitability to Care Delivery Value Chain, integration is a necessary prerequisite that enables reorganization of a clinic to finally produce value. First of all, because of their ability to aggregate information into one pool and connect various departments of clinics (their branches) separated by distance. Taken this into account together with analysis of resource-based view and capabilities suggested by independent information systems, it is necessary to keep in mind that each system that is responsible for management of a certain type of resource (like HR information system, procurement and so on) can contribute into creation of value, provided that they have been integrated first. As of now, there are two major approaches of complex solutions of information systems that can be found on Russian market. These are Hospital Information Systems (HIS) and

Enterprise Resource Planning Systems (ERP). The latter was adopted for clinical use, though originally it was used for business purposes<sup>36</sup>.

As for HIS (рус. МИС), in Russia HIS is understood as a workflow automation system for clinics, which combines a medical decision support system, electronic health records of patients (EHR), digital medical research data, patient monitoring data from medical devices and means of communication between employees, financial and administrative information. One of the main criteria of HIS is patient-centeredness, since HIS is based on the EHR data of each patient. In addition, modern HIS have a wide integration potential. It is possible to integrate HIS with following services<sup>37</sup>:

- Integration of administrative, medical and financial information.
- Integration with specific types of equipment.
- Integration with laboratory and radiological information system.
- Integration with ERP and other information systems

The last point means that, when integrated with other services, HIS has a flexible structure and can gradually expand its functionality (provided that it is complied with the conditions mentioned above), thereby including more and more departments of the clinic, collecting more and more data and, as a result, highlighting meaningful information that would be extremely difficult (or even impossible in the case of a large amount of data) to extract and then use it in creating value for patients. Another useful function is ability to collect and aggregate financial information. One of the most relevant areas of work of the head of an IT service in health care sector today is the improvement of cost accounting in the provision of medical services. In medical organizations, there is often little understanding of the cost structure and the impact of strategic decisions on finances. If manufacturing enterprises use ERP systems to balance and optimize resources, then in health care many classical business approaches are poorly applicable. Due to the specifics of the industry - the uniqueness of each service because of the uniqueness of each patient and the high responsibility for the decisions made - information technologies are used in health care sector mainly to obtain data on the patient's health and to maintain medical records. However, IT needs of clinics are much wider<sup>38</sup>.

---

<sup>36</sup>ERP-система для медицины: зачем нужны платформы?. 1С. URL: <https://solutions.1c.ru/articles/873920/>

<sup>37</sup> Tadviser: Government, Business, Technologies. URL: [Медицинская информационная система \(tadviser.ru\)](https://tadviser.ru/) (accessed:27.04.2022)

<sup>38</sup> ERP-система для медицины: зачем нужны платформы?. 1С. URL: <https://solutions.1c.ru/articles/873920/>

As for ERP, it is rather a set of activities, that include managing of information flow in the enterprise, equipment for its storage and processing, software, IT department and technical support specialists, as well as its users. The main advantage of such systems is that they allow to combine several tasks: one can simultaneously account for and plan funds, as well as track their movement; form the cost and evaluate labor productivity in the organization. In addition, all processes become transparent. Initially, the theoretical justification and practical implementation of ERP systems began with the automation of warehouse accounting. The goal was to minimize the costs associated with the storage and use of material resources involved in the production process.<sup>39</sup> As follows from this definition, in health care, ERP covers the planning and management of resources, as well as the automation of accounting.

Although the two approaches are different, there is a problem which addresses the identification of those systems. To be more concrete, the abundance of information systems for medical purposes that we can observe on Russian market suggests both HIS an ERP. Such a wide functionality of the system, covering not only the functions of managing patient data, but also many aspects of resource management, inevitably suggests the identity of ERP and HIS. Indeed, there is often confusion in academic writing as to which definition is best to use. A number of researchers, on the one hand, when mentioning HIS in their works, adhere to the most popular definition and understand them as a tool for managing most of the functional modules (both patient information and resource planning) of a clinic. (Ross and Venkatesh, 2016) On the other hand, relatively often there are authors who in their work significantly limit the functionality of HIS, reducing the essence of the latter to managing patient data, diagnostic results, treatment and billing for services, aggregating statistics and decision support. (Lundgren-Laine et al., 2013). From the studying of papers done by English-speaking researchers, it was learned that conceptually both clinics and researchers perceive HIS and ERP as the same type of information systems (that are possible to integrate) and even similar definitions were proposed for them. In Russia there can be found little description of comparison of two systems, which is why it is impossible to understand whether management can understand difference of two types of information systems.

Preliminary interview with the assistant of chief of IT department of one of large hospitals in St. Petersburg<sup>40</sup> suggested that ERP structure is limited only by modules that enable resource planning and inventory accounting like 'Invalid food', 'Hospital Pharmacy', 'Radiology' and

---

<sup>39</sup> МИС QMS – ERP-система для медицины. URL: <https://sparm.com/publications/mis-qms-erp-sistema-dlya-medicziny>

<sup>40</sup> Mikhail Y. Bahtin, the assistant of the chief of IT department in FGBU VTSEEM im. A.Nikiforova MCHS Rossii in St. Petersburg (рус. ФГБУ Всероссийский центр экстренной и радиационной медицины имени А.М. Никифорова МЧС России, Клиника № 2)

'Laboratory' modules. According to the interviewee's opinion these are modules that allow to plan and forecast the number of patients, consumables needed to procure, hospital beds available and so on in order to be capable of delivering necessary amount of care more efficiently and effectively. The collection of other modules refers to HIS and ERP itself also is part of HIS. This partially corresponds to the very original concept of ERP that suggests that all resources are integrated and operated via database. They are the same as those of their predecessors, divided into bigger categories. The main of them are operations and logistics, financials, human resources, sales and marketing and two external corporate relationships including suppliers and customers (Nakakawa, 2019). However, we can see that interviewee's opinion lacks HR module and financial information. Also, in an analytical research conducted by Russian division of Healthnet infrastructural research center the systems that can be integrated into HIS and their functional modules (together with functions) were studied. According first and most important module, which lies in the basis of HIS (or to be more specific, which enables HIS) is electronic health records (EHR) and its sub-systems.

<b><i>Electronic medical records (electronic medical history, electronic health passport)</i></b>
Medical examination protocol
Care diary
Management of a dispensary group of patients with chronic diseases
Support of clinical expert work
Medicine prescription records
Dentistry
Diagnostics records
Planning and recording of surgical interventions
Accounting and monitoring of anesthetic benefits
Intensive care records
Patient's perfusion chart
Patient condition monitoring system
Laboratory system
Radiology system (PACS)

Table 8. EHR structure

The table 8<sup>41</sup> lists them one by one. It is important to understand that different companies may name and group them differently. The table also indicates the specifics of the systems depending on the management features. In the base of every HIS there is EHR. As both public and private clinics must provide services to clients they need an enabling tool. EHR as it can be observed manages various information about patients from the purpose of visit and examination

<sup>41</sup> Информационные технологии в медицине. Инфраструктурный центр "Healthnet". 2019. URL: <https://academypark.com/upload/medialibrary/362/36244984677a893f2c2d4a0080de0105.pdf>



results to the planning of care cycle. EHR is also the minimum requirement of any HIS. They are intended for keeping a medical history, recording a patient's examination, searching for and issuing medical information at the request of a doctor and a user, as well as for diagnosing pathological conditions, including prognosis and making recommendations on treatment methods, for diseases of various profiles. These systems are used throughout the entire treatment cycle of care delivery. The next type of systems presented in report is ERP<sup>42</sup>.

As we can see in the table 9<sup>43</sup>, ERP is the information system for integrating production and personnel, finance and asset management, aimed at optimizing the organization's resources. The main purpose of this system is the management of tangible resources and the maximum automation of business processes based on the cost of services provided. Although ERP-modules combine a fairly voluminous functionality, we can say that they are not always integrated into the information system. Ultimately, the last group of systems presented in the report is related to economy statistics. It allows to account the patients that are attached to a clinic (in case of a public clinic), to keep statistic records depending on a group of diseases, to calculate the volumes of care delivered and payment statistics. Ultimately, provided that system was integrated properly it is possible to integrate it together with decision-making tool and extract meaningful information for practical purposes<sup>44</sup>.

<b>ERP system</b>
Accounting System
Human Resource management System
Reporting System
Equipment Inventory System
Assets Management System
Hospital Pharmacy
Invalid food
Billing System
Administration System
System of relationships with paying organizations
Workflow System
Official web-site of the clinic

Table 9. ERP structure

---

<sup>42</sup> Ibid

<sup>43</sup> Ibid

<sup>44</sup> Ibid

ERP is also once briefly mentioned in the Guidelines for ensuring the functionality of medical information systems of medical organizations (MIS MO) (issued by the Ministry of Health of the Russian Federation on February 1, 2016), where there is no definition provided to it. The guidelines only mention that HIS must be able to "integrate with ERP as well as with accounting systems and systems of economical planning (which is actually the same as ERP and simply repeats it in this document), systems of project management and federal and regional services (like EGISZ)<sup>45</sup>. The representation of ERP in this document is rather muddle and indicates that its authors do not understand what it is really about. So, this leads to necessity of learning a point of view of management of clinics and learn how they call their systems.

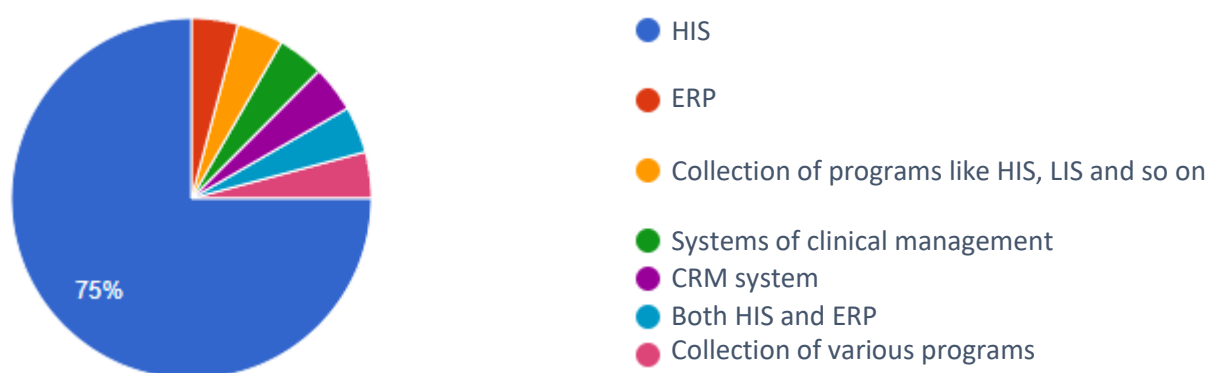


Figure 1. The view of managers on information systems

In order to do that a survey among clinics of St.Petersburg was conducted. The questionnaires were sent to 50 chief officers and managers of divisions of St.Petersburg hospitals. Ultimately, 24 answers were collected. The full scope of questions is presented in Appendix I in the end of this paper. The first and most important question the respondents were suggested to answer was following: Please complete the sentence by choosing, in your opinion, the most appropriate ending for it: "The collection of information systems used in a medical organization is called ..." with "HIS" and "ERP" as two available answer options and open field for a custom answer if respondent has different opinion. Its results are depicted in figure 1. The majority (75%)

<sup>45</sup> Методические рекомендации по обеспечению функциональных возможностей медицинских информационных систем медицинских организаций. Министерство здравоохранения РФ.2016. URL: <https://spbmiac.ru/wp-content/uploads/2018/02/Rekomendatsii-po-obespecheniyu-funktsionalnyh-vozmozhnostej-MIS-MO.pdf> (accessed:27.04.2022)

chose "HIS", while 6,6% of respondents chose "ERP" answer option and 18,4% of respondents have abstract opinions on that matter and believe that it is the set of various individual systems.

Additionally, the respondents were asked about what information system or systems they use and what modules their information systems have. The analysis did not show any correlation between the way of how managers identify the systems and functions of both types of systems. Thus, we can conclude that as compared to western countries, in Russia HIS is rather a definition that unites all modules of numerous information systems and can be claimed to be that one 'enabling IT solution' needed for Care Delivery Value Chain implementation. Also it became clear that many clinic managers have a rather poor understanding of how to classify their systems and this can indirectly mean that they do not understand the importance of integration or they might not understand how the systems fit into general management of their clinic. To study that it is necessary to reason on the topic of system integrity. To begin with, let's consider what kind of health care information system from the point of integrity are offered on the Russian market.

- 1) Collection of individual information systems that can be integrated one by one (often seen among products by such producers as 1C, Medialog, Medesk)

Such systems are characterized by higher fragmentation of system services. As a rule, each system individually has a certain corresponding functionality.

- 2) Packages of pre-integrated information systems (widely offered by qMS, Ariadna, Samson, Vista-Med, Infoclinica)

Representatives of the second point often try to integrate their products from different points of view. Some developers create their systems by classifying them in terms of personnel work, (e.g. doctor's workplace, nurse's workplace, hospital doctor, etc.), type of clinic (hospital, polyclinic, multifunctional medical center, dentistry, etc.).

Through the interview with one of the HIS developers based St.Petersburg<sup>46</sup> it was learned that normally, the more functional modules a clinic has the more positive effects it has (provided that implementation was successful). Although this point is partially fair, it is also peculiar that gaining income is the goal the developers follow and the managers should consult their strategic goals and capabilities first, as every module might bring additional risks, increase its upkeep and can cause the problems of integration.

---

<sup>46</sup> Irina S. Khusainova, Private limited company "Reshenie", (HIS Ariadna)

From Porter's point of view, information systems should be integrated as much as possible and data should not turn into silo. To achieve this goal, it is necessary that all modules of the system (if we are talking about only one information system) or a set of information systems be integrated. As a rule, there are no difficulties with this if the systems belong to the same developer or integration is specially provided between different systems (which in fact is far from always the case). Moreover, 18,4% of respondents believe that today information systems are a set of various programs that exist on their own. In this regard, there is a need to consider the problems that this approach may entail.

When conducting an interview with a management representative of one of the large multidisciplinary clinics in St. Petersburg<sup>47</sup>, it was learned that the clinic used two different information systems. From the interview, it became clear that the clinic management would like to abandon one of the systems, but they are held back by the need to retrain the staff, because the difficulties with staff training and how willingly they want to work in the system are some of the main barriers to the implementation of information systems. It was also said that the partners of the clinic are already accustomed to working with this system and replacing the system with a new one in this case may lead to failures in the chain of relationships with partners, and this, in turn, causes additional risks, costs and problems.

As stated, the use of two poorly integrated information systems provoked data heterogeneity and thus silos. However, the management of the clinic found a way out of this situation. It was decided to integrate the data manually with the help of additional IT staff. Of course, this decision led to an increase in the cost of maintaining the system, although, given the difficulties described above, which may entail the replacement of the system, such a solution seems more beneficial for the clinic at this stage.

What is also very important is a conscious approach to the choice of an information system and the existence of a strategy for its implementation, since the success of implementation depends on this. During interview with one of the HIS developers based in St.Petersburg, it was learned that sometimes it happens that the system is installed not because of a conscious choice and suitability to the strategic goals of a clinic, but because of the lobbying in favor of one particular system done by the clinic management. In perspective, this can lead to a failure to achieve the goals and data heterogeneity. In this regard, there is a need to establish some technical requirements for information systems that could ensure their integration.

---

<sup>47</sup> Alexander S. Nazarov, manager of business planning in multifunctional clinic ""XXI Vek" (рус. многопрофильный медицинский центр XXI век)

According to experts in the field of information systems, the interconnection of technical systems and devices with each other, as well as the environment where such systems interact, is constructed artificially based on some fundamental system principles. Such fundamental principles are the attributes of 'open systems' that underlie so-called 'open systems technologies'. Some experts believe that in Russia such technologies make "an integration basis for building the Russian information infrastructure and merging it with global AI." The open system interconnection model (OSI) enables systems description, design, development, installation, operation, enhancement, and maintenance to be performed at a given layer of a hierarchical structure. Here available functions are provided for each layer and can be controlled and used by functions of the next layer. Each layer can be executed without affecting the processes of other layers and it is also possible to change the characteristics of the system by modifying one or more layers without changing the existing equipment, procedures and protocols of other layers. An 'open systems architecture' can be implemented based on the OSI reference model. Following it enables achieving the desired performance level. (Dabagov, 2011)

Significant difficulties in building of fully integrated medical systems arise primarily due to the difficulty of integrating heterogeneous and aging systems. Significant difficulties still remain in the field of interoperability of systems, while it is noted that the lack of attention of developers to architectural issues breaks the very foundation on which such systems can be built. To be integrated, systems must have an open architecture. Open architecture systems are flexible and can be modified without affecting the operation of other layers. (Batovrin et al., 2005) Also such systems must use HL7 standard that allows to exchange data and provides integrity between different devices<sup>48</sup>.

In the general case, all abovementioned defects arise due to complexity problems, which, as a rule, are interdisciplinary in nature and arise both when expanding and combining systems, and in the process of developing common standards, architectural models and methods for their development and analysis. The situation is further aggravated due to the moral and physical aging of already existing systems and a significant list of problems associated with ensuring the principles of openness, including a number of existing and partially aging systems. (Dabagov, 2011)

Moreover, the author of the research believes that system developers may not be interested in building their products to a common standard. This fact may be supported by common sense

---

<sup>48</sup> Health Level 7 Стандарт. Zrav.Expert. URL: [https://zdrav.expert/index.php/%D0%9F%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%82:Health\\_Level\\_7\\_%D0%A1%D1%82%D0%B0%D0%BD%D0%B4%D0%B0%D1%80%D1%82](https://zdrav.expert/index.php/%D0%9F%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%82:Health_Level_7_%D0%A1%D1%82%D0%B0%D0%BD%D0%B4%D0%B0%D1%80%D1%82) (accessed:27.04.2022)

that by creating systems that do not integrate well with products of other developers, companies can retain customers and thus maintain income. Another point is that regulatory state bodies may have a poor understanding of the target specifics of the implementation of systems and the actual features of the medical institution in which the system is being implemented. For example, during the interview with one of the HIS developers based in St.Petersburg, the implementation of systems is more likely to be successful in those clinics that can use their procurement regulation (Federal Law 223) for the reason that clinical management know better what a clinic needs. In some clinics, sometimes it happens that the regulator makes a decision on behalf of the clinic, imposing a system that does not take into account the specifics of the clinic's activities (for instance, the interviewee gave the example of an oncology dispensary where the adopted system did not work well. It just did not take into account the specifics of the dispensary, which have their own needs).

As of 2018, in St. Petersburg there were 112 clinics (around 31,6%) that could use their own procurement regulation, but it must be noted that although having such a possibility not every clinic decides to use it and relies completely on public regulations. (Ivanov et al., 2019) In this case the authorities must be more aware of specifics of clinics and standardized solutions are not always helpful in this case. Each case should be studied individually by corresponding authorities. Regulation of this issue should include active interaction with all stakeholders, which include developers, clinic management, doctors, various experts and finally patients themselves.

As on now, when considering information systems like HIS for further implementation, it is necessary to take into account possible barriers that may result in implementation failures. One of the biggest barriers is lack of clear purpose of system implementation. The interview results discussed on previous page are examples of this. Requirements should be discussed thoroughly and profoundly during the planning phase to minimize changes. When the goal is set, the next step is to choose the most appropriate system. Other barriers are connected to the staff, for example, they can be caused by the lack of training and motivation to use system. Sometimes staff is not eager to use innovations and this results in problems at work and uncomfortable feeling when working. This, in its turn, negatively affects productivity and working satisfaction. One of the main challenges too, expensive maintenance. This generates regressions and takes time. Another mistake often committed by managers who want to implement an information system like HIS is fitting of system into clinic standards. First of all, information systems must enhance efficiency of an clinics and be a managerial tool, but not a final goal of implementation. (Yamani and Merouani, 2020) It is also necessary to keep in mind that implementation process does not end when the system is first put into operation: in the post-implementation period it is essential to analyze

the activities that the system is intended to support, in order to optimize the system and thus obtain the expected competitive advantages. (Escobar-Perez et al., 2010)

Summing up this sub-chapter, we can conclude that at modern circumstances, the integration of systems has a mixed success among Russian clinics. Despite the fact that there is an objective process of integration of information systems of various medical institutions, these systems often consist of disparate, poorly comparable implementations that need to interact together. However, integration problems do not always affect 'outcomes that matter to patients', they affect 'costs' more often. In confirmation of this, there are interview results, which were discussed previously. However, at the moment, none of the Russian clinics has tried to fully implement the Care Delivery Value Chain. The implementation of IPU and other elements of the chain definitely requires deep integration, so if clinics want to implement it, they will have to reorganize not only the management of clinics, but also the approach to using information systems. The development of global systems is hindered by a number of factors, primarily related to the difficulties of analyzing, optimizing and integrating existing heterogeneous systems, as well as the impossibility of fully applying the existing theoretical and instrumental integration tools. The main integration tool at this stage is the theory and methods of open systems and the construction of an open system environment that is most suitable for all subjects of management. It should be kept in mind that this task generally is very complex and multifaceted, with a number of insufficiently developed problem areas, such as joint consideration of factors with different levels of complexity, interoperability problems associated with architecture mismatch, etc. Based on the existing array of publications, reports, normative and other documents, a list of problematic issues must be discussed and the most significant difficulties, as well as optimal development paths, must be indicated. As a fundamental principle, one should choose the most successful architectural solutions in the field of medical IT systems. Based on the theory of open systems, the possibilities of integrating such systems into larger distributed systems should be developed as well.

### **2.3 Information systems in Value Cycle management**

As of now, it is quite early to talk about full integration in Russian clinics and implementation of full care delivery value chain. However, it does not mean that clinics cannot produce value. As it was discussed before, the two components value consists of are 'outcomes that matter to patients' and 'costs'. Information systems whether they be ERP, EHR or statistics tools, integrated or not are actively used to support most of clinical activities, and this is important for management to know what value can be for each care cycle. As it was discussed previously, IPU principles are organized around pathologies. The cycle of Care Delivery Value Chain reflects this idea very well. The types of clinics that will be used to provide an example are specialized

dispensaries (e.g. psychiatric dispensaries, tuberculosis dispensaries), AIDS centers, Perinatal centers, profile hospitals and clinics (e.g Masterskaya zdorovya clinic in St. Petersburg that specializes in treatment of spine diseases) and so on<sup>49</sup>. According to Porter and Teisberg's vision, the cycle looks in the following way (Porter, 2014):

- 1) Monitoring and Preventing
- 2) Diagnosing
- 3) Preparing
- 4) Intervening
- 5) Recovering/rehabbing
- 6) Monitoring and Managing

In the table 10 there is the presentation of Care Delivery Value Cycle with description of how patients get informed concerning their disease, get access to the care, what activities they may undergo during treatment of their disease. The final outcomes are measured based on the results of full care cycle.

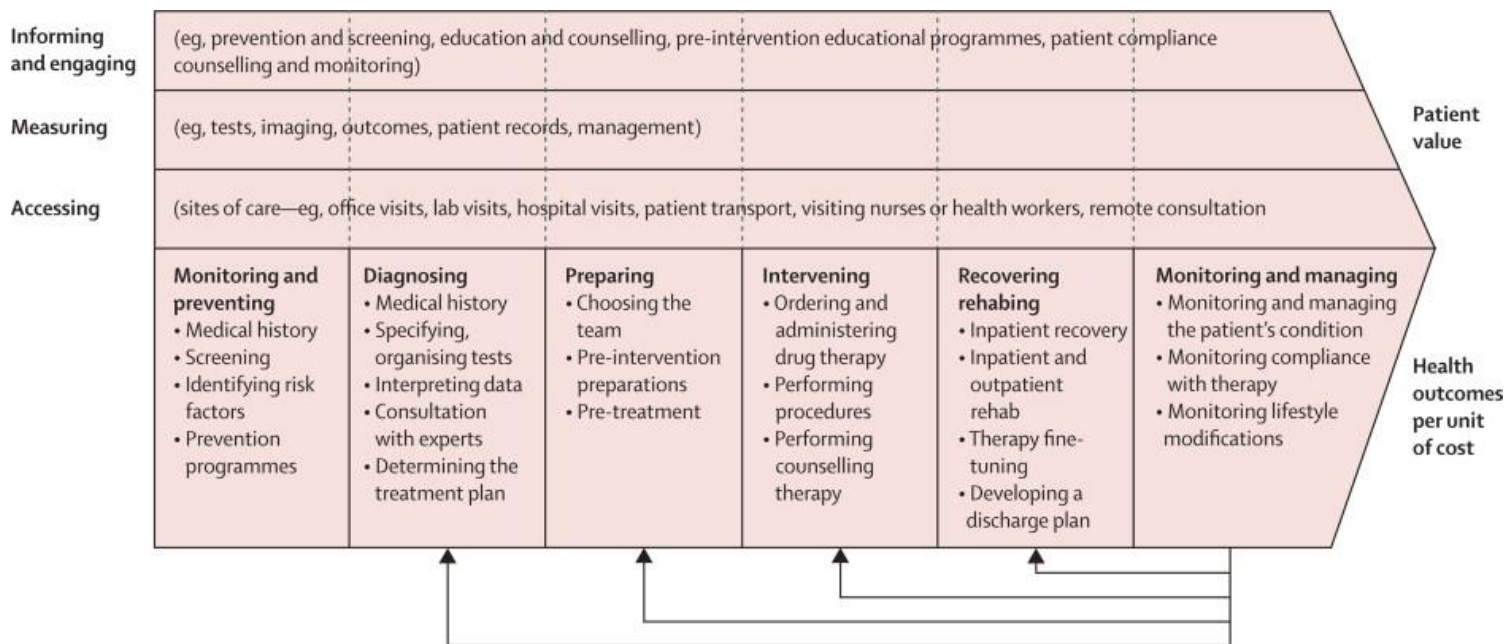


Table 10. Care Delivery Value Chain cycle (Porter and Teisberg, 2006)

One of the goals of this work is a qualitative assessment of the contribution of the functional modules of information systems. To do this, this section will explore the positive qualities of the functions of information systems (in the broad sense – HIS, as it is accustomed to say in Russia

<sup>49</sup> Диспансер. Словарное определение. URL: [https://dic.academic.ru/dic.nsf/enc\\_medicine/11034/%D0%94%D0%B8%D1%81%D0%BF%D0%B0%D0%BD%D1%81%D0%B5%D1%80](https://dic.academic.ru/dic.nsf/enc_medicine/11034/%D0%94%D0%B8%D1%81%D0%BF%D0%B0%D0%BD%D1%81%D0%B5%D1%80) (accessed:27.04.2022)



(pyc. МИС) as it was found out during the survey) to create value, namely - 'outcomes that matter to patients' and 'costs', which will reveal the role of information systems in the process of creating a Care Delivery Value Chain. Since the functionality of the modules for each department may differ depending on the developer, and we do not know yet what modules are used for each cycle stage, this study is based on the modules functionalities of EHR and ERP presented in the previous sub-chapter.

As it can be observed on the table 10, the cycle covers the most important part, which concerns disease treatment process. One of this chapter's task is to study theoretical applicability of various information systems for various steps of care delivery cycle. To do that, there will be given different practical examples of care delivery value cycle developed and studied by Porter for such IPU as Orthopedic center and AIDS center.

According to the survey results, respondents find popular following modules:

- EHR

The minimum requirement for any HIS. EHRs collect medical information about patients, record visit results, medicines prescribed, services received and their results and condition of health. What is really bad here is that patients that do not have records in a clinic they address need to start EHR again. In Russia EHRs are not united very well yet, as addressing different clinics requires getting a new EHR, which may urge doctors to repeat same diagnostics that patient might have undergone before. (Kuhtichev, 2016)

- Diagnostics modules (e.g. Laboratory and Radiology)

These diagnostics modules become essential tools for condition estimation and preparing to invasive or active treatment. Currently, a lot of clinics use outsourced laboratories, which are frequently but not always incorporated into the EHR. This is the problem of system integration. Laboratory data should contain lab orders and lab results. Some researchers specify that currently, there are no unified laboratory coding system for certified EHRs, and the majority of clinics rely on local coding systems for lab orders and results. This may limit the interoperability of multi-site EHR-derived lab data. In addition, different healthcare facilities may use different laboratory tests to measure the same sample, each of which has a different laboratory code. It arises the problem of linking the items automatically. In addition, certain lab results may be protected by laws (e.g., lab tests revealing HIV status) and thus might be missing from EHR-extracts. (Ehrenstein et al., 2019)

- Hospital Pharmacy

Drug provision helps plan, procure and distribute medicines. It also manages pharmacy warehouse, including accounting for receipts, dispensing, write-offs of medicines and medical supplies, inventory results. This can be used not only for regular drug provision but also in value procurement, which is about orientation not only on best price offer or economically best offer but procuring such an offer that is the best in terms of both price, quality and first of all patient results, so called multidimensional specification of needs including qualitative elements, with an explicit focus on patient impact (eg. treatment results and patient comfort)<sup>50</sup>. Pharmacy modules can be helpful here as they contain specifications for each drug and functional requirements to it. Normally, pharmacy modules can keep procurement records, namely contracts with counterparties, funding sources. Also the program can control the actual selling prices of the manufacturer from the protocol for agreeing on prices for the supply of vital and essential medicines.<sup>51</sup>

- HR

In terms of value creation, HR modules that are used in ERP for health care help assign and schedule doctors, connect motivation with KPI systems, estimate the results of work and numbers of visits, trace competencies and qualification backgrounds. Another point is planning and registering all changes in the staffing schedules, controlling the availability of certificates and permissions to work with narcotic drugs, qualification categories. (with function to add payments for them) and tracking the need for renewal of certificates in a timely manner. Also what happens here is reducing costs for the preparation of regulatory forms for corresponding organizations (narcotics control authorities, certification commissions, etc.). Calculating the length of service of an employee automatically, based on the history of their work activity, automatization of work with a large volume of printed documents (it is also possible to use custom templates for printed forms). All this together can be used to motivate personnel (e.g. through financial bonuses for achieved results, considering personal interests), choosing the most suitable doctors for particular cases, which can have positive impact on value. From the point of budgetary organization, HRM module can simplify workflow of organization, reducing time and costs required for daily routine.

---

<sup>50</sup> How to eat the Value-based Procurement elephant? A Deloitte point of view.2018.Deloitte. URL: <https://www2.deloitte.com/content/dam/Deloitte/be/Documents/strategy/Value%20based%20procurement%20-%20Deloitte%20Belgium.pdf> (accessed:27.04.2022)

<sup>51</sup> Методические рекомендации по обеспечению функциональных возможностей медицинских информационных систем медицинских организаций. Министерство здравоохранения РФ.2016. URL: <https://spbmiac.ru/wp-content/uploads/2018/02/Rekomendatsii-po-obespecheniyu-funktsionalnyh-vozmozhnostej-MIS-MO.pdf> (accessed:27.04.2022)

Also another feature is uploading of data onto the Federal Register of Medical Workers, which also complies with public regulations. (Vaideeswaran and Kulandai, 2019)

- Invalid food

This module allows the formation of diets according to medical indications, drawing up cards of dishes depending on the indicators of the prescribed diet; preparation of the food menu, control of the total cost and expenses of products, registration of basic and additional residency requirements. It allows to plan resources and improves cost.<sup>52</sup>

Modules used in clinics out of disease care cycle:

- Administration system (registration of patients and scheduling)

Patients do not step right into the doctor's office from the entrance door. Their first interaction with a clinic starts at registration desk supported by administration module. Here patients can register for an appointment with a doctor. All required data get prepared beforehand prior to the visit, so it helps save time of doctors. Data base of a registration desk also can contain and manage personal data about patients. These may contain the history of visits, personal IDs of a patient, insurance data and other payment documentation, refusal and detachment from clinic (especially, if the clinic is the public one), accounting of disabled people and those who can receive social benefits. Some additional tools like reading bar code of printed insurance card (рус.печатный медицинский полис), and other documents. New patients also can create a new EHR<sup>53</sup>.

From the point of value creation, such systems help manage the flows of patients, and which is more significant the queues. First of all, the patients in the lobby who just have come get individual queue number to registration desk. The patients feel less stressful because they do not need to be on their guard when queuing. When reaching the desk, the system helps choose necessary service according to the goal of visit, doctor's schedule and thus distribute the patients accordingly.

Such systems are often integrated with online services and private online profile of a patient and a patient can get an appointment without coming to clinic personally, which increases the chances of positive service satisfaction.

---

<sup>52</sup> Ibid

<sup>53</sup> Нестандартные решения при внедрении новой модели медицинской организации, оказывающей первичную медико-санитарную помощь. Всероссийская научно-практическая конференция "Развитие системы оказания первичной медико-санитарной помощи". 2019. URL: <https://static-0.minzdrav.gov.ru/system/attachments/attaches/000/048/231/original/> (accessed:27.04.2022)

- Billing

Billing systems can contain coefficients, which allow calculating the cost depending on the conditions for the provision of services (consumption of human resources, materials, time during which assistance was provided, and so on). It is possible to register letters of guarantee issued by insurance companies indicating specific services and amounts for a patient or group of patients. The validity period of the letter, the limit of the amount allocated for services, and the list of services covered by the letter are set. From a billing point of view, the letter of guarantee is a factual attachment.<sup>54</sup>

The cost and quality of services varies depending on the category of the patient. A category with certain cost calculation criteria is set in the system. One can also set a price list for a company under certain conditions (for example, an organization with more than 200 people is served in a clinic).

Actually monitoring the cost of medical care and costing is an extremely urgent task for clinics. Some researches specify that it is done according to three main practices: using classification system for treated cases, which is used to group cases into mutually exclusive categories, using hospital cost accounting system necessary to determine the relative cost of each category (group), which is usually calculated based on the cost of treating an “average” patient in this particular category, economic parameters, including the calculation of the "base" rate, which is the cost of the system average case and is used for the subsequent calculation of the cost of the treated case (good for bundled payments), based on the relative cost of the group, as well as correction factors that take into account differences in structural and other factors (in this research considered a malpractice). An information system, which includes billing, economy statistics blocks and reporting procedures, as well as a monitoring and evaluation system is a tool of monitoring the costs, which simplifies this process<sup>55</sup>.

So, cost is calculated on the basis of the collection of operational data from the HIS, systems of auxiliary and paraclinical services and from other financial blocks. This requires full and seamless integration of all operational processes within a medical organization, both basic clinical and financial management.

The creation of an integrated system from products of various manufacturers carries a high level of technological and organizational risks. In the countries of Western Europe and North

---

<sup>54</sup> Биллинг система. KaurIoT. URL: <https://kauri-iot.com/blog-post/billing-sistema/>

<sup>55</sup> Зачем медицине ERP. Медицинским организациям предстоит вплотную заняться экономикой. 2015. 1С. URL: <https://solutions.1c.ru/articles/1051/> (accessed:27.04.2022)

America, this approach is not common, so the presence of two adjacent systems of different developers often becomes the reason for the introduction of a single information system.<sup>56</sup>

- Decision-making tools (statistics and analytics)

Here it is a tool for reporting. It can prepare workflow in accordance with state statistical reporting standards and also preview the generated reports, printing of reports. It can be used by managers in clinics to be more aware of state of affairs there and to determine strategic goals and weak points. Such systems allow to export reports to office applications, so it is possible to use more sophisticated statistical methods if needed. Ultimate goal of this module is to help create analytical reports for a clinic<sup>57</sup>.

So, now that the references to modules are provided, we can transit to the cycle. However, it must be noted that some researchers find its activities incomplete. It is suggested that it can be augmented by *'Inbound logistics'* link from the original Value chain. It is based on the idea that components that make value are not limited. In light of that logistic activities are proposed as elements that can improve condition of patients. It is supposed that the procurement activities of a medical organization should help it meet its needs for medicines, consumables and medical equipment (and other purchases) within the link. In that sense it is important to help tools that allow to organize and plan drug provision, procure and distribute medicines.(Ivanov et al., 2021)

The next link is *'monitoring/preventing phase'*. For monitoring phase the activities of AIDS center include identification of high risk individuals, testing them and providing them with appropriate risk reduction strategy, which may include recommendations for correction of risky behavior and connecting patients with primary care system. Ultimately, a doctor creates a record in EHR that contains information about the visit. One of the challenges of Care Delivery Value Chain implementation is *'outcomes measuring'*. At *'monitoring/preventing'* a patient is screened for HIV, tuberculosis and sexually transmitted infections. Baseline demographics is also collected. (Ivanov et al, 2022)

The same phase activities for Orthopedic IPU are structurally the same but correspond other specifics. Doctor must do examination first and according to the results refer to specialists or propose prevention activities if necessary. This can be prescription of anti-inflammatory medicines and recommendations of exercise regimen as well as losing weight recommendations.

---

<sup>56</sup> Ibid

<sup>57</sup> Методические рекомендации по обеспечению функциональных возможностей медицинских информационных систем медицинских организаций. Министерство здравоохранения РФ.2016. URL: <https://spbmiac.ru/wp-content/uploads/2018/02/Rekomendatsii-po-obespecheniyu-funktsionalnyh-vozmozhnostej-MIS-MO.pdf> (accessed:27.04.2022)

What is measured here is joint-specific symptoms and overall health criteria (Porter, 2014). In both cases an enabling tool for that stage is EHR. An EHR is an electronic system used and maintained by healthcare systems to collect and store patients' medical information. As a result, it allows to keep medical protocols. EHRs are used across clinical care and healthcare administration to capture a variety of medical information from individual patients over time, as well as to manage clinical workflows. EHRs contain different types of patient-level variables, such as demographics, diagnoses, problem lists, medications, vital signs, and laboratory data. When integrated with statistical registries and online patient profile, EHR extends its functionalities, including the capture of health information, orders and results management, clinical decision support, health information exchange, electronic communication, patient support, administrative processes, and population health reporting. Also, AIDS center may sent patients for screening to laboratory. Here, the information generated there goes to EHR as well provided that they are connected.

So, in both cases EHR helps collect and store significant information that can help identify risks and establish whether a patient had viruses before (in case of AIDS center) and study the history of symptoms and fractures (in case of Orthopedic center).

Based on the measured outcomes of this stage and expert's conclusions, patient may proceed to '*diagnostics*' stage. Here it is necessary to determine a proper diagnosis. If HIV status is confirmed a doctor need to determine method of transmission and whether patient has tuberculosis, syphilis or other diseases that may aggravate HIV condition. This must lead to creation of disease management plan and scheduling of follow-up visits.

In case of Orthopedic diseases diagnostics activities include performing and evaluation of MRI and X-ray. Their results allow to assess cartilage loss and assess bone alterations. With drawing meaningful results from diagnostics, a doctor recommends treatment plan (surgery or other options) The measured criteria can be loss of cartilage, change in subchondral bone, joint-specific symptoms and function and also overall health criteria.

At this stage laboratory and radiology information modules can facilitate the cycle process. As they are normally integrated with working place of a doctor and EHR both patients and doctors can extract the data for different purposes. Laboratory system must be able to support integration with medical equipment, with the ability to transmit equipment data on the user's PC and to let doctor write this data into the examination protocol.

Radiology (PACS) module suits Orthopedic IPU needs. Just like laboratory module it allows to report results and archive images of results. Ultimately both modules integrate with EHR, which is used for farther decision made by doctors. Actually, other diagnostic equipment can also be integrated with EHR and be used like radiology and laboratory modules.

It might happen that disease would require active intervention. In this case '*preparing*' for 'intervention' is the next cycle activity. Doctors need to gather a team of dedicated doctors that specialize on that particular groups of diseases. In AIDS center, it is about formulation and explanation of a treatment plan to patient, improving patient's awareness and connecting them to care team. Necessary medications also need to be procured and prepared as well. Various criteria that indicate co-morbidities and diseases progression become objects of measurement. (Batueva et al, 2022) In case of Orthopedic IPU the activities coincide with these of AIDS center. (Porter, 2014)

HR module that belongs to ERP system is the module that manages personnel of a clinic. It contains all necessary information about doctors and nurses: their competences, skills, qualifications and In terms of care delivery value chain HR module helps select the most relevant personnel for a certain case of treatment. The selection process is based on skill and qualification review of personnel and then the module assigns them and schedules their time for patients. HR module as a mean of personnel information storage can be used as an auxiliary tool for motivation to work better and stimulus for continuous education, which will positively affect results of doctor's work and produce value. Another necessary information system is hospital pharmacy. This module procures, accounts, stores and distributes medical supplies (consumables). At '*preparing*' stage it is necessary to understand what medicines will need for treatment and procure them. IPU's and centers that specialize in treatment of certain groups of diseases may have a list of medicines they procure on regular basis, which is why they can easily plan and procure them. But in cases outside of IPU and clinics similar to it may be so that medicines require proper more precise planning, which can be achieved through pharmacy module.

After having prepared for '*intervening*', this step becomes next. Here AIDS centers initiate comprehensive antiretroviral therapy and assess medication readiness. Patient gets prepared for disease progression and side-effects of associated treatment. During this process secondary infections and associated illnesses get managed as well. As for measured indicators these are monthly primary Care assessment, HIV testing for others at risk and laboratory evaluation for medication initiation. (Batueva et al, 2022) Orthopedic IPU's activities of this stage include anesthesia, surgical invasions and pain management. Blood loss, operating time and consequent

complications are measured here. (Porter, 2014) Yet again, HIS and its ERP modules use EHR, which contains data about patient's physics like height and weight and allergy, which is necessary for and anesthesia calculation and use. Also, pharmacy will administer necessary medicines relevant to patient's condition.

*'Recovering/rehabbing'* and *'continuous disease management'* implies support of patient after intervention phase. Its activities for AIDS center include managing effects of associated illnesses and determination of supporting nutritional modifications, preparing patient for end-of-life management and primary care and health maintenance. (Batueva et al, 2022) In case of Orthopedic IPU, patients may need additional surgical invasion and visiting procedures. Here we measure if at this stage happened infections what Joint-specific symptoms are observed, inpatient length of stay, ability to return to normal activities. (Porter, 2014)

At this stage invalid food module can administer necessary food (the data of which will be stored at accounting module) also patients need to be under constant observation and doing screen tests may be necessary, scheduling is also an important feature.

Finally, *'Post-treatment monitoring and management of complications'* is reached. In AIDS center they must identify clinical and laboratory deterioration initiating 2-line, 3-line drug therapies, manage acute illness and opportunistic infection (through aggressive outpatient management or hospitalization and managing side effects of treatment. HIV staging and medication response can be used for measurement here. (Batueva et al, 2022) In Orthopedic IPU they need to prescribe prophylactic antibiotics when needed and set long-term exercise plan. Symptoms and physical characteristics are monitored in this case. EHR and diagnostics modules are used in both cases. (Porter, 2014)

Properly built system with organized data integration and management allows to implement valuable managerial solutions. For example, to predict patient flows through construction of "imitation models". Doing so requires actual patient-centric information and completion will result in immediate cost optimization and improvement of resource allocation. (Krasilnikov, 2017)

To conclude, the exchange of information ensures stable links between different health care providers, integrates different stages of medical care, avoids duplication of diagnostic studies, and creates conditions for interaction between doctors and patients. Integrated payment methods for medical care create economic incentives for the joint work of outpatient and inpatient services, ensuring the continuity of treatment. (Shevskiy and Sheiman, 2013)



## Conclusion

Patient-centricity has become a popular topic since it urges to do what most of contemporary health care systems lack – concentrating on patients' needs. National health systems try to get to this approach differently. One of the approaches developed is 'Care Delivery Value Chain', which actually went out of business domain. In 'Care Delivery Value Chain', that was proposed by Porter and Teisberg, and was developed from the original 'Value Chain' we see a lot of business strategic concepts like 'competitive advantage' and 'cost leadership'. However, what is special in Care Delivery Value Chain is that it tends to take into account the interests of patients and more significantly – the real outcomes of their treatment. Also, costs management is another marker of value. As it was discussed, this concept requires a lot of coordination and integration to deal with impact of care fragmentation and eliminate additional costs. This would require an information system, which would enable and support care integration. Also, one of the strategic goals of the authorities is to develop a single information network the aim of which is to exchange medical data between medical institutions, health authorities and citizens. As this process involves several components that have hierarchical structure success of this plan depends on how good the information systems are implemented on lower stages which are individual clinics.

Building Care Delivery Value Chain is a long process that requires massive reorganizations of the whole management and IT structure. In order to do both Russian public and private clinics will need to take new approach to outcome and cost measurement, order of care delivery and way of payment. In this case information systems become a reliable and effective tool to ensure this. During this research we learned that information systems refer to a class of supporting innovations. They can manage information flows and resources to improve efficiency and effectiveness both in terms of patient outcomes and costs. In Russia HIS is the most common information system for health care, however it is often confused with ERP and vice versa. In fact, as it was learned through interviews and literature analysis, ERP enables to link finances, resources (material and human) and the quality of medical care for their coordinated management and can be integrated into HIS. Thus, the 'enabling IT system' necessary to implement Care Delivery Value Chain in Russian reality would be HIS (provided that technical integrity requirements are complied). HIS integrates all other information systems into one framework. The scope of systems used depends on the strategic goals and specifics of clinics.

To implement it successfully, clinic management should understand the goals of implementations very well, as implementation of wrong system might lead to the need to replace it with another one. In this case, it might lead to big problems as the partners of clinic might be

already used to it, also it is very difficult to re-teach staff. Another problem is acquiring the systems with integration capabilities like open architecture. Although, it is not problematic for some company products, clinics sometimes have different system providers, which may be corresponding to their needs and standards but lack integrity and produce silos, which is bad for value creation. The medical data of each patient is formed in different medical institutions as a result of the work of many doctors and the medical devices they use. The integration of this data is important both for the quality of medical care and for saving money in the system.

Also, some companies, especially those with many branches, may have difficulty accounting for cost data. They have begun to realize that the use of data in business is becoming a necessary requirement for sustainable development, and many companies are beginning to actively use corporate information systems. In clinics it is important as well as costs management is another component of value. To allow this happen, data must be properly collected, processed, stored and used. In return, clinics become more cost aware and also have the opportunity to look at their chain from the outside.

Also, the influence various modules of HIS and ERP on care delivery cycle were studied in this work and the scope of their functions in value creation was qualitatively measured. The consolidated results for treating groups of diseases are presented in table below.

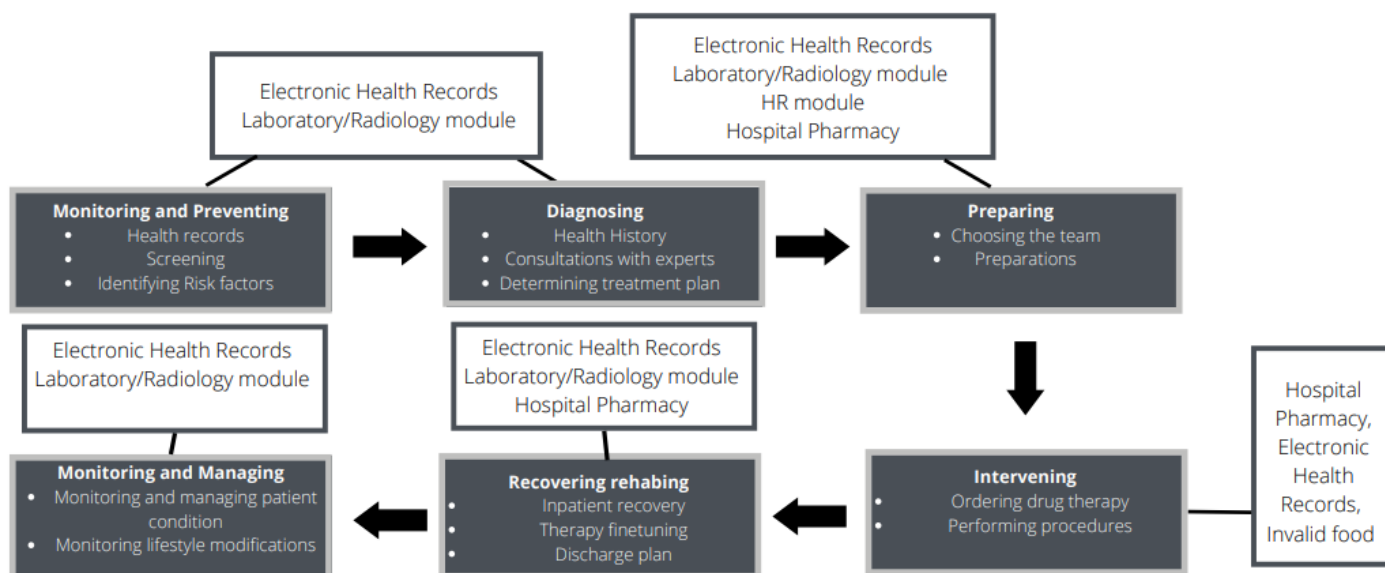


Table 11. Care Delivery Value Chain cycle augmented by HIS modules

They allow to solve two major problems - to reduce costs (or keep them at the existing level) and to improve the quality of medical care. The first task is solved by increasing operational efficiency and the possibility of introducing new, more efficient business processes. Analysis of

complete information in real time helps to improve the quality of decisions made, thereby solving the second problem.

One of the tasks the modules deal with involves planning so that the right resources are assigned to the right tasks. Managing resources involves schedules and budgets for people, projects, equipment, and supplies. It positively affects costs and allows to measure outcomes in the end.

There are certain limitations of this research. It studies only implementation of information systems on clinical level, while the final point of this strategy is to create a hierarchical network of regional and then federal significance and information systems help greatly to achieve that. Thus, it represents another interesting topic worth studying.

## List of References

1. Amit, R. (1986). Cost leadership strategy and experience curves. *Strategic Management Journal*, 7(3), 281-292.
2. Avison, D. E., & Fitzgerald, G. (1991). The nature of information systems and the role of practice. In *Systems thinking in Europe* (pp. 459-464). Springer, Boston, MA.
3. Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of management*, 27(6), 643-650.
4. Batueva, E., Gilenko, E., Ivanov, A., Lvova A., Pantelev A. (2022). Contribution of public procurement to the performance of institutions counteracting infection diseases: the cases of HIV and TB. XXIII Yasin International Academic Conference on Economic and Social Development, Moscow, HSE.
5. Brook, R. 2015. Redefining Health Care Systems. *Rand Corporation*
6. Butler, J. M., Gibson, B., Lewis, L., Reiber, G., Kramer, H., Rupper, R., ... & Nebeker, J. (2020). Patient-centered care and the electronic health record: exploring functionality and gaps. *JAMIA open*, 3(3), 360-368.
7. Christos, B., Vicky, M., & Constantinos, S. J. (2014). Supply Chain Management in The Healthcare Sector: A Research Agenda. In *European, Mediterranean & Middle Eastern Conference on Information Systems (EMCIS2014) October 27th–28th*.
8. Devadass, L., Sekaran, S. S., & Thinakaran, R. (2017). Cloud computing in healthcare. *International Journal of Students' Research in Technology & Management*, 5(1), 25-31.
9. Dukes, M. N. G. (Ed.). (2003). *Drugs and money: Prices, affordability and cost containment* (Vol. 15). IOS press.
10. Escobar-Pérez, B., Escobar-Rodríguez, T., & Monge-Lozano, P. (2010). ERP systems in hospitals: a case study. *Journal of Information Technology Research (JITR)*, 3(4), 34-50.
11. Garber, S., Gates, S. M., Blume-Kohout, M. E., Burgdorf, J. R., & Wu, H. (2012). Challenges to value-enhancing innovation in health care delivery: Commonalities and contrasts with innovation in drugs and devices. *Rand Health Quarterly*, 1(4).
12. Goodwin, N. (2016). Understanding integrated care. *International journal of integrated care*, 16(4).
13. Gusev, A. (2019). Trends and Perspectives of Development of Digital Healthcare. *Vrach I informacionnye tehnologii*.
14. Herzlinger, R. E. (2006). Why innovation in health care is so hard. *Harvard business review*, 84(5), 58.

15. Ivanov, A. E., Gilenko, E. V., & Batueva, E. M. (2021). On some approaches to increasing performance and cost-efficiency of Russian regional AIDS centers. *Российский журнал менеджмента*, 19(1), 35-66.
16. Jayakumar, P., Moore, M. L. G., Hill, A. D., & Koenig, K. M. (2019). Integrated Practice Units: What Are They and How Can They Be Applied to Orthopaedic Trauma?. *Journal of orthopaedic trauma*, 33, S43-S48.
17. Kanter, J. (1989). Clinical case management: Definition, principles, components. *Psychiatric Services*, 40(4), 361-368.
18. Kaplinsky, R., & Morris, M. (2000). *A handbook for value chain research* (Vol. 113). Brighton: University of Sussex, Institute of Development Studies.
19. Leung, T. I., & Van Merode, G. G. (2019). Value-based health care supported by data science. *Fundamentals of clinical data science*. Cham: Springer International Publishing, 193-212.
20. Mäenpää, T., Asikainen, P., Rostila, I., & Suominen, T. (2009). Health Care Information Systems—the Outcomes of the Integrated Use of Health Information. *Connecting Health and Humans*, 749-750.
21. Mintzberg, H. (2017). *Managing the myths of health care: bridging the separations between care, cure, control, and community*. Berrett-Koehler Publishers.
22. Mucheleka, M., & Halonen, R. (2015, April). ERP in Healthcare. In *ICEIS (1)* (pp. 162-171).
23. Murtola, L. M., Lundgrén-Laine, H., & Salanterä, S. (2013). Information systems in hospitals: a review article from a nursing management perspective. *International Journal of Networking and Virtual Organisations* 4, 13(1), 81-100.
24. Nakakawa, A. (2019). Enterprise resource planning: Towards Enterprise Resource Planning Systems. *Makerere University*
25. Olaisen, J. (1991, May). Information as a strategic resource: A question of communication. In *International Conference on Advanced Information Systems Engineering* (pp. 141-167). Springer, Berlin, Heidelberg.
26. Pankomera, R., & van Greunen, D. (2020). ICT framework to support a patient-centric approach in public healthcare: A case study of Malawi. *The Journal of Community Informatics*, 16, 45-76.
27. Porter, M. (1985). *Competitive Advantage*. New York: Free Press
28. Porter, M. E., & Teisberg, E. O. (2006). *Redefining health care: creating value-based competition on results*. Harvard business press.
29. Porter, M. (2013). Value-based Health Care Delivery. *Harvard Business Review*.

30. Porter, M. (2014). Outcome Measurement. *Harvard Business School*.
31. Porter, M. E., & Lee, T. H. (2021). Integrated practice units: A playbook for health care leaders. *NEJM Catalyst Innovations in Care Delivery*, 2(1).
32. Ross, D. S., & Venkatesh, R. (2016). Role of hospital information systems in improving healthcare quality in hospitals. *Indian journal of science and technology*, 9(26), 1-5.
33. Teisberg, E., S. Wallace and S. O'Hara. 2020. Defining and Implementing Value-Based Health Care: A Strategic Framework. *Acad Med*. 95(5): 682–685
34. Vaideeswaran, R., & Kulandai, A. (2019). Impacts of ERP in HRM. *Journal of Emerging Technologies and Innovative Research*.
35. Valentijn, P. P., Schepman, S. M., Opheij, W., & Bruijnzeels, M. A. (2013). Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *International journal of integrated care*, 13.
36. World Health Assembly, 53. (2000). The World Health Report 2000: health systems: improving performance. World Health Organization.
37. Yamani, F. Z., & Merouani, M. E. (2020). Review the Enterprise Resource Planning in Moroccan Healthcare Organizations. *arXiv preprint arXiv:2010.06989*.
38. Батоврин, В. К., Васютович, В. В., Гончаров, Н. Г., Гершфельд, А. С., Гулиев, Я. И., Гуляев, Ю. В., ... & Широбокова, Т. Д. (2005). Проблемы интеграции информационных систем лечебных учреждений РАН. *Журнал радиоэлектроники*, (4), 11.
39. Бокарев, А. А., Богачева, О. В., & Смородинов, О. В. (2017). Развитие методологии оценки эффективности управления государственными инвестициями в инфраструктуру. *Финансовый журнал*, (4 (38)), 56-70.
40. Бударин С.С. (2011). Финансирование системы здравоохранения. *НИИ Организации Здравоохранения И Менеджмента*.30.
41. Гусева, Н. К., & Бердугин, В. А. (2016). Некоторые вопросы оценки качества медицинской помощи в системе здравоохранения Российской Федерации. *Здравоохранение Российской Федерации*, 60(5), 228-233.
42. Данилова, Н. В. (2019). Материально-технические ресурсы здравоохранения.
43. Иванов, А. Е., Горбань, В. И., & Чуева, А. В. (2019). Об обеспечении лекарственными препаратами медицинских учреждений, имеющих собственное положение о закупках. *Госзаказ: управление, размещение, обеспечение*, (58), 26-37.

44. Красильников, И. А. (2017). Управление системой здравоохранения с использованием имитационного моделирования. In *Имитационное моделирование. Теория и практика* (pp. 432-437).
45. Кухтичев, А. А. (2016). Электронная медицинская карта как основа сервисов цифровой медицины информационной системы «ЦифроМед». *Вестник Новосибирского государственного университета. Серия: Информационные технологии*, 14(1).
46. Мадьянова, В. В., Арестова, А. А., Винокуров, В. Г., & Алленов, А. М. (2016). Современное состояние сферы предоставления платных медицинских услуг в бюджетных учреждениях амбулаторно-поликлинической сети Москвы. *Проблемы стандартизации в здравоохранении*, (5-6), 36-40.
47. Мурашко, М. А. (2015). Качество медицинской помощи: новый вектор развития. *Вестник Росздравнадзора*, 6, 7-11.
48. Назаров, В. С., & Авксентьев, Н. А. (2017). Российское здравоохранение: проблемы и перспективы. *Финансовый журнал*, (4 (38)), 9-23.
49. Обущенко, Т. Н. (2014). Проблемы финансирования медицинской помощи. *Вестник Волжского университета им. ВН Татищева*, (2 (31)), 98-103.
50. Омеляновский, В. В., Максимова, Л. В., & Татаринов, А. П. (2014). Зарубежный опыт: модели финансирования и организации систем здравоохранения. *Финансовый журнал*, (3 (21)), 22-34.
51. Парыгина, Н. М. (2011). Калькулирование себестоимости и определение цены медицинских услуг. *Финансовый журнал*, (1), 131-142.
52. Хамидуллина, Г. Р. (2013). Актуальные проблемы менеджмента качества в здравоохранении. *Актуальные проблемы экономики и права*, (2 (26)), 113-119.
53. Хожаев, С. С., & Зенкина, И. В. (2019). Роль нефинансовых показателей при анализе эффективности деятельности коммерческих медицинских организаций. *Вестник евразийской науки*, 11(5).
54. Шахабов, И. В., Мельников, Ю. Ю., & Смышляев, А. В. (2020). Ключевые аспекты пациент-ориентированной модели управления медицинской организацией. *Научное обозрение. Медицинские науки*, (3), 34-38.
55. Шевский, В., & Шейман, И. М. (2013). Проблемы формирования интегрированной системы здравоохранения. *Вопросы государственного и муниципального управления*, (3), 24-47.

56. Шишкин, С. В. (2000). Реформа финансирования российского здравоохранения. *Научные труды Фонда «Институт экономической политики им. ЕТ Гайдара»*, (25).

### Electronic sources

57. ERP-система для медицины: зачем нужны платформы?. 1С. URL: <https://solutions.1c.ru/articles/873920/>
58. History of Information Systems. URL: <https://uh.edu/~mrana/try.htm> (accessed:27.04.2022)
59. Inc., Gallup (July 10, 2014). "In U.S., Uninsured Rate Sinks to 13.4% in Second Quarter" URL: <http://www.gallup.com/poll/172403/uninsured-rate-sinks-second-quarter.aspx> (accessed:27.04.2022)
60. International Organization for Standardization. ISO/IEC 2382:2015 Information technology — Vocabulary.
61. Health Level 7 Стандарт. Zrav. Expert. URL: [https://zdrav.expert/index.php/%D0%9F%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%82:Health Level 7 %D0%A1%D1%82%D0%B0%D0%BD%D0%B4%D0%B0%D1%80%D1%82](https://zdrav.expert/index.php/%D0%9F%D1%80%D0%BE%D0%B4%D1%83%D0%BA%D1%82:Health%20Level%207%D0%A1%D1%82%D0%B0%D0%BD%D0%B4%D0%B0%D1%80%D1%82) (accessed:27.04.2022)
62. How to eat the Value-based Procurement elephant? A Deloitte point of view.2018.Deloitte. URL: <https://www2.deloitte.com/content/dam/Deloitte/be/Documents/strategy/Value%20based%20procurement%20-%20Deloitte%20Belgium.pdf> (accessed:27.04.2022)
63. Integrated care models: an overview. 2016. WHO. URL: [https://www.euro.who.int/\\_data/assets/pdf\\_file/0005/322475/Integrated-care-models-overview.pdf](https://www.euro.who.int/_data/assets/pdf_file/0005/322475/Integrated-care-models-overview.pdf) (accessed:27.04.2022)
64. Monitoring of the procurement schedule of the Ministry of Health of Russia for 2021 and the planning period 2022-2023 URL: <https://minzdrav.gov.ru/ministry/tenders/monitoring-plana-grafika-zakupok-minzdrava-rossii-na-2021-i-planovyy-period-2022-2023-godov>
65. P. Valentijn. Fragmentation of care: its causes and what we can do about it. URL: <https://www.essenburgh.com/en/blog/fragmented-care-the-causes-and-what-we-can-do-about-it> (accessed:27.5.2022)
66. Percentage of respondents worldwide who were satisfied with their country's national health system as of 2019, by country. Statista. URL:



- <https://www.statista.com/statistics/1109036/satisfaction-health-system-worldwide-by-country/> (accessed:27.04.2022)
67. Pros and Cons of Various Payment Models and their Effect on Practices. Medical Billers and Coders. URL: <https://www.medicalbillersandcoders.com/articles/practice-administration/pros-and-cons-of-various-payment-models-and-their-effect-on-practices.html> (accessed:27.04.2022)
68. Regional fragment of the unified state healthcare system of St. Petersburg. Netrika. URL: <https://netrika.ru/project/regionalnyy-fragment-edinoy-gosudarstvennoy-informacionnoy-sistemy-v-sfere-zdravoohraneniya-sankt-peterburga> (accessed:27.5.2022)
69. Tadviser: Government, Business, Technologies. URL: [Медицинская информационная система \(tadviser.ru\)](https://tadviser.ru) (accessed:27.04.2022)
70. The procedure for paying for medical care under compulsory health insurance. URL: [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_324740/4be1dbd7a93293bd302a6e9b001748fa8eba4ffa/](http://www.consultant.ru/document/cons_doc_LAW_324740/4be1dbd7a93293bd302a6e9b001748fa8eba4ffa/) (accessed:27.04.2022)
71. Value Vs. Volume Based Care. 6 Critical Issues. URL: <https://healthinfoservice.com/value-vs-volume-based-care-6-critical-issues/> (accessed:27.5.2022)
72. What is case management? American Case Management Association. URL: <https://www.acmaweb.org/section.aspx?mn=&sn=&wpg=&sid=22> (accessed:27.04.2022)
73. Биллинг система. KaurIoT. URL: <https://kauri-iot.com/blog-post/billing-sistema/>
74. Госуслуги – Официальный сайт Администрации Санкт-Петербурга. URL: <https://gu.spb.ru/> (accessed:27.05.2022)
75. Диспансер. Словарное определение. URL: [https://dic.academic.ru/dic.nsf/enc\\_medicine/11034/%D0%94%D0%B8%D1%81%D0%BF%D0%B0%D0%BD%D1%81%D0%B5%D1%80](https://dic.academic.ru/dic.nsf/enc_medicine/11034/%D0%94%D0%B8%D1%81%D0%BF%D0%B0%D0%BD%D1%81%D0%B5%D1%80) (accessed:27.04.2022)
76. Информационные технологии в медицине. Инфраструктурный центр "Healthnet". 2019. URL: <https://academpark.com/upload/medialibrary/362/36244984677a893f2c2d4a0080de0105.pdf> (accessed:27.04.2022)
77. Критерии оценки качества медицинской помощи ФГБУ «ЦЭКМП» Минздрава России URL: <https://rosmedex.ru/kk/> (accessed:27.04.2022)

78. Лекарства кладут в стационар. Коммерсант. 2022. URL: <https://www.kommersant.ru/doc/5283991> (accessed:27.04.2022)
79. Методические рекомендации по обеспечению функциональных возможностей медицинских информационных систем медицинских организаций. Министерство здравоохранения РФ.2016. URL: <https://spbmiac.ru/wp-content/uploads/2018/02/Rekomendatsii-po-obespecheniyu-funktsionalnyh-vozmozhnostej-MIS-MO.pdf> (accessed:27.04.2022)
80. МИС QMS – ERP-система для медицины. СП.АРМ. URL: <https://sparm.com/publications/mis-qms-erp-sistema-dlya-meditsiny>
81. Национальные проекты "Здравоохранение" и "Демография". URL: <https://minzdrav.gov.ru/poleznye-resursy/natsproektzdravooхранenie> (accessed:27.04.2022)
82. Нестандартные решения при внедрении новой модели медицинской организации, оказывающей первичную медико-санитарную помощь. Всероссийская научно-практическая конференция "Развитие системы оказания первичной медико-санитарной помощи". 2019. URL: <https://static-0.minzdrav.gov.ru/system/attachments/attaches/000/048/231/original/> (accessed:27.04.2022)
83. ОНФ: 86% россиян пожаловались на нехватку врачей. Егор Четвериков. 2019. Вадемекум. Деловой журнал о здравоохранении. URL: <https://vademec.ru/news/2019/05/21/onf-86-rossiyan-zhaluyutsya-na-nekhvatku-vrachey/> (accessed:27.04.2022)
84. О признании утратившим силу постановления Правительства Москвы от 28 декабря 1999 года N 1228. URL: <https://docs.cntd.ru/document/537949484> (accessed:27.04.2022)
85. Реформа здравоохранения: панацея или проблема. Государственная дума. 2016. URL: <http://duma.gov.ru/media/files/q7QeBHNyDQy0IgMjYZFs4iUC9xFH7nFJ.pdf> (accessed:27.04.2022)
86. Современные тенденции в системе здравоохранения Российской Федерации. Издание Государственной думы. 2019. URL: <http://duma.gov.ru/media/files/otTeY7Kh7jQrYiz92JbKmbymxb6971xF.pdf> (accessed:27.04.2022)

87. Счетная палата проанализировала оптимизацию здравоохранения. Российская газета. 2015. URL: <https://rg.ru/2015/04/14/optimizacya-site.html> (accessed:27.04.2022)
88. Указ Президента Российской Федерации от 06.06.2019 г. № 254. URL: <http://www.kremlin.ru/acts/bank/44326> (accessed:27.05.2022)
89. ФАС предлагает запретить платные медуслуги в госклиниках. ТФОМС КБР. URL: <https://tfomskbr.ru/news/fas-predlagaet-zapretit-platnye-meduslugi-v-gosklinikah> (accessed:27.04.2022)
90. Федеральный закон "О внесении изменений в отдельные законодательные акты Российской Федерации по вопросам применения информационных технологий в сфере охраны здоровья" от 29.07.2017 N 242-ФЗ. URL: [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_221184/](http://www.consultant.ru/document/cons_doc_LAW_221184/) (accessed:27.05.2022)
91. Федеральный закон от 21 ноября 2011 г. № 323-ФЗ "Об основах охраны здоровья граждан в Российской Федерации". URL: <https://minzdrav.gov.ru/documents/7025-federalnyy-zakon-323-fz-ot-21-noyabrya-2011-g> (accessed:27.04.2022)

## Appendix I. Questionnaire

### Опрос на тему информатизации медицинских учреждений

*Уважаемый респондент, данный опрос проводится в рамках исследования на тему информатизации российских медицинских учреждений. Его прохождение займет не более 3 минут.*

*Благодарим за участие!*

*\* Ответ обязателен*

1. Ваша организация: \*

- Больница
- Поликлиника
- Другое:

2. Пожалуйста, закончите фразу, выбрав, на Ваш взгляд, наиболее подходящее для нее окончание: "Совокупность используемых в медицинской организации информационных систем называется ..." \*

- МИС (Медицинские информационные системы)
- ERP (Системы планирования ресурсов предприятия)
- Другое:

3. Комментарий к Вашему ответу

4. Если Ваша медицинская организация использует какую-либо информационную систему, пожалуйста, выберите название ее фирмы-разработчика из списка ниже. Если разработчик в списке отсутствует, пожалуйста, укажите его название в графе "Другое". Если у Вас несколько систем разных разработчиков, Вы можете выбрать несколько вариантов ответов. \*

- Ариадна
- Инфоклиника
- 1С

- Medesk
  - Самсон
  - СП.АРМ (фирма-разработчик системы qMS)
  - MedTrak
  - Медиалог
  - Авиценна
  - Medwork
  - Амулет
  - Интерин
  - Интрамед
  - Торинс
  - Фобос
  - Эверест
  - Артемида
  - МедИС-Т
  - БАРС.Мед
  - Другое:
5. Пожалуйста, укажите, какие службы интегрированы в Вашу информационную систему. Можно выбрать несколько вариантов ответов. Вы также можете указать свой вариант в графе "Другое".\*
- Администрирование потоков пациентов
  - Биллинг
  - Электронная медицинская карта
  - Статистика и аналитика (система поддержки принятия решений)
  - Системы наблюдения за пациентом
  - Больничная аптека
  - Диетическое питание
  - Лаборатория
  - Радиология
  - Бухгалтерский учет
  - Управление кадрами
  - Другое:

## Appendix II. Figures and Tables

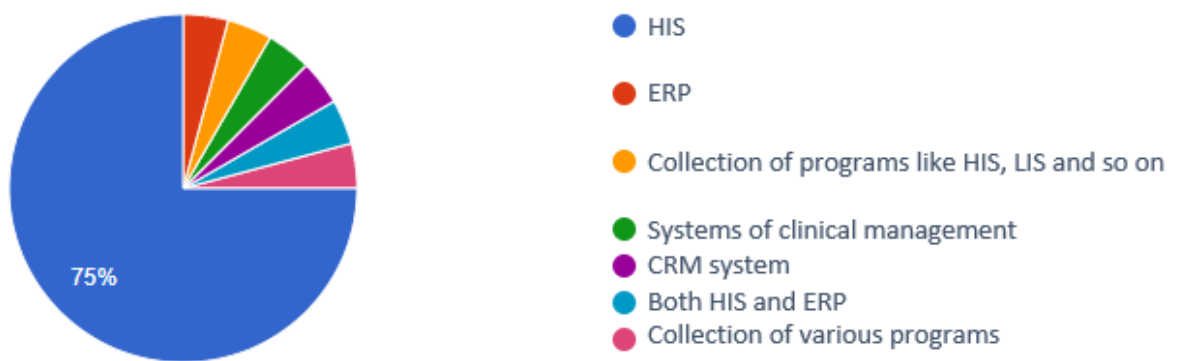


Figure 1. The view of managers on information systems

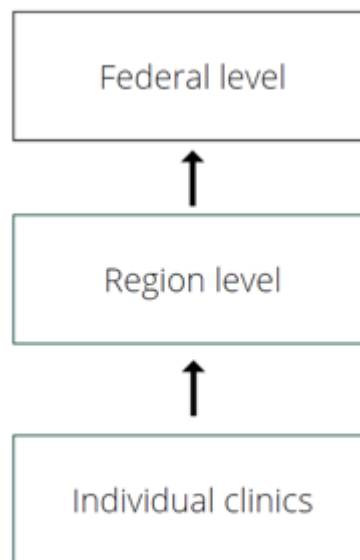


Table 1. The hierarchy of integration

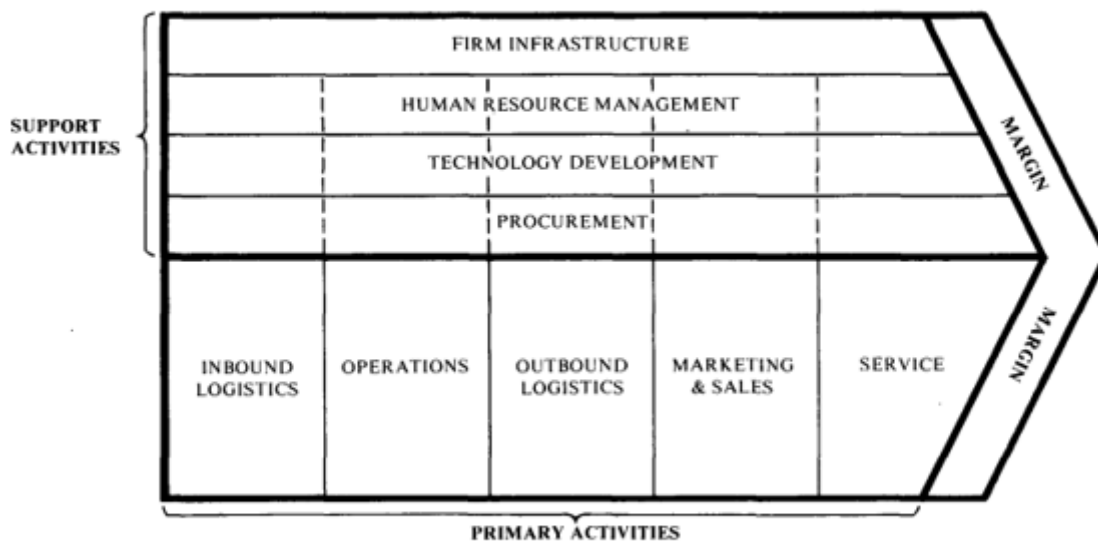


Table 2. Value Chain Activities (Porter 1985)

Organizational	Integration of organizations are brought together formally by mergers or through collectives and/or virtually through coordinated provider networks or via contacts between separate organizations brokered by purchaser
Functional	Integration of non-clinical support and back-office functions, such as electronic patient records
Service	Integration of different clinical services at an organizational level, such as through teams of multidisciplinary professionals
Clinical	Integration of care delivered by professional and providers to patients into a single or coherent process within and/or across professions, such as through use of shared guidelines and protocols

Table 3. Types of integration (1) (Goodwin, 2016)

Horizontal integration	Integrated care between health services, social services and other care providers that is usually based on the development of multi-disciplinary teams and/or care networks that support a specific client group (e.g. for older people with complex needs)
Vertical integration	Integrated care across primary, community, hospital and tertiary care services manifest in protocol-driven (best practice) care pathways for people with specific diseases (such as COPD and diabetes) and/or care transitions between hospitals to intermediate and community-based care providers
Sectoral integration	Integrated care within one sector, for example combining horizontal and vertical programmes of integrated care within mental health services through multi-professional teams and networks of primary, community and secondary care providers;
People-centred integration	Integrated care between providers and patients and other service users to engage and empower people through health education, shared decision-making, supported self-management, and community engagement;
Whole-system integration:	Integrated care that embraces public health to support both a population-based and person-centred approach to care. This is integrated care at its most ambitious since it focuses on the multiple needs of whole populations, not just to care groups or diseases.

*Table 4. Types of integration (2) (Goodwin, 2016)*



Definition	IPU Ambulatory Orthopaedic Care	IPU Fragility Fracture Care	IPU Complex Polytrauma
1. Condition	Fractures and associated injuries managed on an outpatient basis (ie, walking wounded), for example, closed fracture of the distal radius	Fragility fractures related to osteoporosis after low-energy injury (eg, osteoporotic fractures of the proximal humerus, wrist, hip, tibial shaft, spine)	Two or more severe injuries in 1 or more body areas after high-energy injury (eg, open/closed fractures of axial/appendicular skeleton, concurrent head, chest, abdominal injuries)
2. Population segments	Broad range of adult patient populations ± complex psychosocial needs	Elderly patient population with osteoporotic fragility fractures ± complex psychosocial needs	Broad range of adult patient populations ± complex psychosocial needs
3. Cycle(s) of care	First specialist outpatient clinic review till discharge from clinic	Initial hospital admission—lifelong surveillance	Initial hospital admission—long-term review (variable, patient-provider designated)
4. Organization	ED information flow, prework, briefing (team huddle), clinic, debrief, follow-up	ED information flow, prework, briefing (team huddle), rounds, debrief, follow-up	ED information flow, prework, briefing (team huddle), rounds/clinic, debrief, follow-up
5. Core team and support services	Orthopaedic surgeon Associate provider (midlevel) Physical therapist  Psychologist/behavioral health specialist Social worker Nutritionist Risk factor modification	Orthopaedic surgeon Associate provider (midlevel) Physical therapist  Orthogeriatrician Anesthesiologist  Nurse (advanced nurse practitioner) Social worker Psychologist/behavioral health specialist Primary care practitioner (remote access) Nutritionist Risk factor modification* Pharmacist	Orthopaedic surgeon Associate provider (midlevel) Coordinator (advanced nurse practitioner) Physical therapist General/vascular/neuro/plastic surgeon Anesthesiologist/Intensivist Social worker Psychologist/behavioral health specialist Risk factor modification Nutritionist Risk factor modification† Pharmacist
6. Key location(s)	Outpatient clinic	Inpatient trauma unit Outpatient clinic	Inpatient trauma unit Outpatient clinic
7. Key assets	Outcome measurement platform Dynamic costing system Real-time activity tracking Shared decision-making solution	Outcome measurement platform‡ Dynamic costing system Real-time activity tracking Shared decision-making solution	Outcome measurement platform Dynamic costing system Real-time activity tracking Shared decision-making solution
<p>*Injury/falls prevention; Secondary fracture prevention, for example, pharmacological.  †Injury prevention.  ‡Aligned with national/international benchmarking/key performance indicators, for example, length of stay, discharge disposition, complication rates (ie, hospital acquired infections, pressure ulcers).</p>			

Table 5. An example of an IPU (Jayakumar et al., 2019)

<u>Advantages</u>	<u>Disadvantages</u>
Encourages the delivery of care and maximizing patient visits	Offers little or no incentive to deliver efficient care or prevent unnecessary care
Relatively flexible and is employed regardless of the size or organizational structure	Limited to face-to-face visits and acts as a barrier to care coordination and management of conditions via other means
Supports accountability for patient care, but it is often limited to the scope of the service a particular physician provides at any point in time	Patients suffer the logistics involved in this type of model

*Table 6. Fee-for-service model*

<u>Advantages</u>	<u>Disadvantages</u>
Improves coordination among multiple caregivers	How to define the boundaries of an episode
Flexibility in terms of place and timing care can be delivered	Can create barriers to patients' choice of provider and/or geographic preferences
Effective management of an episode (reduce treatment/manage costs)	Lack of incentive to reduce unnecessary episodes
Simplicity in billing logistics (one bill instead of many)	The tendency to avoid high-risk patients or cases that could exceed the average episode payment
Accountability for care for a specific episode	

Table 7. Bundled payments model

<b>Electronic medical records (electronic medical history, electronic health passport)</b>
Medical examination protocol
Care diary
Management of a dispensary group of patients with chronic diseases
Support of clinical expert work
Medicine prescription records
Dentistry
Diagnostics records
Planning and recording of surgical interventions
Accounting and monitoring of anesthetic benefits
Intensive care records
Patient's perfusion chart
Patient condition monitoring system
Laboratory system
Radiology system (PACS)

Table 8. EHR structure

<b>ERP system</b>
Accounting System
Human Resource management System
Reporting System
Equipment Inventory System
Assets Management System
Hospital Pharmacy
Invalid food
Billing System
Administration System
System of relationships with paying organizations
Workflow System
Official web-site of the clinic

Table 9. ERP structure

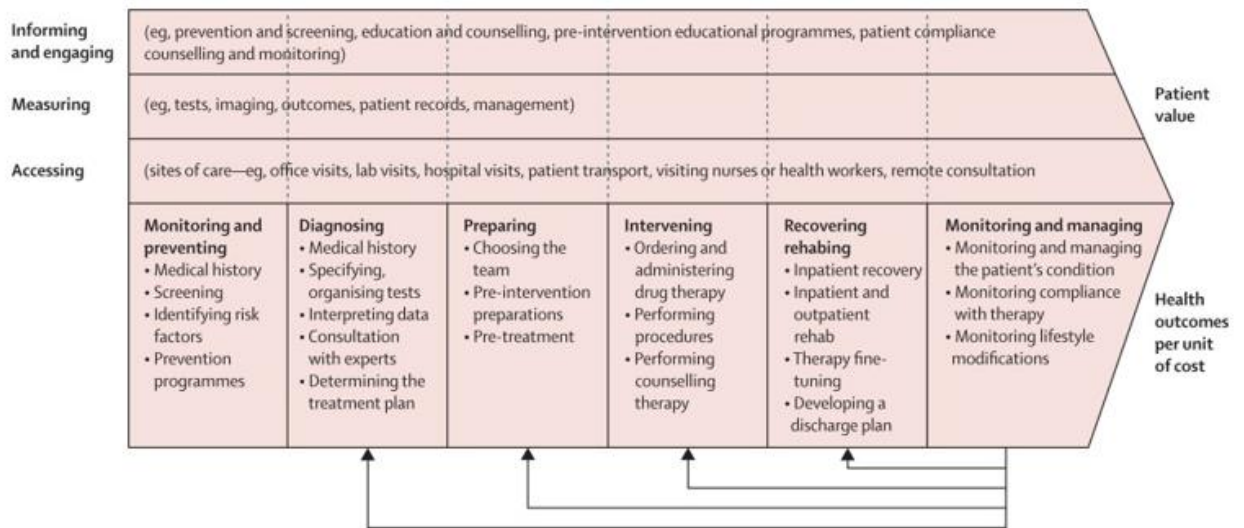


Table 10. Care Delivery Value Chain cycle (Porter and Teisberg, 2006)

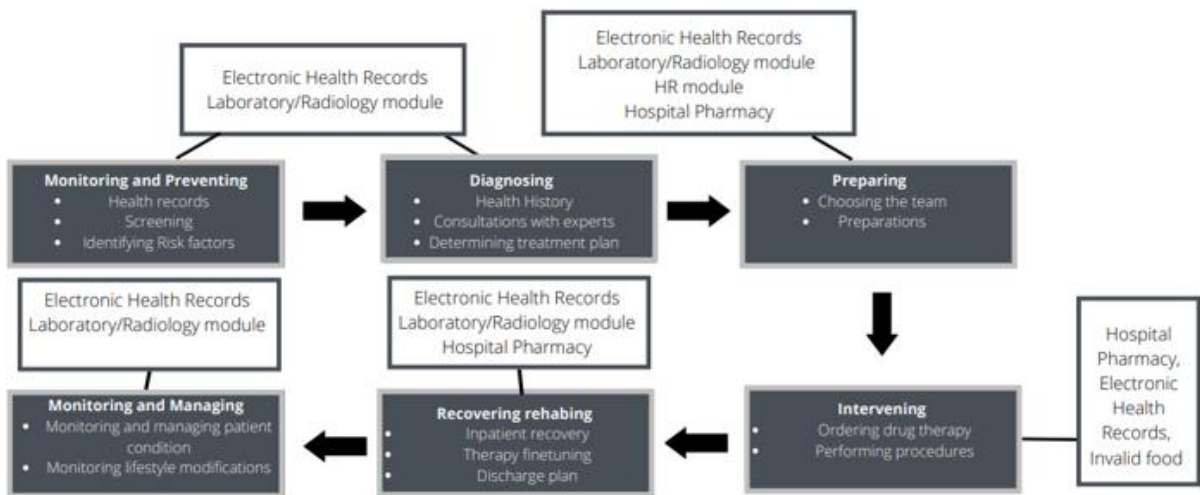


Table 11. Care Delivery Value Chain cycle augmented by HIS modules