

## INNOVATIVE INFORMATION TECHNOLOGIES IN THE MANAGEMENT OF A MEDICAL INSTITUTION: DENTEXPERT AS A TOOL FOR DIGITAL TRANSFORMATION AND SERVICE QUALITY IMPROVEMENT

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The problem of developing criteria for the quality of medical care is of great importance throughout the world. However, there is no clear understanding and definition either in Ukraine or abroad. Only one thing is clear: high-quality medical care should ensure the longevity and quality of life of patients, as well as the economic, medical and social efficiency of healthcare. Timeliness is the ratio between the time of providing a medical service and the time when the need for this service would arise if the system functioned in ideal conditions. This feature is very relevant in dental practice: more than 30% of visits to the dentist are due to untimely treatment of patients.

Criterion (from the Greek. *kriterion* – a means of judgment), a sign based on which an assessment is made, something is determined or classified. The main criteria characterizing the timeliness and quality of dental care are the ratio of the number of teeth treated for caries and complications, the ratio of the number of treated permanent teeth and remote teeth. An important indicator of socio-economic significance characterizing the planning, timeliness and level of organization of preventive work is the need for oral hygiene. The main task of planned preventive oral hygiene in the attached contingent is to identify uncomplicated early stages of diseases of the teeth and oral cavity organs through regular examinations and to prevent functional and morphological disorders of the dento-maxillary system and possible complications. According to WHO experts, the distribution of responsibility among entities related to the quality of organization and provision of dental care appears uneven: the share of responsibility of patients is 60%, state authorities and their structures are 25%, and medical personnel are 15%.

The main characteristics of the quality of dental care are safety, clinical and economic effectiveness, timeliness of provision, and the criteria are compliance with standards, absence of complications, and patient satisfaction with the results of its provision.

The quality of medical care is influenced by various factors that have cause-and-effect relationships. The following factors are distinguished: the availability of resources for the organization of medical care; the interest of institutions and medical personnel in optimizing the final results of their activities, the condition and behavior of medical care consumers. An important role is played by medical personnel, who must be highly qualified. This is achieved by improving the quality of basic and continuing medical education, a system for registering errors and defects in the work of medical personnel.

The desire to use new effective treatment and prevention technologies should become one of the most important factors in improving the quality of dental care, because in the last 30 years, a profound technological breakthrough has been made in dentistry, especially in the field of caries and prevention, which makes it possible to dramatically increase the efficiency of dental care for the population.

Separately, we should dwell on the problem of training in new technologies. The current system of postgraduate education does not meet the needs of dentists, since most clinics do not provide them with a workplace, there is no necessary equipment, materials, tools, and teachers themselves often do not have access to modern technologies.

Administrative and managerial measures have always been and will be one of the important ways to improve the quality of work of specialists. The main one should be the implementation of professional (industry, medical-economic, state) algorithms and standards for the work of dentists. Standards should ensure the quality of work of dentists of all specialties, while performing several functions. The content of the standard is to describe certain technological methods of diagnosis and treatment that a specialist should apply for effective examination and treatment of the patient.

By implementing a quality management system in medical organizations, and then passing the certification and accreditation procedure, the most significant effect is achieved in terms of improving the quality of medical care. Increasing the efficiency of medical institutions is associated with streamlining and accounting for all aspects of their activities, meeting the requirements of supervisory authorities, improving the effectiveness of processes and the efficiency of the entire system as a whole. As a result of fulfilling these conditions, the stability of the main indicators of the activities of medical organizations, the quality of services provided their compliance with consumer requirements, employee health and safety, compliance with environmental requirements and social responsibility increase. Improvements in the following indicators are also noted: the volume and quality of services provided, consumer and staff satisfaction, cost reduction at all stages of medical service provision, increased income, and the stability of the management system.

Today, there are practically no unambiguous criteria for assessing the quality of medical care (including dental care), since each specific situation related to diagnostics, treatment, prevention and consequences of the disease requires individual analysis with the involvement of experts, careful study of medical documentation, and peer assessment. At the same time, the logical connection between the concepts of "quality of dental care" and "optimization of dental care" is undeniable. In many developed countries, the main criterion for assessing the quality of a dentist's work is the opinion of the population. Interview and questionnaire methods are used. Although they are subjective, they become objective in the conditions of long-term prospective observation or a large sample. A large number of scientific works have been devoted to the fundamental study of the problem of the quality of medical care in healthcare.

In order to improve the quality of medical care, increase the economic efficiency of the organization, patient satisfaction and safety, standardization can be carried out in a medical organization. The choice of a standardization model (Procedures, Standards, ISO, EFQM, and JCI) should be carried out in accordance with the tasks of the organization, taking into account available resources. All countries face the problems of ensuring accessibility of medical care, equity, safety and participation of patients, as well as improving the skills and abilities of specialists, technologies and the implementation of evidence-based medicine with available resources.

Modern dentistry relies on evidence-based care. But what if the evidence is poor or absent? In various clinical contexts, dentistry struggles with a lack of parameters for quality assurance and control, and it becomes the responsibility of the practitioner to ensure a high level of care that meets their own level of acceptability, which is governed by personal ethics, laws, policies and principles.

The evidence used in this scenario is largely empirical. The importance of this is further emphasized by the increasing costs and demands for dental care, which are driving innovation to improve the efficiency and quality of care. This raises the question: How do we define quality management in our own context? Unfortunately, there is a paucity of literature that provides information on the application of quality management in dentistry, as the available material is almost always related to medical practice.

However, by adopting a standardized approach to quality management, the practice will ensure continuous improvement in the quality of medical care. It should be emphasized that the treatment of dental patients is a technologically material-intensive production. A large amount of consumables is spent on performing certain manipulations, filling teeth, manufacturing dentures, splinting and orthodontic appliances. One of the important issues in the quality of providing dental care is the implementation and implementation of infection control programs. The safety of dental procedures has been and remains relevant to this day. This is due to the high probability of the spread of blood-borne infections of HIV, hepatitis B, C and no less dangerous tuberculosis, meningitis, herpes, viral, staphylococcal, streptococcal and other infections at a dental appointment. In the context of merging with other medical organizations, the dental service is experiencing insufficient funding both in the field of medical measures and in the field of implementation and implementation of infection control programs. Many dental institutions are financed according to the residual

mechanism, which also affects the quality of providing highly qualified care. Many dentists purchase dental supplies and personal protective equipment at their own expense, which is not required by infection control requirements. This does not apply to private practices that care about each client.

In the era of infectious diseases, the FDI World Dental Federation puts the issue of ensuring a safe environment for dental care at the forefront. Dentists are classified as the first risk group for infection with viral hepatitis and HIV infection, as well as doctors of therapeutic specialties who periodically perform parenteral procedures and who have practically no anti-epidemic vigilance. Medical personnel can become infected during examination, dental treatment, that is, when performing dental manipulations in one of the most infected areas of the human body, as well as procedures associated with the risk of traumatizing the gums and oral mucosa during surgical interventions. Assuming that today the patient can be infected with pathogens of the most common diseases, each dental manipulation must be performed using all protective equipment by both the doctor and the nurse.

In case of violation of the relevant sanitary instructions, both patients and medical personnel are at risk of infection. Some researchers indicate the constant danger of cross-infection in dental practice among patients, dentists and auxiliary personnel [3, 14]. Viral particles can be found in almost all biological fluids, but in different concentrations, and therefore their epidemiological danger as transmission factors is not unambiguous. In case of contact with the skin with microdamages and mucous membranes, the introduction of an infectious agent into the body is possible. Thus, the herpes simplex virus remains viable on rubber gloves and instruments for several hours. Infection is possible both in the presence of clinical manifestations of herpesvirus infection in a person and in their absence [15].

Prevention of infection of the patient and the medical worker in the dental office can be effective if the rules of disinfection and sterilization are strictly observed. In case of suspicion of infection, consultations should be held with the participation of an infectious disease specialist, a dermatovenereologist, and appropriate laboratory tests should be performed in a timely manner. Such diagnostic tactics will allow avoiding not only infection along the chain patient – doctor – patient – medical staff, but also intrahospital spread of infection.

There are many publications in foreign medical publications on the topic of compliance with measures for the prevention and control of infectious diseases in dental medical organizations [2, 4, 12, 14, 16]. Despite the fact that the principles of prevention and control of infections are the same throughout the world, approaches to solving these problems in developed and developing countries vary greatly. Experts from WHO (World Health Organization), the US Centers for Disease Control and Prevention, the European Center for Disease Prevention and Control and other organizations of the GIPC Network in their reports indicate the problem of global health security, which is under threat due to the absence or limitation of infection prevention and control programs. The priorities outlined by the GIPC Network are based on evidence-based recommendations, approved implementation strategies, and take into account increasing awareness of the threats associated with epidemic diseases. All this promotes coordination, synergy, accountability and communication as the most important means to achieve the goal [1]. A number of authors draw attention to the need to improve knowledge about infectious occupational risks; the use of personal protective equipment; the use of environmental barriers and disposable instruments; waste management; water quality control in the dental unit, biofilms and water and some other important sections.

Thus, the problem of the need to ensure infectious safety during the provision of medical services, especially dental services, is extremely important. The universal problem of public health, despite the qualitative changes in modern dentistry, is still oral hygiene [13]. With the development of insurance medicine, patients have become more attentive to their health and visit dental doctors more often [5]. However, according to estimates from the study of the global burden of disease, 3.5 billion people worldwide suffer from diseases of the organs and tissues of the mouth [8]. Improving dental care will make it possible to significantly improve the level of health of the population [9]. It has been proven that regular oral and tongue hygiene is of decisive importance in improving the

prognosis of dental patients. Mandatory components since the time of Hippocrates during the treatment of any disease are hygienic care, regimen and diet.

It should be emphasized that many service quality assessments are currently used; one of the relevant ones is the SERVQUAL method. It is based on identifying gaps in the service provision process. An important and priority in this methodology is to understand how patients perceive the service and how they evaluate it during real use. Finally, the level of quality of dental care in practice looks like the effectiveness of the entire dental care system and is determined by a large number of indicators, starting and ending with the availability of any type of dental treatment and prevention.

Thus, the management and regulation of the quality of dental care is a multi-level and multi-directional process that requires serious analysis and integration of the current state of care and information about it, an objective picture of the situation, deep research and creativity to take real and effective measures to improve it. It should be based on a systematic approach and long-term comprehensive purposeful work.

In modern practice, there are two ways to open a dental clinic. The first is that the founder of the business is a dentist who wants to open his own business, but in addition to the professional ability to treat and the desire to earn money, he does not have administrative skills and the corresponding skills for running a business. Another case is when a dental clinic is founded by an experienced entrepreneur who views it from the perspective of a profitable business. Thus, the result of the entire economic activity of the individual entrepreneur depends on the one who will manage the business and make management decisions. As a result, the risk of making unconsidered management decisions is quite high. Based on this, when organizing the management process, it is necessary to conduct a correct analysis of the current state of the business and make timely management decisions that affect the further functioning of the business structure. Considering this case of running a dental business, we are dealing with the first model of its organisation. The dental clinic we have studied is located in Sumy, and its founder is a practicing orthopedic dentist.

The use of innovative marketing technologies in dental practice requires taking into account its following features: dental services, as a rule, are mandatory for any patient; the demand for dental services is inelastic, since an increase or decrease in prices by 10-15% will remain completely unnoticed by the market; the demand for dental services is of two types – primary and secondary. The patient can apply for primary demand services himself, without referral from other doctors (in dentistry this is therapeutic and surgical care). Secondary demand services include all types of dental care that the patient "does not know", "does not understand", or "is not relevant without a doctor's referral" (dental implantation and orthodontic treatment); combination in dental practice of both traditional (invasive methods of caries treatment, tooth extraction, prosthetics with plate and clasp prostheses, installation of a bridge prosthesis) and innovative services (treatment of initial caries by infiltration method, chemical-mechanical system for treating dental caries, air-kinetic and laser method of dental treatment, method of photoactivated disinfection, use of xenon, lumineers in the walls of a dental institution) and methods of their implementation.

Patients purchase a dental service if there are three factors that are fundamentally important to them: the need for a dental service; the acceptability of the price; and positive reviews from experts and consumers about the new dental service.

The attraction of patients to a dental medical organization is influenced by systemic traditional and innovative factors. According to the level of compliance with the perception of his expectations, the consumer evaluates the received service and compares it with the costs incurred (money, time, effort and psychological costs). Therefore, from the consumer's point of view, the level of quality of medical services is the correspondence between the perception of the service and its expectations. The conditions under which the quality of service reaches the highest level are as follows: when the expectations of all participants in the service process coincide – consumers, employees, managers and owners of the dental institution – and when the staffs ensures productivity and ideal repeatability (homogeneity) of the service, which is provided completely in accordance with expectations. When

managing the quality of service, the most important task is to set the right level of customer expectations. If expectations are too low, customers will be satisfied, but it will be difficult to attract a sufficient number of them. Conversely, if the bar is set too high, consumers will be disappointed. In today's highly competitive dental services market, it is particularly interesting that the perception of services aligns with expectations.

It should be noted that professional dental clinics are usually established by dentists. Patients are attracted to such clinics by the reputation of doctors, their level of qualification and experience. Such clinics have a large share of regular customers; new patients come on the recommendation of existing patients. These dental clinics value their reputation. The pricing of all these clinics is based on the desire to implement medical standards, which is necessary to maintain their reputation. The doctor's pricing behavior is also determined by the choice of the type of price list: detailed or nosological. The detailed price list indicates the prices of many manipulations that the doctor performs during treatment. Accordingly, the total cost of all medical manipulations is the cost of the treatment performed. The nosological price list includes the cost of treating a certain disease. Choosing the first type of price list makes it possible to vary the price of the service.

We describe a little company through SWOT analysis. SWOT analysis is one of the most important diagnostic procedures, which we present in Table 1.

**Table 1.** SWOT analysis matrix of activities

Internal environment	<u>Strengths:</u> 1 Highly qualified personnel. 2 Quality dental services. 3 Using modern technologies. 4 Use of modern equipment and its regular updating. 5 Availability of a customer base. 6 High quality service. 7 Individual approach to the patient. 8 Convenient location (next to public transport stops). 9 Convenient payment terms for patients (cash and non-cash). 10 Sufficiently high level of wages and their timely payment. 11 Profitable activity. 12 Competence and friendliness of staff, customer-oriented approach to doing business.	<u>Weaknesses:</u> 1 Unstable volumes of services. 2 High prices. 3 Incomplete market coverage (geographic and demographic segments). 4 Insufficiently wide range compared to competitors. 5 Weak promotion of sales of services. 6 Average level of information availability on the Internet. 7 Insufficiently effective marketing strategy.
	<u>Features:</u> 1 Stable demand for dental services 2 Possibility of introducing new services. 3 The presence of potential consumer segments on the market.	<u>Threats:</u> 1 Rising inflation rate. 2 Rising prices for dental materials and equipment. 3 Decrease in the purchasing power of the population. 4 A possible drop in demand. 5 High competitive rivalry between operating business entities.

Source: author's own development

This is a business technology for assessing the initial state, unused resources and threats, and the existing potential of the organization's activities. An important part of SWOT analysis is the formation of an idea of the need for certain strategic changes. In the process of SWOT analysis, a vision of the development prospects of a medical organization is determined, which makes it possible to develop a doctrine (purpose, mission) of a medical organization, set strategic goals, and formulate

tasks that need to be solved to achieve the goals. The information listed above can form an information basis for conducting a SWOT analysis, which is widely used in strategic planning as a tool to support decision-making. An important part of SWOT analysis is to get an idea of the need for some strategic changes. Within the framework of SWOT analysis, a vision of the development prospects of a medical institution is determined. This makes it possible to formulate the most important strategic goals and form tasks. The information presented in the table can be used as an information base for strategic planning and support of decisions that affect the quality of medical services. Thus, the use of SWOT analysis technology in combination with the expert assessment method allows you to obtain complete and objective information about the system of organizing dental care for the population of Sumy and scientific substantiation of the concept of optimizing dental care for the population. The strengths and weaknesses, opportunities and potential threats identified on the basis of the analysis allow you to scientifically substantiate the strategy for improving the model of the regional system of dental care (including resource allocation) for residents of sparsely populated areas.

It should be emphasized that in recent years there has been a rapid commercialization of the medical services market. Moreover, the clear leader of the transformations is the dental branch of medicine, which reacts faster than other medical areas to economic, social, marketing and innovative changes. The local market of Sumy, along with the general features of the dental services markets, also has its own specific features. First of all, this is increased and growing competition among dental institutions with a relatively small number of existing and potential users of this type of service. At the same time, the main tool of competitive struggle is innovations, which currently have a clearly pronounced specificity – a minimum period from the appearance of an innovation to its application, which makes it possible to constantly expand the range and change the nature of the dental services provided. However, these are often very expensive innovations that require an appropriate level of staff training and rapid marketing "promotion".

A certain competitive environment has formed in the Sumy dental services market, which is in constant development and is characterized by the transformation of competitiveness. It can be noted that the formation of the competitive environment was carried out in certain stages. Initially, the competitors were the state sector and business structures. Then a struggle unfolded between private dental clinics to increase their segment of the dental market. Currently, large dental clinics with a wide range of services, the presence of advanced technologies and an affordable dental check-up have stood out. The local market is divided almost in half: large private dental clinics; state and small private dental clinics (most often specialized).

At the same time, each dental institution is fighting to retain existing patients and attract new ones. The patient has a wide choice, which is based on the assessment and comparison of positive and negative factors in the development of public and private dental clinics.

The customer-oriented business process of interaction of a dental clinic with a patient consists of the following business procedures: initial contact of the clinic administrator with potential clients; initial contact of the doctor with the patient; contacts of the doctor with the patient during the treatment process; patient service after treatment. In the process of interaction with patients, the dominant role is assigned to medical personnel, which makes it possible to establish not only professional contacts with them, but also to communicate as effectively as possible on an informal emotional level. In this case, such psychological techniques as emotions, empathy, tactility, visual, audio communication channels are used. Table 2 shows the main procedures of the business process and the functions of medical personnel.

To determine the service quality index according to this model, a study was conducted in the form of a questionnaire survey of patients of dental services. The purpose of this study is to assess the quality of services provided by determining the discrepancy during patient service between the perception of the service and the expected level. This index helps to determine the gap between expectations and perceptions of the quality of dental services provided.

This SERVQUAL model was adapted to the conditions of medical dental services and the most significant components were identified: materiality: building, modern equipment, uniforms of clinic staff; reliability: to provide services of appropriate quality in the required volume during the service process; responsiveness: timely response of clinic staff to patients' wishes and requests; conviction: main indicators of convenience, guarantees and safety.

**Table 2.** *Distribution of functions according to business procedures of the process of interaction between clinic staff and patients*

Interaction process procedure	Functions (jobs) of personnel
The clinic administrator's initial contact with potential clients	Establishing verbal, visual and psychological contact with potential clients. Identifying needs. Reporting primary information. Answers to questions. Assessment of interest in cooperation
Initial contact between the doctor and the patient	Establishing verbal, visual and psychological contact with the patient. Patient examination. Identifying problems and developing a treatment plan
Doctor-patient contact during treatment	Maintaining verbal, visual, and psychological contact with the patient. Patient consultation
Patient care after treatment	Preventive maintenance. Warranty service. Consultations for potential and existing patients. Quality control of treatment and service (patient satisfaction assessment)

Source: own research

The methodology has a complete look, as it is focused on the main indicators of the dental clinic's activities. During the conducted research, it was proposed to set points from 1 to 5 according to the proposed criteria for the quality of dental services received by perception and expectation. 80 people were interviewed. The results of the study are presented in Table 3, which shows that there is a gap in such quality criteria as speed of service, trust between the client and staff, and queues. The results of the SERVQUAL analysis of service quality confirmed the presence of service problems that were identified earlier. Clients want service to be faster. The next significant indicator when assessing the quality of services is the patient satisfaction index with dental clinic services, which shows how satisfied consumers are after using the service.

**Table 3.** *Assessment of service quality of dental clinics using the SERVQUAL method*

Quality criteria	Perception rating	Waiting rating	Gap
1. Material values			
1.1 Equipment	4.8	5.0	-0.2
1.2 Appearance of information materials	4.2	4.5	-0.3
1.3 Queues	4.4	4.8	-0.4
1.4 Clinic interior	4.9	4.6	0.3
2. Reliability and efficiency			
2.1 Staff discipline	5.0	4.8	0.2
2.2 Service speed	4.3	4.8	-0.5
2.3 Professionalism of doctors	5.0	4.7	0.3
3. Responsiveness			
3.1 Trust between client and staff	4.6	5	-0.4
3.2 Staff courtesy	5	5	0
4. Conviction			
4.1 Individual approach to patients	4.4	4.7	-0.3
4.2 Knowledge of customer needs	4.9	5	-0.1
4.3 Convenience of working hours	4.8	4.7	0.1

Source: compiled by the author

For this purpose, a survey was conducted on the most important indicators of service quality and the average patient satisfaction index was calculated. A detailed analysis of the main quality characteristics shows that consumers are generally not satisfied, that not all services are provided in a timely manner. Sometimes patients want to be seen on Saturday, but it is necessary for the high-quality work of an orthopedic doctor.

In the process of managing the quality of dental services, it is necessary to pay attention to all indicators. However, the most important in the process of quality management are the following: setting standards and monitoring the quality of the service; maintaining the necessary level of motivation and fair assessment; coordinating efforts in the field of marketing and personnel management; forming a pricing policy; it is difficult to find a balance between unified rules and individual characteristics of individual personnel and the special requirements of individual patients, the presence of a corporate culture. Thus, the ideal option for providing dental services from the point of view of quality is characterized by the necessary tracking of gaps between the perception of the service and its provision, as well as constant monitoring of consumer satisfaction indicators.

According to the opinion of Sole Proprietor doctors, when choosing the main direction in achieving the optimal level of dental health, prevention should be preferable to treatment measures. It has been proven that dental rehabilitation and improving the level of hygiene (hygienic status) have a positive effect on the terms of treatment of inflammatory lesions of the periodontium and oral mucosa, change the quality of life of the patient. The introduction of the latest technologies and diagnostic methods in the treatment of patients when providing medical services to the population in modern conditions provides doctors in the specialty of "dentistry" with new opportunities contributes to the intensification of their activities and requires constant improvement of skills and knowledge when providing dental services.

In order to continue to provide optimal care and benefits, the Sole Proprietor under study is responsible for managing its own quality and implementing quality assurance measures in practice. This covers organizational activities, patient care and service, and even resource management.

Increasing the effectiveness of assessing the quality of dental services is ensured not only by expanding the existing methods of sociological research and differentiating office research, but also by combining methods that would correspond to the tasks and behavior of clients when assessing the quality of services. The assessment process should not be discrete, but be continuous and involve producers and consumers of services.

The quality level of the dental clinic an individual entrepreneur from the point of view of a technocratic approach meets the established standards. However, sometimes there is an outflow of clients, which may indicate possible dissatisfaction with the medical services provided.

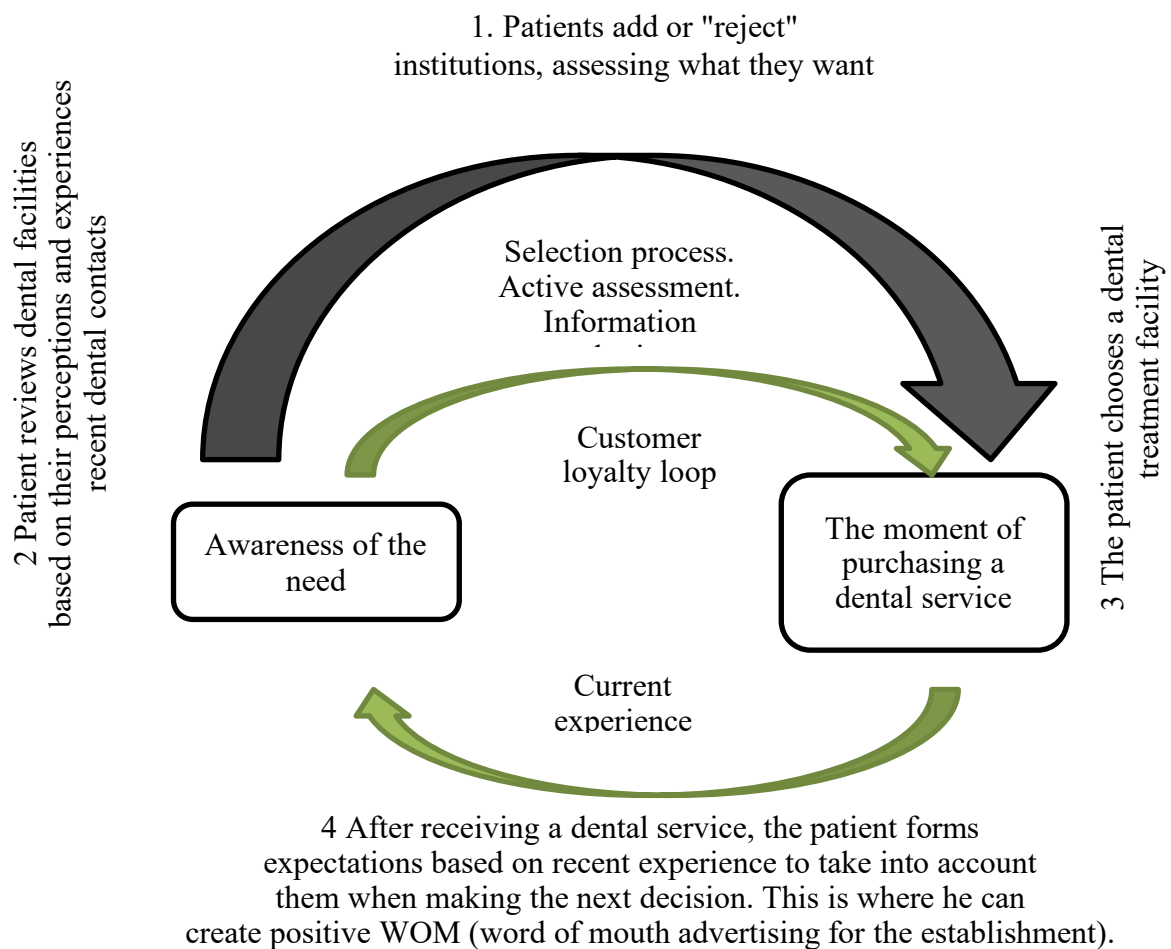
The fight in a highly competitive market is for every client. In 2023, the clinic was visited by an average of 103 patients per month, which indicates the small size of this private medical organization. This allows the institution to use a targeted approach in interacting with clients, unlike large companies with a mass flow of patients.

To assess quality, it is proposed to use modern technologies for working with clients, which can take into account behavioral aspects. The institution under study currently uses a technocratic approach to assessing quality. The assessment is discrete in nature and is carried out only when an actual patient complaint occurs. The dental institution needs a marketing approach to assessing quality. The assessment will act as a tool for retaining and attracting clients through feedback.

The approach chosen was the Dental Customer Journey Map (DCJM). A DCJM is any interaction that can change a consumer's attitude towards a dental product, business or service. An example of an encounter without physical interaction is reading an online review. Touchpoints are a key element in creating an overall "patient experience". They drive success – long before the encounter and after the patient has had their first treatment. They can also be intentional (e.g. email) or unintentional (e.g. online feedback). Today, most dental practices can take advantage of timely opportunities to optimize the patient journey by marking key touchpoints on a dental map.



A dental patient journey map (DPJM) is a description of each step that patients take when interacting with a dentist. There are several touchpoints at different stages of this journey. For example, a DPJM chart includes the path from the first patient interaction, purchasing a service, working with a dentist, to telling others about their experience or choosing a competitor. Providing a unique DPJM experience makes it more likely that patients will return for services, spend more, recommend the clinic to their friends, and stay with the dental institution (Figure 1). Therefore, the first important step in improving the patient experience is to map their journey. A patient journey map is a very simple idea: a diagram that illustrates the stages those patients goes through when interacting with a specific dental practitioner at the institution under study. These steps, or "touchpoints", are usually written in chronological order to demonstrate what a typical patient's experience with a dental business looks like.



**Fig. 1.** Consumer Decision Path or Dental Patient Record (DPJM)

Source: modified by the author according to [7, p. 4]

Some modern scholars argue that DCJM is an analogue of the sales funnel. One of the fundamental differences of the customer journey map is the recognition of the post-sales period as particularly important.

Among the general benefits that customers will see are the following: a feeling that there is less risk of something going wrong, the ability to trust the dental facility and receive the highest level of service; being known by name, a friendly relationship with the service provider; the benefits of special treatment, including better prices, additional services and higher priority.

If we compare this tool with a sales funnel, we can note the advantage of DCJM in that it takes into account not only the quantitative characteristics of the success of the chosen company strategy, but also qualitative indicators. That is, the customer journey contains quantitative indicators of effectiveness, as well as key points on which it is necessary to focus. In turn, the sales funnel is a tool that allows the marketing manager to understand when and where the conversion occurs, while DCJM is a tool used to understand how the customer behaves throughout the entire period of interaction with the brand. The customer journey is a linear process that, with the right approach, forms a loyalty loop.

The sales funnel is a small part of the customer journey, as the journey encompasses not only the purchase experience, but also how customers learn about a product or service (dental clinic awareness), how they use it, and how they feel when the product or service is fully integrated into their lives. Today, an increasing number of factors influence customer behavior, which complicates the process of understanding consumer behavior.

For a dentist, knowing their touchpoints and understanding their importance is only half the battle. To increase patient satisfaction, they must ensure that each touchpoint leads to a good customer experience and meets customer expectations. Expectations (including beliefs, evaluation criteria, attitudes, and sequences of actions) often mask emotional outcomes. Emotions are subjective, fluctuating across people and social situations, making them difficult for consumers to predict. Effective touchpoints make a new patient feel more confident and familiar with the dentist's office. As issues of uncertainty gradually disappear, the patient's fears or anxiety are replaced by a positive experience. The feeling of uncertainty grows into awareness of opportunities, service, and trust in the dentist, staff, and office as a rich and personal resource.

Therefore, DCJM allows you to control the process of designing services, as well as the products being sold, and also to visually visualize the process of providing the service. It is proposed to use the model of the customer journey map of the dental clinic, adapted to the assessment of the quality of medical services.

Consumers approach the quality of medical services differently, each with a differentiated approach to quality assessment. Therefore, the clinic needs to use a differentiated approach to quality assessment. At the first stage, clients evaluate the quality of medical services in general. They study the reviews of other consumers, read information on the official website, ask friends for advice. The main reason for contacting the clinic is health-related issues. Therefore, when consuming services, patients primarily evaluate the quality of medical care, and service is in second place.

Currently, the dental clinic does not conduct any measures to collect feedback on satisfaction with the quality of services provided. It is proposed to implement such a mechanism for receiving feedback, accumulating, processing and using information in the clinic. It is necessary to use a differentiated approach according to the client's status.

#### 1 Patients who hold loyalty cards

Patients are called 2 days after the dentist's visit. The purpose of the call is to monitor the client's well-being as one of the factors in providing quality medical care. The call is made directly by the patient's doctor, not the clinic administrator. This is necessary to increase the level of trust and build long-term relationships with the patient. Before the call, the doctor studies the medical record to understand the subject of the conversation. The content of the call is formed taking into account the medical services provided and their possible consequences. If the patient has any negative consequences, an additional consultation is conducted.

After the call is completed, the doctor marks the call in the log and enters the information received from the patient into the database developed by the marketing specialist. He, in turn, analyzes the data received over the past week every Monday, compiles a report, prepares recommendations for improving the company's work, and submits it to management.

The introduction of this type of feedback will allow assessing the quality of medical care provided on an ongoing basis. In addition, the clinic's doctors will be involved in the quality assessment process, as the initiator. Whereas previously they were the object of quality control, which

caused a negative reaction from them. Such a self-assessment act demonstrates the maturity of the doctor's personality, the ability to demand from him and colleagues, to show personal responsibility for the results of his work. However, it is necessary to realize that this type of interaction with patients concerns a specific doctor, and not the entire clinic as a whole.

During the implementation phase, management may encounter resistance from physicians. Staff may be reluctant to take on additional responsibility and may fear a possible negative reaction from patients. After an explanatory conversation with management, physicians will agree to use this feedback collection mechanism and note patient reactions.

2 Patients who stopped using the services of a medical institution (did not visit the institution for one year)

Every month, a call is made to patients who have left the company. The administrator generates a report in the CRM system on the length of patient visits and makes an incoming call to the patient in order to find out why the patient no longer visits the clinic. The call is of a caring nature so that the patient knows that they are remembered. After the call is completed, the operator marks the call as made and enters the information received from the patient into the database. Every month, no later than the 5<sup>th</sup> day of the month following the reporting month, the administrator analyzes the data received for the previous month, compiles a report, prepares recommendations for improving work and transfers it to the clinic manager.

3 Patients who did not come for doctor-prescribed procedures/services

Calls to patients who did not come for the procedures/services prescribed by the doctor are made by the administrator every day. Immediately after the call is completed, the administrator marks the call as made and enters the information received from the patient into the database. 3 days after the failure to appear, the administrator calls the patient back to clarify the relevance. Every month, no later than the 5<sup>th</sup> day of the month following the reporting month, the administrator analyzes the data received for the previous month, compiles a report, prepares recommendations for improving the company's work and submits it to the company's management.

4 All patients of the clinic

After the reception, during the payment for the services provided, the patient is invited to fill out the feedback. The administrator draws the attention of patients that the questionnaires are anonymous and the time for filling them out does not exceed 2 minutes. The administrator must thank the patient after filling them out.

Completed questionnaires are sent to a sealed box, which the management (entrepreneur) opens once a week. The institution's employee, responsible for analyzing the data received from patients, monitors the status of the implementation of proposals every week, every Monday. The administrator monitors the implementation of patient proposals every month.

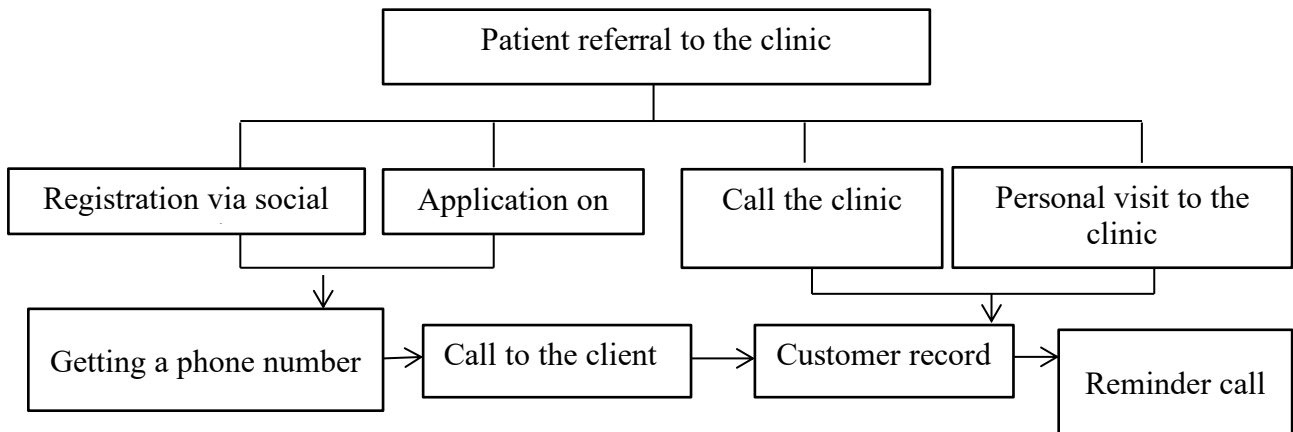
Also, in medical institution it is recommended to start working with online reputation (SERM). SERM is Search Engine Reputation Management, which in English means "reputation management in search engines". With the advent of the Internet, modern society has changed. The development of technologies has led to the fact that most consumers receive the main part of information from the Internet, and not on TV or in the newspaper. We emphasize that the term SERM is increasingly important for any brand, in particular dental. The presence of negative reviews can be a reason for refusal at the stage of choosing a service provider, while positive reviews are an additional incentive to purchase.

Therefore, it should be stated that a dental touchpoint is any area in which a dentist, their clinic, or dental staff interact with a patient or potential patient. From the first phone call to the last treatment, from the first advertisement to the last message, these interactions make up the patient experience. And grouping dental touchpoints chronologically helps an entrepreneur identify touchpoints that cause friction so that they can eliminate them and improve the patient's journey within the office. Many dental touchpoints occur at different stages of the dental service purchase (pre-service, during service, and post-service). Analyzing the dental patient journey should reflect the

touchpoints from the patient's perspective, and therefore requires their participation. Therefore, to create a useful dental patient journey map, dentists need to gather information about the patient, identify both critical and less critical touchpoints, and ensure that each of them leads to a positive experience. It is important to emphasize that a significant portion of touchpoints are under the control of the dental brand and are characterized as brand-owned. In this sense, DPJs are recurrent and can recur for a significant percentage of patients.

It is necessary to improve the quality assessment algorithm of the dental clinic of medical institution at each stage of the client's journey: before, during and after the consumption of the service. These algorithms are intended for internal use, they will be a reference behavior for the institution's employees in the process of assessing the quality of the services provided. It is necessary to pay special attention to any deviation from the algorithm. The detected deviations will serve to improve either the job descriptions of the employees or the algorithm.

It is also necessary to note the limitations. These algorithms can be applied in small and medium-sized private medical institutions. This is due to the high attention to each patient, which cannot be organized in large medical centers, both private and budget, due to the high level of client flow. Figure 2 shows an algorithm that describes the first stage of the client's journey, where it is necessary to effectively process his application to medical institution.



**Fig. 2.** The process of a patient applying to a dental facility  
Source: own development

You can make an appointment by contacting us on social networks, applying on the website, calling the clinic and visiting in person. After making an appointment, the administrator reminds the patient about the visit 3 days in advance and the day before the appointment. In case of cancellation of the appointment, the patient who cannot come due to the inconvenience of the proposed time is offered an appointment for another day. However, if the client used the services of another clinic, it is necessary to find out the reasons for the refusal. This information is formed into a report and transmitted to the manager. According to this report, proposals are formed to improve the services offered.

The administrator is obliged to greet the client by name, show where to leave outerwear and offer to put on shoe covers. Each patient must have a medical record with detailed information. A dental patient's medical record is a document that properly identifies the patient and contains information that characterizes the features of the condition and changes in his or her health, established by a doctor and confirmed by laboratory, instrumental and hardware research data, as well as the stages and features of the treatment being carried out. After filling out the medical record, the administrator invites the patient to the waiting area or refers him or her to a doctor. The next stage will be the provision of medical care. Before starting medical treatment, the doctor examines the patient and enters the relevant information into the medical record. Medical records are stored in the archive.

First of all, it is necessary to understand that the dental patient card has the role of proof of the quality provision of dental services. The "medical" component is mostly detailed, has a component of readable records in the card and the patient's examination at the time of the dispute. At the same time, the important content of the records is their completeness, not the form of presentation. The "consumer" component of quality is evidenced by the text of the Contract, Treatment Plan, Informed Consent, Memo or Refusal of treatment, for example, refusal of alternative prosthetic options. Therefore, information about the performed diagnostic and therapeutic manipulations should be readable and complete, that is, abbreviations should be understandable to dental experts, the records should unambiguously interpret the performance of the manipulation according to the standard or accepted rule, without guesswork (not just "the root is filled to the anatomical apex", but all stages of endodontics).

Then the doctor fills out the patient's periodontal chart, which indicates the condition of the oral cavity and the proposed plan for further treatment. The patient takes this chart with him to plan subsequent visits. If the patient agrees to treatment, the doctor begins the manipulations. In case of refusal, it is necessary to work with objections and find out the real reasons for the refusal. In a conversation with the patient, the doctor must talk about the possible consequences in case of refusal of surgical treatment. Patients who refused are entered into the database. The administrator calls such patients back in a month about their problem and clarifies the relevance. If the treatment is still relevant, he invites them to an appointment.

To provide an opportunity to make a visual assessment of quality, it is proposed to use a photo protocol of treatment with the patient's permission. The doctor photographs the situation in the oral cavity before the manipulations are performed, as well as after each stage of treatment. After all manipulations, the doctor shows pictures with an explanation of the work performed, which is one of the factors justifying the cost of the service. The treatment becomes "transparent" for the patient. The photo protocol also allows the patient to visually assess the quality of the medical care provided. If the treatment cannot be performed in one appointment, the doctor transfers the data to the administrator for recording the next day. After treatment, the patient pays at the reception desk. The dental clinic has cash and non-cash payments. During the payment, the patient is invited to fill out an anonymous feedback questionnaire.

Thanks to the proposed quality assessment algorithm, medical institution gets rid of the gap in interaction at the last stage. This is achieved by collecting feedback. In this regard, the functionality of the staff in the field of quality assessment will change (Table 4).

**Table 4.** *Staff functionality in the field of quality assessment after the implementation of changes*

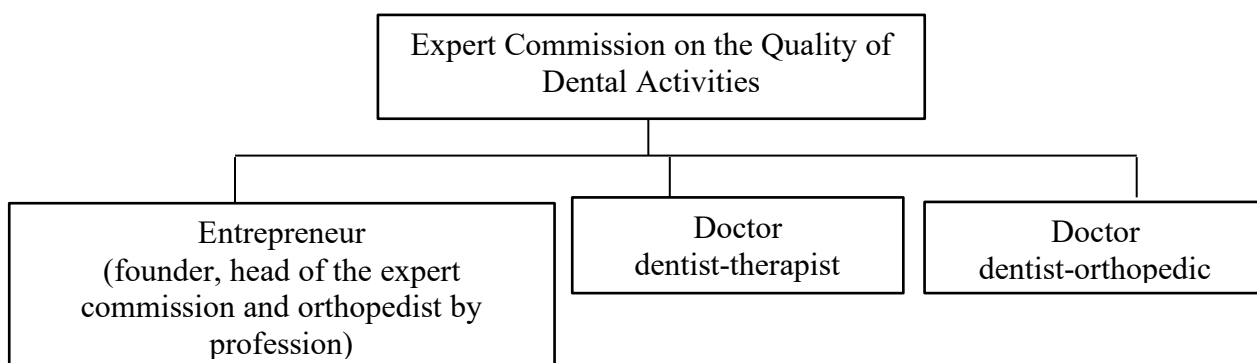
Employee	Stage			Functions
	to	during	after	
Administrator	+	+	+	Collecting feedback questionnaires after patient treatment; processing the results of feedback received via phone call; processing feedback questionnaires after patient treatment; monitoring the institution's reviews on the Internet and generating a report; responding to customers on social media; monitoring the book of complaints and suggestions.
Doctor	-	+	+	Taking photos of the work before/after; monitoring the client's well-being 2 days after treatment.
Manager (entrepreneur)	+	+	+	Monitoring the implementation of job descriptions by employees; presence in the expert commission for assessing the quality of the clinic's dental activities, monitoring the reasons for repeated patient visits (as a result of poor-quality care); analysis of the results obtained during the processing of feedback questionnaires; analysis of the report on customer feedback about the clinic on the Internet; analysis of financial results and the indicator of change in customer flow.

Source: own development

Thus, the implementation of the proposed changes should have a positive effect on the development of the clinic. There should be a replacement of control with a quality assurance and assessment system, the use of self-control, rather than control, by employees and an analysis of the basic stages of the process. Also, the new methodology provides for quality assessment as a process of continuous improvement at all workplaces, with the involvement of each employee in the quality assessment process.

It should be emphasized that the clinic is guided by high standards of quality of medical services and service. Patients receive a guarantee for the work performed, but it is necessary to constantly improve and adhere to some points. You can hang out the main tasks and areas of activity at the entrance to the institution for patients to familiarize themselves with. Guarantees of quality of treatment at medical institution: correct diagnosis, treatment plan, choice of treatment method; compliance with professional standards of treatment of teeth, dentition, carious cavities, anesthesia, etc.; compliance with professional standards of quality of manufacturing and installation of dental products; compliance by patients with hygiene rules for product care, etc.

The main features of the quality of dental care are its safety, clinical and economic effectiveness, timeliness of provision with the participation of the patient. Thus, quality criteria can be compliance with standards, the absence of complications and patient satisfaction with the results of its provision. However, clients are not always satisfied with the services provided and their expectations do not coincide with reality. It should be noted that currently the clinic does not have a permanent quality assessment in the form of a commission on the quality of dental activities, which would consist of the head of the expert commission in the person of an entrepreneur who has the specialty of a dentist-orthopedist and two dentists (a general practitioner and an orthopedist) who work at the medical institution (Figure 3). The doctor who caused the incident does not participate in the assessment. This way, complaints can be avoided, if any. The commission could analyze and consider the patient's complaints and make decisions on resolving the problem. One of the advantages of this commission is the speed of decision-making. However, this commission does not take into account the multi-component nature of medical services and assesses the level of patient satisfaction only based on the quality of medical care. Such a practice will allow creating an effective quality management system and motivating staff for constant interaction with clients.



**Fig. 3.** Improved structure of the expert commission for assessing the quality of dental activities of the private enterprise  
Source: own development

Observation of caries treatment allowed us to identify and group iatrogenic errors. All medical errors consisted of 2 problems: 1 – during preparation for treatment and 2 – during preparation and filling of the carious cavity. The main errors are distributed unevenly.

Thus, dentists note that at the stage of preparation for treatment, incorrect diagnosis is noted only in 20% of cases, while in 90.0-95.0% of cases, ineffective treatment of initial caries is carried

out; the presence of background pathology, which significantly reduces the mineral potential of enamel, is not taken into account, and remineralizing therapy is practically not used everywhere. A detailed analysis of the quality of dental care during preparation and filling of a carious cavity indicates that the largest number of errors is due to the mismatch of the type of filling material to the functional group or functional surface of the teeth (up to 87.0–92.0%). At the same time, almost all doctors used microfilled composites during the restoration of the chewing surfaces of premolars and cutting edges of front teeth. Errors during the actual surgical treatment, preparation and filling of the carious cavity indicated insufficiently thorough performance of medical manipulations and a low level of manual skills.

Services and service in the clinic must be provided with high quality. This will increase the competitiveness of the individual entrepreneur. Each patient must leave satisfied, then the effectiveness of such a promotion channel as word of mouth will increase significantly. As practice shows, it is in medicine that patients most often rely on the recommendations of acquaintances when choosing a clinic. It should be emphasized that all legislative acts are observed in the clinic, since conducting medical activities requires the strict implementation of each of them. The clinic regularly carries out technical maintenance of the equipment. In the event of a breakdown, the institution uses the services of a specialist. Also, one of the important criteria for assessing the quality of dental care is the education of specialists. All working doctors have higher education, and also undergo additional training annually.

Thus, it can be concluded that at the moment the dental institution adheres to a technocratic approach in assessing the quality of dental services. The object of assessment is dental medical care as a component of medical services. The technical base and education of specialists meet the quality criteria, but the entrepreneur (manager) does not conduct a constant continuous assessment of the quality of dental services. For the further successful development of the institution, in conditions of fierce competition, it is necessary to make a transition from an industry approach to assessing the quality of consumers.

The work of any dental clinic involves interacting with hundreds of patients who need to be reminded about their appointments, as well as maintaining contact with suppliers of medicines and consumables. Keeping such a volume of information in disparate files without the risk of forgetting something is unrealistic. Also, at the moment, the clinic is actively developing, gradually increasing the patient base and staff, but it has already become clear that the clinic's employees (administrator) do not have time to work with the entire client base, so the administrator spends more than 12 minutes on scheduling a patient appointment, and in addition to scheduling patients for an appointment, the employees had other responsibilities, which is why we proposed to implement a new CRM system (DentExpert) for patient relations. Management information technologies place the highest demands on the 'human factor', having an important impact on employee qualifications [11, p. 68]. Total digitalisation must necessarily be accompanied by an increase in labour efficiency, which will lead to a shorter working week and more efficient use of knowledge. The transition to digitalised HR management can be a logical extension of rethinking the position of the enterprise [10, p. 107].

DentExpert Dental Clinic Management System (dental CRM system) is designed to organize and control the work of dental clinics. All employees of a medical institution who interact with patients should work with CRM. Before starting work, it is necessary to draw up instructions with the rules for filling out the program and distribute them to all staff. Doctors enter medical information before or after treatment, administrators enter general information. Administrators should offer clients to fill out a questionnaire with clearly thought-out questions. This way, the clinic staff will be able to use the maximum number of CRM tools and offer visitors only those services that they really need.

A detailed application will help you use many features. Dentists and receptionists should record not only the client's current illnesses, but also the services they simply asked about. For example, a patient asked about installing veneers, but has so far refused the procedure, explaining this by the high price of the service. This should be indicated in his card. When you decide to hold a

promotion for installing veneers in the clinic, this person will be sent a message with an offer to receive the desired service at a discount. If he does not want to learn about current auction offers, for example, for dental implants, he will not receive the newsletter.

It is advisable to choose the optimal format of the CRM database and start filling it out from the very beginning of the medical center's opening. Switching to another program is a long and laborious process that can take several years and reduce the efficiency of a dental practice.

CRM capabilities. Thanks to CRM, you can analyze the actions of visitors and clinic employees; understand whether marketing campaigns were successful. You can even track the client's journey: for example, which advertising attracted them and which services they are interested in. There is an opportunity to analyze the work of staff and improve the level of service. For example, the program allows you to find out which doctor is more likely to make an appointment for treatment after a professional examination and which administrator most often makes appointments for patients.

Table 5 presents the structure of the DentExpert system according to the developer's website.

The program can be used by both a single doctor and an unlimited number of doctors in a clinic. The developer on his website provides the ability to calculate the cost of DentExpert for any number of doctors. We have 4 doctors working in our sole proprietorship, so we are counting on this number. We give this example in Table 6.

**Table 5.** DentExpert system structure

Registry	Clinic	Accounting
<i>Dental clinic receptionist workplace</i>	<i>Workplace of a dental clinic doctor</i>	<i>Workplace for financial accounting in a dental clinic</i>
Structure of the dental clinic. Clinic staffing schedule. Medical staff work schedule. Planning patient examinations. History of doctor visits. Mutual settlements with patients. Applications to the laboratory (registration, control of execution and current status). Work with patient treatment plans. Possibility of marking the performance of services by a doctor. Setting up printed forms, issuing checks	Storing and viewing information about patients undergoing treatment in the clinic. Maintaining a periodontal dental chart. Databases of X-rays and video materials. Working with orders in the dental laboratory, patient tests. Receiving medical documents. Planning an orthopedic structure. Making a diagnosis and prescribing a course of treatment. Working with a treatment plan. Accounting for work performed.	Price list. Directory of supplier organizations. Drawing up a certificate of work performed for the patient or payer. Acceptance of payments from the patient or payer. Issuing an invoice to the patient or payer. Accounting for internal clinic expenses. Statistics of services performed for the period. Inventory accounting. Viewing the list of overdue invoices. Setting up salary calculation rules for doctors.
Composition	Administrator	Head
<i>Dental clinic warehouse accounting workplace</i>	<i>Configuring System Settings</i>	<i>Workplace of the head of a dental clinic</i>
Viewing unfulfilled requests for materials. Viewing the list of materials with balances below critical. Viewing the list of materials available in the warehouse. Returning, writing off, and viewing the balance of materials from the selected warehouse. Viewing the dynamics of the availability of materials for the period in the warehouse. Printing reports on material turnover for the period.	Security. Setting up access rights and passwords for employees. Logging of system operations. Setting up data for report templates. Changing user rights to work with different modes and modules of the system. Viewing general information on the composition of the system database: Database size, number of doctors, patients (active, archived, remote).	Dynamics of new patient registration, patient balance. Payment history, payer balance (filtering by debtors and organizations). Admission statistics. Financial monitoring of the clinic. General information on the status of the clinic. Analysis of doctors' work. Status of orders in the laboratory. Manager's journal

Source: compiled based on developer information [6]

The basic configuration includes an administrator and a registry. The standard configuration adds accounting, a warehouse and a dental laboratory. If the clinic expands, then the license for each additional doctor is another 100 euros. The cost of the system includes setup, user training, system updates during the year and service. Thus, medical institution will receive benefits as a result of the implementation of the CRM system, namely: improving the quality of dental services, optimizing office work and production costs, increasing the volume of services and strategic impact, improving the customer orientation of the enterprise.



We believe that the effectiveness of implementing a CRM system can only be assessed on the example of a specific institution, as well as a solution that imposes its own specific features on management processes. Despite this, in the general format, the results of implementing a CRM system will directly depend on several key factors: First, this is taking into account the dental institution's need to implement a CRM system and accepting those business processes that will be changed under the influence of CRM. In other words, without a specific goal for implementing CRM, it is quite difficult to assess efficiency and effectiveness indicators. Secondly, this is the specific functionality of the CRM system used.

**Table 6.** *DentExpert dental clinic management system configuration calculator*

Minimum configuration		Free configuration		Standard configuration	
Equipment	Price, €	Equipment	Price, €	Equipment	Price, €
Basic configuration	700	Basic configuration	700	Standard configuration	2000
License for 4 additional doctors	150	License for 4 additional doctors	150	License for 4 additional doctors	150
		Clinic	300		
		Head	400		
Together:	850	Together:	1550	Together:	2150

Source: compiled based on developer information [6]

Most often, management solutions have a fairly large set of functions and advantages, but not each of these functions will be used on an ongoing basis, which creates some contradictions in the field of costs for service and maintenance of the system. Thirdly, this is the degree of readiness of personnel and management for the comprehensive digitalization of business processes, the constant use of the CRM system in the activities of the business entity, and the transition to a new business model. If one of the links of the clinic is not ready, the effectiveness of using CRM will significantly decrease, since the complexity and integrity of the software application will be violated.

In order to identify general problems and prospects for implementing a CRM system, we will group the SWOT analysis table presented in Table 7. In the process of designing CRM system implementation processes, it is important for a medical institution to take into account the presented and possible specific risks, to form "exit" paths in advance, which will allow reducing dependence on a specific solution. In this matter, CRM system programming becomes really effective, since it allows you to fully take into account the requirements of the clinic, work out additional security areas and create a system independent of external maintenance.

**Table 7.** *SWOT analysis of CRM system implementation*

Strengths	Weaknesses
Variability of functional application; relatively low costs if the clinic is initially ready; industry-specific nature; information security; management complexity; large market for ready-made solutions (basic format); independent programmability; compatibility with other digitalization tools; greater control over hidden processes; potential for expanding functions; scalability and integration of some systems.	Requires comprehensive training; additional burden on business; not intended for certain areas and situations; difficulty in covering all business processes without exception; need to create capacity.
Opportunities	Threats
Increasing sales of dental services of the clinic; improving the quality of service; comprehensive support for the consumer (increasing satisfaction); increasing loyalty; creating trusting relationships between the institution and the patient; building relationships "institution – patient", not "patient – institution doctor"; tracking the effectiveness of doctors, etc.	System inefficiencies; disruption of traditional business processes; unpreparedness of personnel or management; security breaches (internal or external); non-compliance with operating principles; system failures; data loss; termination of support for the base version.

Source: own research

However, in this case, the cost of maintaining and preparing such a system increases significantly, such an option becomes simply impractical and cannot be considered as a solution for typical tasks. The institution must be prepared for additional financial burden, possible undescribed difficulties that are revealed at the level of a specific industry and the chosen solution (Table 8).

**Table 8.** Direct economic effects of implementing DentExpert in the private enterprise medical institution

Changes	Short-term effects after implementation	Long-term effects after implementation
Effects of income growth category		
Interaction between doctors	Automated interaction between doctors and the reception desk	Increasing the quality of working conditions, accelerating the decision-making process
Formation of an information database	Acceleration of the customer service process, improvement of quality, availability of information support for processes	Increased customer and staff satisfaction
Segmentation of the medical services market	Increasing service delivery by focusing on profitable customers	Growth/emergence of profit by identifying the most profitable segments, offering each segment better consumer value.
Formation of a new staff motivation system	Increasing the productivity of medical staff through automated control	Profit growth due to increased functionality in the provision of services
Interaction between client and doctor	Improving the quality and speed of patient care	Increased patient satisfaction; increased physician satisfaction
Cost reduction category effects		
Business process automation	Increasing the efficiency of service provision; speed of service	Profit growth due to customer inflow
Automation of the contact processing process	Increased staff productivity	Increased profits due to the possibility of customer inflow through improved awareness

Source: compiled based on developer information [6]

In addition, the quality of the implementation itself is an important factor. The information system itself is not an "Aladdin's magic lamp", but only a tool for the effective work of the staff, primarily the head of the clinic.

The main key to successful implementation is his personal involvement in this process. According to the data of the Ministry of Finance of Ukraine as of 11.08.23, 1 euro costs 40.49 UAH. Let's take the basic model and calculate the implementation costs in Table 9.

**Table 9.** Costs for implementing the DentExpert system

Expense items	Amount, UAH
Product purchase costs	34365.5
Software product setup costs	0
Staff training costs	0
Total expenses	34365.5

Source: own calculations

In the first year, technical support is free. Only starting from the second year, a fee of UAH 2,500 is already charged. Let's calculate based on the data of the medical institution we are studying. According to the reporting data, net income in 2022 was UAH 1,691 thousand. Accordingly, the projected implementation is presented in Table 3.5. Technical support in the first year is provided

free of charge, and starting from the second year – UAH 2.5 thousand. According to the reporting data for 2022, the revenue amounted to UAH 1,691 thousand, respectively, the projected growth is UAH 169.1 thousand (Table 10).

**Table 10.** Financial flows from the implementation of the DentExpert system in the activities of medical institution, thousand UAH.

Indicators	Periods (year)					
	0th	1st	2nd	3rd	4th	5th
I. Investments	34.4					
II. Technical support of the software product		0	2.5	2.5	2.5	2.5
III. Annual amount of savings, incl. Growth in the volume of service provision (10%)		169.1	186.01	204.61	225.07	247.57
IV. Annual amount of amortization of intangible assets		6.88	6.88	6.88	6.88	6.88
V. Cash flow from the project (III+ IV)	-34.4	175.98	192.89	211.49	231.95	254.45
VI. Cumulative cash flow	-34.4	141.58	334.47	545.96	777.91	1032.36
VII. Discount factor (discount rate = 20%)	1	0.833	0.694	0.579	0.482	0.402
VII. Discounted cash flow	-34.4	146.5913	133.8657	122.4527	111.7999	102.2889
Cumulative discounted cash flow	-34.4	117.9361	232.1222	316.1108	374.9526	415.0087
Net Present Value (NPV)	582.5985					
Profitability Index	16.94					

Source: own calculations

The net present value is 582.6 thousand UAH. The profitability of the project (return on investment index) in the amount of 16.94 means that 1 UAH of initial investment will provide a net profit (as of the start of the project) in the amount of 16.94 UAH. The calculated payback period of the investment will be 0.23 years. That is, it will take less than a year to pay off the investment from the implementation of the DentExpert CRM system for the sole proprietorship. This indicates the economic attractiveness of the latter. The net present value is 582.6 thousand UAH, which means that the investment is justified.

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