

## ERGONOMIC PRINCIPLES IN MEDICINE AND DENTISTRY (REVIEW)

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The paper is based on a review of articles published over the past five years in the journals indexed in ScienceDirect, Scopus, and PubMed databases and dedicated to the importance of implementing ergonomic principles in medicine and dentistry.

*The Essence of Ergonomics.* Ergonomics is a Greek word (“ergon” - “work”, “nomos” - “law”) and refers to the science of labor, which aims to study the human activity in the system - “human - technology - environment” and ensure the efficiency, safety and comfort of this system [1].

The precondition for the creation and development of ergonomics arose with the problems coming from the introduction of new techniques and technologies. Among these problems, the inadequacy caused by the lack of prior training and the low quality of the practice is especially important. So, for example, the incompatibility of the technical characteristics of the dental chair and the equipment with the physical and intellectual capabilities of the service personnel; restriction of the ability of service personnel to work due to the influence of such factors as noise, vibration, emission, microclimate. This leads to an incomplete realization of the existing potential and, consequently, to a decrease in the quality of both the work process and its product [13].

Another major problem with ergonomics is the growth of industrial damage [26]. For example, according to materials of the VI Congress of the International Association of Ergonomics (2015), Intensification of the introduction of new technologies in Wales led to a three-fold increase in mortality due to industrial damage compared with deaths caused by infectious diseases, while before the introduction of technology, the number of deaths from infections was twice as high as deaths caused by industrial damage [11]. Another significant problem is the dissatisfaction of the working staff with the work process, which is caused by outdated technical equipment, incorrect organization of the work process, poor sanitary-hygienic norms and aesthetic conditions [17]. At the same time, it should be noted that the “man - technology - environment” system is accompanied with an increase in the number of so-called “industrial stresses” associated with nervous and mental diseases, which, according to experts, is caused by the influence of stress factors on the central nervous system, which occurs not only at work but continuing both at home and during rest [6].

In view of the above, in order to properly and efficiently organize the “human-technology-environment” system in modern conditions, along with the real opportunities of the person participating in it, it is necessary to take into account all the above-named problems. Proper understanding of a person’s physical, intellectual, or emotional loss during the work process provides an opportunity to introduce and manage the process with minimal losses.

Thus, the subject of ergonomics research is human labor in the process of technical systems management and under the influence of environmental factors. In every peculiar case, the ergonomics has its goal and objectives, as well as the methods of psychological, physiological, hygienic, anatomical and sociological defense [5].

The first and the main task of ergonomics is to enhance the efficiency of the “human-technology-environment” system in order to achieve a predetermined degree of fulfillment of the tasks associated with this system in the given conditions [18].

The efficiency of the “human-technology-environment” system will hardly increase without the high-quality work opportunities of the working person and the credibility generated by him, on the one hand and the human operator’s high working capacity and reliability, on the other hand the working capacity is the human operator’s feature defined by his/her psycho-physiological functions and characterized with the ability to perform activity of necessary quality in a given period of time.

While the reliability is defined by the human operator’s capability to smoothly do a work of certain parameters in a given period of time. Some labor expenses occur in the mentioned process to be regulated as necessary [10].

The degree to which labor safety is required in ergonomics is directly related to the introduction of sophisticated techniques and technologies that require more mental and physical effort on the part of working staff. This significantly increases the risk of developing injuries and diseases caused by the production process [19].

In this regard, strict adherence to sanitary and hygienic norms is important, especially when using technologies that involve contact with various chemicals, noise, vibration, radiation and special microclimates [7]. In view of all the above, ergonomics:

- Develops the theoretical basis for the work of the staff, taking into account the specifics of the external factors of operation of technical systems [4].
- Objective studies (examines) of the interaction between human, technical system and external factors in order to improve the quality of work of serving personnel [29];
- Develops principles for the creation of the system “human - technology - environment” [21].
- Develops an “ergonomic forecast and hypothesis” to improve the level of human work.
- Establishes methods of study, development and work of the system “human - technology - environment”, which ensures its safety and effectiveness, as well as aesthetic satisfaction of the individuals participating in the work [16];
- Finds and describes the factors that reflect the connection between technical systems and external factors to the quality of the workflow [20].

In view of the above, it is considered that adherence to basic ergonomic principles and implementation in practice is a necessary prerequisite for successful planning and implementation of any work process, including in medicine.

**Ergonomics in Medicine.** In the field of medicine, there are two groups in need of special attention from ergonomics: people with disabilities (including those with temporary disabilities) and health professionals [1]. Many authors note a high rate of work-related illness among health professionals. Moreover, the incidence of such a disease among medical professionals is significantly higher than that of professionals in other fields [8,14,16,20,23,26]. Given this, it is natural that many medical professions, in order to adhere to the principles of ergonomics, inevitably require a helper who performs less important functions as a helper of physician or junior physician, thus making it easier for the main actor to work, which in turn enhances the quality of service provided [17].

Working conditions have some effect on the women in gestation period. A direct link between maternal occupation and pre-

term birth has been established [30]. Factors such as vibration, noise, physical inactivity, etc. are thought to have a significant effect on a woman's reproductive system, which may lead to premature birth [3,13] or fetal pathology. It is noteworthy that the rate of preterm birth is higher in large industrial cities than in small settlements [17].

Lack of physical activity, which is caused by automation of the work process, as well as strong emotional load and unbalanced diet, is considered to be one of the important risk factors for the development of pathologies of the biliary tract [12].

It is known, that the sight organs of doctors employed in various fields of medicine are more or less under the strain [15]. Eye strain is particularly high in specialties where optical, digital or graduated mechanical devices are regularly used for diagnosis and treatment (laboratory medicine, dentistry, microsurgery, radiology) [6,10].

In general, the eye adapts well to exposure to light, however, in some cases the light can adversely affect the eye and, in extreme cases, cause blindness [9,22]. Because the radiation from different parts of the light spectrum is absorbed and perceived by different areas of the eye [7,26], the shape and degree of damage depends on the geometry of the rays. For example, parallel rays of the sun are particularly dangerous to the retina on which they focus [20,27].

The intensity of the light beam is determined by the radiation energy, so the emission of any spectral composition can be harmful if its intensity exceeds the allowable limit. In particular, infrared rays ( $>1.35 \mu\text{m}$ ) are completely absorbed by the cornea, which causes its damage due to overheating. Ultraviolet radiation of a relatively short wave ( $<0.313 \mu\text{m}$ ) causes conjunctivitis [7,19,22,24].

In medical practice, the eye must be protected not only from radiation, but also from the harmful effects of various microparticles and chemicals, for example, during dental pharmaceutical, anesthetic procedures; In such cases, individual protective equipment is used quite successfully [7,9]. In addition, it should be noted that sometimes protective drugs cause allergies [1], dermatitis [15], fungal diseases [5] or so-called "pathology of respiratory pathways" [21].

A review of the literature data reveals that poor lighting and careless treatment of the organs of vision, including neglect of protective equipment, can lead to tragic results [24].

Medical personnel who have to stand for long periods of time at work (surgeons, dentists, anesthesiologists, etc.) often suffer from venous and lymphatic congestion in the lower limbs [4,29,30], which is one of the most important etiological factors for the formation of varicose veins and/or its recurrence after the surgical treatment [15,295]. On the contrary, being in the sitting position for most of the working time can lead to chronic colitis and constipation [12], increased intraabdominal pressure, and small pelvic vascular pathology, with the formation of varicose hemorrhoids [11,28,30].

Being in a certain posture for a long time, due to the peculiarities of some medical professions, can be accompanied by the influence of the vibration and/or development of micro trauma which can lead to inflammation of the finger joints, decreased elasticity of the cartilage of the joint, eating disorders and degeneration changes - sometimes with the development of focal necrosis [17]. Deforming arthrosis, osteoarthritis, and osteochondrosis may also develop [29].

Almost all medical professions involve a great deal of physical and mental strain, which is associated with significant psycho-emotional stress. This leads to a high incidence of cardiovascular [17,24] and nervous system [18] pathologies among physicians.

Physicians of infectious diseases, District Physicians (Family Physician), Physician Dentists are often at risk of making a

contact with infectious disease. A serious infectious disease can be transmitted to a surgeon, transfusiologist, and dentist by having a contact with the patient's blood and saliva [10,25]. With this in mind, special importance is attached to the ergonomic organization of the work environment and to the professional competence of physicians [10].

*Ergonomics in dentistry.* Dentistry is one of the most complex and specific fields of medicine in terms of ergonomics. In particular, the characteristics of the patient's treatment, the doctor's position during dental procedures, the correct use of work tools by him as well as noise, vibration, lighting, the aesthetic side of the workplace, etc. in the working process should be taken into account. The theoretical foundations of dental ergonomics, which have been developed and tested over the years, are constantly being improved in accordance with the development of the field, relevant technology and environmental conditions [23,25,26].

In dentistry, patient treatment is not always based on ergonomic principles, because the hardware and the environment often fail to meet the needed requirements. Pressure of huge amount of work dentists have often causes damage to health and contributes to the development of various pathologies [31].

Studies in the Netherlands and Germany show that 89% of dentists have 20-250 bends in their cervical vertebrae, in 61% is observed their rotation along with bends, 36% bend their backs during their work, 25% have inadequate rest, 47% misuse their tools, 65% work without chairs, 55% work continuously for 7 hours, and 75% work under conditions of unsatisfactory lighting and light distribution not meeting the standard, etc. All of the above confirms the inadequate loading of skeletal, muscular, circulatory and other systems of dentists, which ultimately leads to depletion of their reserves, de-compensation, and the development of different diseases/pathology [23].

Therefore, one of the main goals of dental ergonomics is to reduce the pressure on the dentist's muscles, bones, and joints. It is important to consider the improvement of the interior of dental clinics in harmony with ergonomic principles in accordance with the requirements of the time (James M 1994).

In addition, ergonomics establishes the requirement toward a practicing dentist to be aware of all the possible complications that could endanger his/her health [16]. It should be noted that a work environment and equipment that is optimal for one dentist may be unsuitable for another dentist. Often, a dentist's height and physical abilities (depending on age and gender) can be crucial in this regard. Therefore, all dentists should independently assess the working environment and select the conditions that will suit their requirements and meet their physical capabilities [33].

It is known that improper placement of a dental patient in a chair (indirect rather than horizontal) forces the doctor to "move forward", which is due to his/her desire to access the required distance between them and the patient. However, in most cases, the equipment that is needed for work is arranged in such a way that it is difficult, if not impossible, for the doctor to "move" forward, which further complicates the condition of the dentist during the medical procedure and puts him in an ergonomically unfavorable condition [28].

The correct sitting position of working dentists is developed on the basis of anatomy and physiology: 1) the dentist should sit symmetrically, with the straight back and pelvis tilted slightly forward; 2) the forward tilt of the body shall not exceed the limit of  $20^\circ$  from the correct position; 3) The doctor's head should be tilted forward no more than by  $20-25^\circ$  in relation to the body; 4) The seating angle between the doctor's body and legs should be within  $105-110^\circ$  degrees to avoid overloading the thigh joint. The

legs should be positioned at 45° degrees from each other and perpendicularly to the floor, with the feet positioned symmetrically to the hands, to maintain equilibrium [34]. Maintaining this posture during the course of a doctor's work ultimately results: 1. facilitating intraoral procedures; 2. doctor's fatigue is minimal; 3. the possibility of preventing professional diseases is provided [21].

Frequent changes of active and passive sitting positions during the work process are important for dentists. In the active sitting position, the dentist does not lean on the back of the chair, and the spine is always in physiological lordosis. In the passive position, the back is straightened, but it is rested on the back of the seat. The dynamic shift in these two positions helps to relax the spinal muscles and maintain the ability to work during the day [31].

In order to maintain an ergonomically correct position in the work process, it is also necessary to place the patient properly in the dental chair [33,32].

The ergonomically correct position of the patient involves the correct placement of the torso, spine and jaw, which helps the doctor maintain a proper viewing angle during the treatment and the diagnostic procedure, get the right image in the intraoral mirror, create more workspace and select the right lighting conditions [30].

A 30° elevated position is generally convenient for both the patient and the physician. In addition, it is advisable for the patient to individually select the desired position for each case, depending on the nature of the treatment procedure and health status (heart failure, ischemic heart disease, hypertensive asthma, respiratory problems, some joint and spine pathologies, glaucoma, imbalance, pregnancy, etc.) [24].

Dentist's working tools should be easily accessible and should not be placed in a doctor's field of vision. Otherwise, the doctor's attention is diverted, he/she performs more than necessary rotational movements, causing the muscles of the neck, upper limbs and eyes to strain. This leads to rapid fatigue of the doctor, lowers his/her ability to work and the quality of the performed job. According to the established rules, dental instruments can be placed at the height of the patient's mouth, at the same time, dynamic instruments can be placed at a distance of 30-40 cm from the doctor, and static - at a distance of 20-25 cm [27].

The design of the chair is very important. It should be selected in such a way as to reduce muscle strain, blood pressure, pressure on the nerves, neck and spine, in addition to facilitating the work of the dentist. It should also be convenient for the patient.

The profession of dentistry requires a good support area and proper lighting. Experience shows that lighting is often inadequate, leading to significant eye fatigue, headache, and industrial trauma. The most rational type of lighting is its combined system, with general lighting of the work room and additional lighting of all workplaces. It is necessary to ensure that the lighting is adjusted - by changing its intensity or distance - as needed [34].

The high brightness of the operating field is well ensured by the high-frequency neon lamp, the light source is usually adjusted before the manipulations in the oral cavity. It should be noted that with age, the physician becomes more demanding of light, impairing his/her ability to perceive contrast, color, and darkness [23].

In order to create a satisfactory ergonomic environment for lighting, it is also necessary to consider details such as the color of the ceiling curtains and work equipment, the location of the doctor's workplace in relation to the window, the difference between the wall colors of a lounge and a dental office. It is believed that the ceiling, curtains and work equipment should be soft white, the window should not be in the field of view of the working doctor, the window should at least be covered with blinds, there should be no contrasting difference between

the colors of the doctor's lounge and the procedure room [12].

Noise is an unequal combination of sounds of different strengths and frequencies, which negatively affects the human body [17]. The source of noise is any process that causes a change in local pressure or mechanical vibration and has a frequency (expressed in hertz) and intensity (measured in decibels). The human ear perceives noise in the range of 16 to 20,000 hertz.

Prolonged noise causes tiredness, and later - due to tiredness, impaired ability to work and impaired quality of work performed. Due to the noise, both ears are usually equally damaged [35].

The nonspecific effects of noise on are revealed earlier than the changes in the auditory organ [26]. These include neurotic and asthenic syndromes, which can be complicated by vegetative dysfunction. It is also possible to develop hypertensive-type neurocirculatory syndrome. The noise may support the development of the gastrointestinal tract and metabolism disfunction, cardiovascular and other pathologies [14].

Among the medical professions where the impact of noise on the physician is significant, dentistry occupies a leading place. The sources of noise in dental clinics are dental drilling machine, compressor, air conditioner, telephone, street noise and more. It has been established that the noise with frequency exceeding 35-40 Hz supports creation of the conditions for the development of the all above-mentioned complications. Therefore, the reducing the impact of noise on the physician is one of the main tasks of ergonomics in dentistry [16,35].

The work of dentists is in constant contact with an irritating factor such as vibration. The word is originated from Latin - "vibrationem" (to shake). Vibration is a complex, periodic, mechanical fluctuation of dense bodies, with its the specific frequency and amplitude. In biology and medicine, vibration is usually associated with fluctuating movements of the whole body as well as of individual organs and tissues which are caused by external factors [30]. There are two types of vibrations: general and local vibrations [28]. The local vibrations are defined as the complex, periodic, mechanical oscillations of a certain frequency and amplitude that are transmitted from different devices to the working body or any part of it. It is clear that this type of vibration affects the dentist.

During local vibration, the peripheral vascular tone changes predominantly. Direct mechanical irritation of vascular smooth muscle cells causes them to spasm, which in turn causes hemodynamic changes in the peripheral zone of the cardiovascular system, which causes an adaptive response of the entire system (1988). Prolonged vibratory irritation of the nerve endings around the blood vessels leads to further disruption of tissue trophism and vasomotor coordination. Individuals who have been subjected to vibration for a long time are also affected by the musculoskeletal system and joints. Due to degenerative changes in the cartilage, arthrosis of the phalanges, wrist, elbow and shoulder joints is common in dentists [26].

It should be noted that prolonged intense action of the fingers, frequent monotonous movements and chronic trauma contribute to the development of various types of chronic tendovaginitis. For the above reasons, the secondary mononeuropathy (30% of cases) and various types of Charpal tunnel syndrome (2.9% of cases) as well as the peripheral neurovascular syndrome are common in dentists. In view of the foregoing, it is clear that adherence to ergonomic principles in dental clinics is necessary for the health of both the dentist and the patient. To comply with ergonomic standards, it is important:

- constantly study the patterns of interaction between people, equipment (technologies) and environmental factors in order to increase the efficiency of staff;

- Ergonomic assessment of working conditions, the dynamic identification of “occupational hazards” - to facilitate the formation of an ergonomic environment that meets the prevailing socio-economic conditions in the country;
- develop ergonomic forecasts and hypotheses about the progress and improvement of the human labor process.

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## SUMMARY

### ERGONOMIC PRINCIPLES IN MEDICINE AND DENTISTRY (REVIEW)

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Ergonomics is the science of labor. The subject of its research is the interrelationship between human, technology and the environment in the labor process. The development of ergonomics is closely related to the level of socio-economic development of the Country. The principles of ergonomics are becoming increasingly important in managing all areas of medicine. Since dentistry is one of the fastest growing areas of medicine in terms of technology, it is important to constantly monitor the requirements of ergonomics in order to ensure technological progress with adequate labor recommendations that will help specialists adapt to innovations and thus improve the quality of service.

In dentistry the effectiveness of the labor process is determined by the qualification of the workers, the specifics of working conditions and the adaptations of the personal to this conditions. The development of the correct recommendations on this issue is one of the most important tasks of ergonomics, however, the practical implementation of such recommendations is somewhat problematic.

The presented review discusses the conditions for introducing ergonomic principles and risk factors that cause the incomplete implementation of these principles. The review is based on the articles published over the past 5 years in journals indexed in the Science Direct, Scopus, and PubMed databases. The analysis of the collected information revealed the necessity of:

- studying of the patterns of interaction between human, equipment (technology) and environmental factors in order to improve the activities of service providers;

- ergonomic assessment of working conditions and dynamic detection of "occupational harmful factors" to create an ergonomic environment reflecting the changes of the socio-economic conditions in the Country;

- development of the theoretical bases of the functioning of the "human-operator", taking into account the operating conditions of technological systems and the peculiarities of environmental factors;

- development of ergonomic prognoses and hypotheses for the development and improvement of the human labor process.

**Keywords:** ergonomics, dentistry, equipment, technology, environment.

## РЕЗЮМЕ

### ЭРГОНОМИЧЕСКИЕ ПРИНЦИПЫ В МЕДИЦИНЕ И СТОМАТОЛОГИИ (ОБЗОР)

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Развитие эргономики тесно связано с уровнем социально-экономического развития страны. Принципы эргономики становятся всё более значимыми в управлении всеми областями медицины. Поскольку стоматология является одной из самых быстрорастущих областей медицины с точки зрения технологий, важно постоянно следить за требованиями эргономики, чтобы обеспечить технологический прогресс адекватными рекомендациями по труду, которые помогут специалистам адаптироваться к инновациям и, следовательно, повысить качество обслуживания.

В стоматологии эффективность трудового процесса определяется квалификацией обслуживающей рабочей силы, спецификой условий труда и адаптацией работников к этим условиям. Разработка адекватных рекомендаций по этому вопросу является одной из значимых задач эргономики, однако, практическая реализация таких рекомендаций несколько проблематична.

Целью представленного обзора явился анализ текущей и ретроспективной научной литературы глубиной 5 лет (2015-2020 гг.) по вопросам внедрения эргономических принципов в медицину, в частности в стоматологию.

Анализ и синтез ретроспективной и текущей научной литературы диктует необходимость:

- 1) изучения закономерностей взаимодействия человека, оборудования (технологий) и факторов окружающей среды с целью улучшения деятельности обслуживающего персонала;

- 2) проведения эргономической оценки условий труда и динамического выявления «профессиональных вредных факторов» для создания эргономичной среды в медицине, соответствующей изменениям социально-экономических условий в стране;

- 3) разработки теоретических основ функционирования «человека-оператора» с учетом условий эксплуатации технологических систем и особенностей факторов окружающей среды;

- 4) разработки эргономических прогнозов и гипотез для развития и совершенствования трудового процесса.

## რეზიუმე

ერგონომიკული პრინციპები მედიცინასა და სტომატოლოგიაში (მიმოხილვა)

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ერგონომიკის განვითარება მჭიდრო კავშირშია ქვეყნის სოციალურ-ეკონომიკურ განვითარების დონესთან. ერგონომიკის პრინციპები სულ უფრო ფარ-

თოდ იჭრება მედიცინის ყველა სფეროს მართვაში. ვინაიდან სტომატოლოგია ტექნოლოგიური თვალსაზრისით მედიცინის ერთ-ერთი ყველაზე სწრაფად განვითარებადი დარგია, მნიშვნელოვანია ერგონომიკული კუთხით მუდმივი მონიტორინგი, რათა ტექნოლოგიურ წინსვლას თან სდევდეს ადეკვატური შრომითი რეკომენდაციები, რაც ხელს შეუწყობს დარგში დასაქმებულ ადამიანების ადაპტაციას სიახლეებთან და შესაბამისად, მომსახურების ხარისხის ზრდას. სტომატოლოგიაში შრომითი პროცესის ეფექტურობას განსაზღვრავს: მომსახურე პერსონალის კვალიფიკაცია, შრომითი პირობების სპეციფიკა და ამ პირობებთან პერსონალის ადაპტაცია. აღნიშნულის თაობაზე სწორი რეკომენდაციების შემუშავება წარმოადგენს ერგონომიკის ერთ-ერთ უმნიშვნელოვანეს ამოცანას, ამასთანავე, ასეთი რეკომენდაციების პრაქტიკული იმპლემენტაცია გარკვეულად პრობლემურია. მოცემული ლიტერატურის მიმოხილვაში გაანალიზებულია ერგონომიკული პრინციპების დანერგვის პირობები და ის რისკ-ფაქტორები, რომლებიც განაპირობებს ამ პრინციპების არასრულფასოვან რეალიზაციას.

მიმოხილვა მოიცავს „Science Direct“, „Scopus“ და

“PubMed”-ის ბაზებში ინდექსირებულ ჟურნალებში ბოლო 5 წლის მანძილზე გამოქვეყნებულ ნაშრომებიდან მიღებული ინფორმაციის განხილვას და ანალიზს.

სათანადო სამეცნიერო ლიტერატურის წაყარობის განხილვის და ანალიზის შედეგად გამოიკვეთა, რომ აუცილებელია:

1. მომსახურე პერსონალის საკმარისობის გაუმჯობესების მიზნით ადამიანის, ტექნიკის (ტექნოლოგიის) და გარემო ფაქტორების ურთიერთქმედების კანონზომიერებათა გამოკვლევა;

2. სამუშაო პირობების ერგონომიკული შეფასება და „პროფესიული მავნე ფაქტორების“ დინამიკური გამოვლენა, ქვეყანაში სოციალურ-ეკონომიკური პირობების ცვლილების შესაბამისი ერგონომიკული გარემოს შემქმნა მედიცინაში;

3. „ადამიან-ოპერატორის“ მოღვაწეობის თეორიული საფუძვლების შემუშავება ტექნიკური სისტემების ექსპლუატაციის პირობებისა და გარემო ფაქტორთა თავისებურებების გათვალისწინებით.

4. ერგონომიკულ პროგნოზების და ჰიპოთეზების შემუშავება ადამიანის შრომითი პროცესის განვითარება-გაუმჯობესებისათვის.

## ПРОБЛЕМЫ МОНИТОРИНГА КАЧЕСТВА РАБОТЫ СТАЦИОНАРОВ ГРУЗИИ В УСЛОВИЯХ ПАНДЕМИИ COVID 19 (ОБЗОР)

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Пандемия Covid 19 существенно повлияла на выбор стратегического направления глобального здравоохранения и адекватных форм управления стационарными учреждениями, в том числе и в Грузии. Для реализации гарантий и обеспечения качества медицинской помощи важное значение придается принятию решений доказательного характера, базирующихся на мониторинге и углубленном анализе информации с использованием различных средств программного обеспечения. Однако, на данный момент, в учреждениях здравоохранения отсутствует единая система для реализации концепции непрерывного улучшения качества, что представляет особую необходимость в условиях резкого роста инфицированных COVID 19, требует поиска механизмов, позволяющих обеспечить гарантированный уровень качества медицинской помощи пациентам [1,4,6,9].

Во время пандемии COVID 19 возникла необходимость в разработке множества нормативных актов, затрагивающих все сферы функционирования государственных органов, в том числе здравоохранения, образования, экономики, индустрии туризма, деятельности правоохранительных органов. Большинство из них нацелены на оказание медицинских услуг и непрерывное управление здравоохранением. Основным документом является Постановление правительства Грузии №164, которое является основой для мер по предотвращению возможного распространения нового коронавируса в Грузии и утверждением плана оперативного

реагирования на случаи заболевания, вызванного новым коронавирусом COVID 19.

В условиях пандемии министерству здравоохранения Грузии пришлось адаптироваться к существующим реалиям, возникла необходимость изменений в системе здравоохранения, например: изменились условия оплаты для поставщиков медицинских услуг, участвующих в программе универсального здравоохранения, увеличился период ожидания финансирования, для населения реализован ряд социальных программ в связи с пандемией. Возникла необходимость освободить от налогов импорт определенных медицинских изделий. Обычные клиники временно переквалифицировались в лихорадочные центры, которые являются первым барьером для пациентов с COVID 19 [1,5,11,12].

Созданы элементы информационной инфраструктуры для нужд медицины, положено начало применению и распространению современных информационно-коммуникационных технологий в сфере здравоохранения. Разработанные информационные системы, как правило, носят узконаправленный характер, ориентированный на обеспечение частных функций и задач, отсутствует унифицированный подход к их преобразованию в единую информационную среду.

Следует подчеркнуть, что данная проблема относится к одному из самых затратных и ресурсоемких видов - стационарной помощи. Создание и внедрение эффективных методик экспертизы качества лечебно-диагностического