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PROBLEMS OF ARCHITECTURAL FORMATION OF MILITARY CLINIC REHABILITATION CENTERS

PROJEKTOWANIE MILITARNYCH CENTRÓW REHABILITACYJNYCH

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ABSTRACT

Modern experience of designing rehabilitation facilities for military personnel is very small and is represented mainly by mobile hospitals. The complexity and multivision of the problem under consideration indicates the necessity of its further in-depth study. From the above material it can be concluded that the architecture of the BMRC today is redirected to a rapid change in the processes of treatment, technological equipment.

Key words: Clinical and Rehabilitation Center, Medical Complex, Treatment Process, architectural formation.

STRESZCZENIE

Współczesne doświadczenia w projektowaniu zaplecza rehabilitacyjnego dla personelu wojskowego jest niewielkie i skupione głównie przy szpitalach mobilnych. Złożoność rozpatrywanego problemu wskazuje na konieczność jego pogłębionej analizy. Z powyższego materiału można wywnioskować, że architektura BMRC jest dziś przekierowana na szybką zmianę procesów leczenia oraz urządzenia technologiczne.

Słowa kluczowe: Centrum Kliniczno-Rehabilitacyjne, Kompleks Medyczny, Proces Leczenia, projektowanie architektoniczne.

1. FORMULATION OF THE PROBLEM

The 2011 war in Syria continues till date with its victims are said to have reached estimates as high as hundreds of thousands of people. In addition, the conflict in Syria has caused a European migration crisis. Military operations still continue in the territory of Ukraine specifically in the Donbass region. Different parts of the world today are still facing military conflicts. All these conflicts lead to a steadily increasing number of servicemen who constantly need rehabilitation.

Leading countries of the world such as Israel, Germany, Switzerland, Austria, France, Great Britain and the USA have accumulated vast increasing experience in these issues.

Today rehabilitation in foreign countries exists all over the world and is on the rise. But unfortunately, this cannot be said about Syria and Ukraine. A comprehensive approach to the rehabilitation of patients means that the interdisciplinary approach is used in the rehabilitation program, in which methods from various fields of knowledge take part: first of all, doctors, psychologists, teachers, medical personnel, nutritionists, cooks and other rehabilitation professionals. Individually selected modes of nutrition, rest, employment medical and physiotherapy treatment, etc. are used.

Also, complex rehabilitation combines elements of various therapies, sanatorium treatments, organization of leisure and purposeful educational work. The purpose of rehabilitation is the awakening of the internal reserves of the body, the restoration of lost functions, the social and psychological adaptation of man. No wonder the word "rehabilitation" has two Latin roots, which speak for themselves: re - "anew, again" and habilis - "adapted, comfortable".

Of course, all of these issues, in one way or another, are closed and implemented in the complex architectural formation of clinical and rehabilitation complexes.

In Ukraine, the design standards for rehabilitation facilities in such a narrow specialization have not been developed, such as providing medical and social assistance to combatants. In addition, this problem is complicated by the lack of a scientific base that takes into account the specifics of injuries and injuries among servicemen, as a result of hostilities. The above-mentioned problems sharpen the urgency, and the search for their solutions that can allow the competent organization of the rehabilitation facility space, which in turn can provide comfortable conditions for patients to stay and increase the efficiency of the process of their rehabilitation.

2. ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Analysis of recent achievements and publications on the subject of the study allows us to say that the problems of designing rehabilitation facilities for military personnel are paid very little attention. Specific regulatory documents were not formed. When designing objects of the type being investigated, it is possible to use only those documents that relate to this subject only indirectly. For example, the design standards for health care institutions [1], social protection institutions [2], rehabilitation facilities for children with disabilities [3], hospitals and polyclinics [4]. There were attempts to form highly specialized requirements for military hospitals. The analysis of the works shows the direction of the development of further scientific research.

To date, the state of the problem and the context of research are included in the following scientific papers:

– on the architectural typology of design and construction of multidisciplinary clinical facilities: VT Shimko, A.L. Gelfond, G. Laros, D.K. Francis;
– on the architectural composition of complexes of medical institutions: R.U. Allen, T.A. Bulycheva, J. JI Bishop, P. Blandel-Jones, G. Laroche, R. Lauson, J. Nagasawa, F. Nesdowli, A.B. Roshchin;

– on the ecologization of the architectural environment NI Kryvoruchko, AS Krivitskaya [5]

On the one hand, it is the search for optimal architectural and engineering solutions, since clinics are medical institutions reminiscent of a production complex based on rigid functional processes based on ergonomic and energy-efficient principles. On the other hand, it is the creation of an environment in which the human traumatized organism must self-repair not only under medical influence, but also independently, drawing and being inspired from the very space, from its qualitative and quantitative content.

The development of the design of the buildings of clinical and rehabilitation centers reflects many problems related to the improvement of architectural and planning solutions for clinical and rehabilitation centers, designed and reconstructed, however, some of the questions require supplementation in a more detailed study that takes into account the best practices of foreign countries.

3. FORMATION OF THE PURPOSE OF THE ARTICLE

From the foregoing, the aim of the article is to analyze the history of the development of the architectural formation of military clinical rehabilitation centers (VKRTS) and to identify universal and specific methods for their formation.

4. STATEMENT OF THE MAIN MATERIAL

The history of the development of the WRCM can begin with the Ancient East, which was the cradle of the world history of human civilizations. Among the general features of the development of healing in the slave states of the ancient world, were the following ones:

– the invention of writing and the creation of the first texts of medical content;
– development of ideas about the origin of the disease;
– training of doctors (family tradition, training in general schools and in the temples);
– Creation of the oldest sanitary-engineering constructions, development of hygienic skills.

In Greece, medical institutions were arranged at the temples - Asclepius (fig. 1). In the Roman Empire, they built special houses - valetudinarian - intended for the treatment of wounded soldiers.

The first public hospital was built in Egypt (about 873 years ago). But it was intended only for the poor. In the middle of the 7th century in France, the Parisian bishop Landry built the first hospital in the city "Hotel-Dieu" ("House of God"). The first mention of it in the historical chronicles refers to the year 651. In the Middle Ages, medical institutions were a part of the temples. Then there was a rapid development of medicine in the East.

The peak of prosperity fell on the times of the Arab caliphates - X-XI century. The Hospital of the Holy Spirit in Germany is one of the best preserved medieval buildings of this kind in Central Europe to this day.

A sharp and rapid technological growth at the end of the 19th century lead to a transformation of medical buildings. The ubiquitous introduction of electricity, heating, water supply, sewerage and ventilation dictated changes in the volume-planning structure of the building. Hospitals consisted of a number of separate buildings. An example of such a hospital is the Botkin (fig 2) In Moscow, built under the leadership of the architect Hilarion Ivanov-Shits (1910).

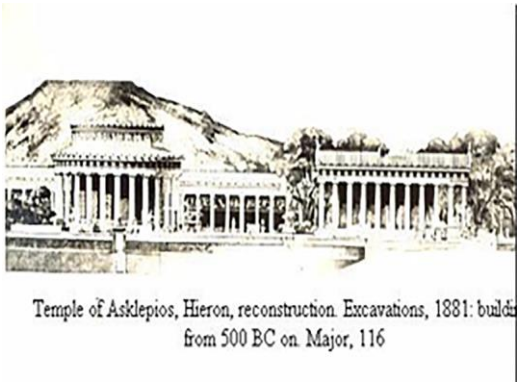

Fig 1. Temple of Asclepius, Ancient Greece. Source: [12]

Fig 2. The Bodkins hospital in Moscow. Source: [13]

At the end of the twentieth century, the appearance of cities and buildings began to change. Hospitals turned into large centers, housing not only the clinic, but also research institutes.

Modern buildings of medicine inherent in "humanizing", the direction of architectural forms to contact with people at different levels: symbolic, social, psychological and emotional. This helped to solve the problem of the facelessness of the buildings of medical institutions. At the same time, the architects identified the main disadvantages of medical buildings: - the presence of long and dark corridors; - artificial cold light; - boring finish; - primitive furniture. Architects began to design new buildings, taking into account the revealed shortcomings. An example of a modern hospital can be the Children's Medical Center "COSEIR" (fig. 3.) in the city of Brownsboro (USA).

Spanish architect Rafael de La Oz Kastanis calls "Architectural medicine" his project - the hospital "Rey Juan Carlos" in Madrid (fig. 4.). The lower part of the hospital is represented by three modules united by a stylobate. The facades of the building are dressed in decorative modules made with a glass pattern. Each such module has a circular concave shape and is the window in the room.

Fig. 3. Children's Medical Center "COSAIR" in the town of Brownsboro. Source: [13-1]

Fig. 4. Rey Juan Carlos Hospital in Madrid. Source: [14]

The architecture is able to influence the state of human health. As many employees who manufacture medical equipment and personal protective equipment note, a modern hospital must meet two basic requirements: to attract patients, offering them living conditions that are almost identical to the hotel, and to support all work processes using the latest

technological developments, and the environment surrounding the patient should promote the patient's recovery. The hospital today must become part of the landscape, be inscribed in the urban environment. It becomes not only a place where sick people are, but a wellness center.

To date, the architecture of many clinic-rehabilitation centers is quite conservative. But along with that, more attention is paid to the creation of a comfortable environment that contributes to the effective work of medical personnel and the speedy recovery of patients. There are exploited roofs with promenades, wards that resemble hotel rooms and have multi-colored interiors. Also, in such centers, there is a possibility of having joint residence of children and their parents. The finishing uses new high-tech materials - rubber and fill flooring, plastic wall panels, etc. Like most public buildings, medical centers become multifunctional, uniting clinics, polyclinics and medical research and training centers, which entail the use of new planning techniques: the separation of flows of visitors, patients, medical staff, teachers and students; creation of autonomous or interconnected zones; medical complexes that contain conference halls and auditoriums, etc.

The modern WRCC is a real city, living its own life. There are also procedural rooms and rooms where patients spend several weeks at a time, a restaurant, a cafe, a delivery service, a laboratory, workshops, and sports zones. And as in the multifunctional complex, it is necessary to design a space in the MIRC so that the "blocks" cooperate and do not interfere with each other, and the clinic-rehabilitation center should be beautiful and awaken energy and the desire to live, no matter what. Functionality and aesthetics in a medical institution should become an integrating system, complementing each other.

Modern medical buildings have a variety of infrastructure. Architects fill their space with guest blocks for patients' visitors, food points, libraries, gyms, cinemas, spa centers. Thus, patients of hospitals do not feel detached from the external, familiar world. Designers, working together with architects, include in the interiors numerous details that create coziness. It is noted that sick people perceive space, color, light, texture and the fullness of the environment more sharply than healthy people. It is important for a sick person to quickly navigate in space, be independent and feel free.

Fig. 5. The Cedars-Sinai Medical Center. Source: [15]

Fig. 6. Anderson Cancer Center at the University of Texas at Houston, USA. Source: [15]

At the present stage of development, the approaches to medicine and technology change, the conditions for the existence of such institutions, both within the city and beyond, and, of course, the style of architecture changes. Patients, doctors, architects and designers know that in a medical institution all conditions for a comfortable stay should be created. The most comfortable hospital today is the Medical Center of Cedars-Sinai Medical Center in Los Angeles, USA. The medical center of Cedars-Sinai is most loved by the stars of Hollywood. The eighth floor of the main building is occupied by 32 suites (Super

Deluxe Suites) with a luxury unheard of for hospitals, which cost patients $ 900-1,000 per night. Patients can admire the original canvases of Picasso, and the food for them is prepared by a specially hired chef (fig. 5).

Analyzing modern centers, it can be noted that in the process of treatment for the patient, it is important not only medical services, personnel qualification, but also the atmosphere of stay in the medical institution. Endless white corridors, white robes and white light in all rooms, a dull view from the windows, minimalism and sterility of the interiors make an oppressive impression.

That is why not only the design of the premises is important, but also the special architecture of the premises, the functional placement of recreation areas, medical zones and chambers. For example, the architectural solutions of hospitals and cancer centers in Europe and the US (fig. 6.) include a clear separation of office space and patient areas, as well as the use of greenery around the premises and inside them, the use of hanging gardens, the use of eco-facades, use of the view from the windows to the mountains, lakes, trees - the visual interconnection of the internal and external space, which certainly calms and enlightens the mood of patients.

And in Ukraine, as well as in Syria, there is hardly any special rehabilitation center which makes this topic very relevant. Comparing the figures of Table 1, it can be said that Ukraine and Syria need rehabilitation centers that are equipped with modern methods of providing medical services, as well as optimal functional connections within the structure (Table 1).

Before you start working on the design of the premises, you need to have a clear idea of the features of the medical institution and the services it offers. A very important factor is the consideration of the demographic component of its patients.

It should be borne in mind that the development of electronic registration systems has led to a reduction in the need for a large number of waiting rooms. Where possible, flexible space and planning systems are recommended to adapt to the changing functional needs.

The first thing that should be paid attention to those who develop a project of a clinical and rehabilitation center is the patient's opportunity to orientate himself in a medical institution. This is a very important factor for him. The understanding that a patient can successfully navigate the clinic using only pointers and generally accepted guidelines, increases his confidence in his abilities, reduces stress. Also, the layout and design in such a center should be based on privacy. A separate ward does not just give the patient a personal space but it allows him to see friends and family often. Sometimes this plays a decisive role in the recovery process.

The architecture of such medical centers is highly aesthetic, as natural materials are used, a lot of daylight and the space qualitatively imitates the home environment. An interesting view from the window, works of art, paintings and photographs used in the design of the premises - all this not only has a good effect on the patients' condition, helping them to recover quickly, but also becomes a good marketing move that increases the attractiveness of the medical institution.

Reducing the noise level is one of the important tasks of architects, designers working with construction projects of WDC and medical facilities. Modern civilization with its constant noise is already stressful itself. That is why patients need special treatment, they are vulnerable to external stimuli and therefore it is extremely important to take into account the noise levels and its reduction during the design of the MIS and patients must sleep properly. Patients should not hear constantly opening, closing doors, the noise of instruments and the rumble of voices. Also, it is important to choose the right color scheme, which dominates the design, because the psychology of their perception is re-

lated to mood and well-being. The architectural image of the medical center is a complex of measures to ensure the proper level of comfort in the institution.

The projects of the WRCS allowed medicine to look at the treatment, health improvement and social adaptation process differently. Designing a new generation of the WRCS was a victorious step across Europe. New modern clinics attract qualified specialists and medical workers. They are comfortable working in such conditions. Patients perceive these clinics as those facilities in which it is pleasant to be treated (fig. 7-12).

Fig. 7. Intrepid Fallen Heroes Fund. Main entrance. Source: [16]

Fig. 8. Intrepid Fallen Heroes Fund. View from the mall. Source: [16]

Fig.9. Intrepid Fallen Heroes Fund. Training "rock", treadmills, bright beautiful interior. Source: [17]

Fig. 10. Intrepid Fallen Heroes Fund. Pool with waves and walking exercises on gravel . Source: [17]

So Intrepid Fallen Heroes Fund is a rehabilitation center for treating patients with amputations and burns. It is located next to the San Antonio Military Medical Center in Fort Sam Houston in San Antonio, Texas. The center was specifically created to assist the United States military and women who served in the hostilities in the war in Iraq and in the war in Afghanistan. Veterans from previous conflicts also have the right to receive treatment, as well as other servicemen who were injured in other operations, training exercises and in non-combat situations. The 4-storey building with an area of 6,000 m2 was officially opened on January 29, 2007. The ceremony was attended by United States Senators John McCain and Hillary Clinton (fig.7-12).

Fig.11. Intrepid Fallen Heroes Fund, Source: [17]

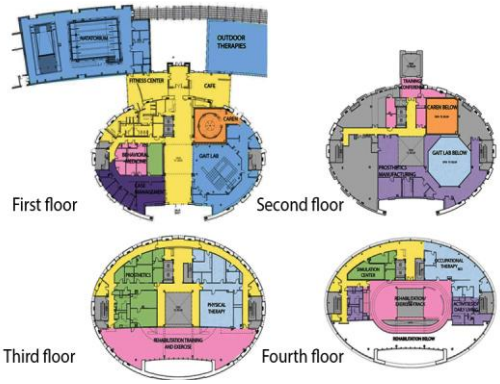

Fig.12. Intrepid Fallen Heroes Fund, floors. Source: [17]

Dressed in the granite of South Dakota, this center of physical rehabilitation offers a welcoming return to American soldiers from combat. Construction began at a time when the rehabilitation center was still in development. The integrated approach made it possible to realize the WMP as a state-of-the-art complex within a limited time frame. The most advanced technologies of rehabilitation centers in the world were applied when it came to the design and architecture.

An elliptical masonry cylinder with large glass holes provides a great view of the ceremonial entrance arch. The windows of the clincher and the stepped metal roof complete the classical and respectful sensitivity of the building.

Inside the center combines physical training zones with complex studies in the field of prosthetics, robotics, virtual reality and biomechanics. Along with the indoor pool with wave technology, elevated treadmill, climbing walls, uneven terrain and obstacle simulators, first-generation technologies were used, including a 300-degree virtual real dive environment and an advanced gait analysis laboratory.

Fig 13. Queen Elizabeth Hospital, Birmingham, United Kingdom.Source: [28]

Fig14. Queen Elizabeth Hospital, General plan. Source: [28]

Europe was in need of modern rehabilitation centers and therefore in 2010, the establishment of the newest center for medical rehabilitation was put into operation at Queen Elizabeth Hospital in Birmingham (fig 13 - 18). It is a modern multifunctional complex, where a variety of zones are created for multiple functions. Functional connections are sought out very optimally. The architectural composition has three ellipsoidal volumes of different numbers of stories, which create an image of three waves when approaching

them. There are open courtyards within the ellipses as well as the main chambers. Adjoined to these buildings are three and two floor podiums. It is a clearly zoned space, connected by communications and patios. The building is looks bright, decorated with modern materials and inside the system are atrium spaces is created. The entrances to the complex are very plastic and the perception of the rehabilitation center occurs from different points, which gives the character of completeness and optimism.

Fig. 15. Queen Elizabeth Hospital, Elevations. Source: [28]

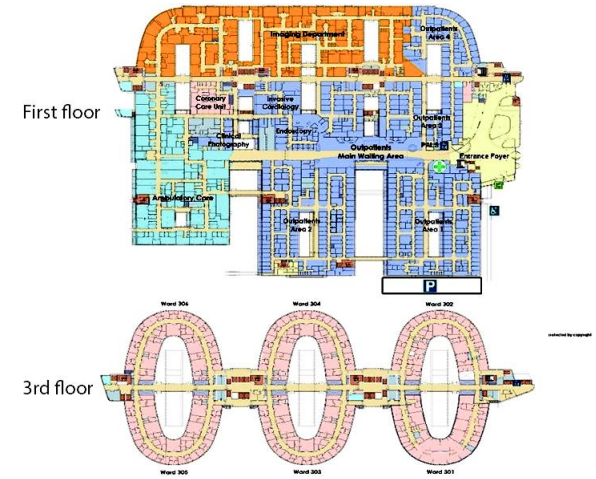

Fig. 16. Queen Elizabeth Hospital, Floors. Source: [28]

Fig. 17. Queen Elizabeth Hospital, Interior. Source: [28]

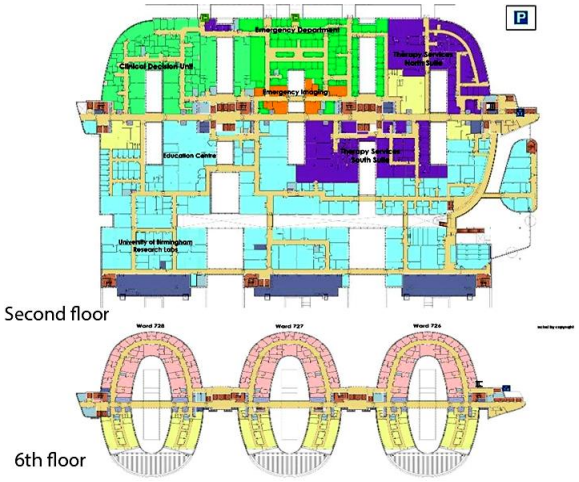

Fig. 18. Queen Elizabeth Hospital, Floors. Source: [28]

Unlike Europe, Ukraine has no specialized rehabilitation centers, and the rehabilitation of its servicemen takes place in adapted rooms of old hospitals, health resorts and other medical institutions and therefore the need for designing such centers is extremely important and necessary. In this article it is impossible to highlight all the issues concerning the above topic but it is important to put more emphasis and focus on the interior designing and the interior environment while establishing such a center. As it is today, the adapted premises of rehabilitation centers in Ukraine and Syria are structured long corridors, chambers of about 6-10 people. The general interior outlook is quite depressing and leaves a lot to be desired as one can hardly notice any adequate design of proper planning. This does not create a patient friendly and healthy environment conducive to create positive energy and a healthy feeling needed by a patient. Scientific researches of both psychologists and sociologists confirm the strong emotional and positive impact of spaces e.g. Interiors and their disclosures on the outside world, like nature. This topic will be described in more detail in the following articles.

5. CONCLUSIONS

1. Modern experience in the design of rehabilitation facilities for military personnel is very limited and is represented mainly by mobile hospitals, after which, if necessary, the victim is transferred either to a military hospital that has been obsolete for dozens of years of operation or to a general rehabilitation center where the trauma patients are treated.
2. The complexity and multidimensionality of the problem under consideration points to the necessity and expediency of its further in-depth study.
3. From the foregoing, it can be concluded that the architecture of the WMRT today is reoriented to a rapid change in the processes of treatment and technological equipment. When designing complex systems of hospital services, there is a desire to achieve their maximum effectiveness.
4. Rehabilitation centers and hospitals are filled with various infrastructure elements. They become multifunctional. There is clearly a tendency to transform the strict barracks of the hospitals into comfortable ones with an elaborate interior.
5. The planning structure of medical buildings is also changing. There is a reduction of the use of corridor planning systems as they have proven to be less convenient.

6. From past experience the last decades in the design and construction have shown that the modern hospital is like a whole city, living its own.

Table 1. Comparative analysis of the number of servicemen and the availability of beds. Source:[18 – 27].

Countries	Number of military personnel	Number of disabled war	Number of beds	Source
Ukraine	255 000	117،897	20 thousand	[18].[19].[20]
Syria	2.8 Million	3 Million	86 thousand	[21].[22].[23]
USA	1 348 400	8,9 Million	12 million	[24].[25].[25]
Russia	900 000	12,8 Million	10 thousand	[24]. [26].[27]

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