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FORM AND TECHNOLOGY. ARCHITECTURE OF HEALTH CARE FACILITIES IN BREAKING THE TABU

FORMA A TECHNOLOGIA. ARCHITEKTURA OBIEKTÓW OCHRONY ZDROWIA W PRZEŁAMYWANIU TABU

Abstract

The healthcare architecture is determined by technological and functional solutions, and its form remains in the background in the perception of the building, giving way to efficiency. Referring to the research on the influence of architecture on the healing process, the quality of space and form are gaining importance as a catalyst for complex processes, breaking social taboos. The article presents an overview of objects where the unreal and futuristic form fits the goals of patient-centered design, evidence-based design and personalization in the treatment process.

Keywords: healthcare architecture, form, hospital, technology

Streszczenie

Architektura obiektów ochrony zdrowia jest determinowana rozwiązaniami technologicznymi i funkcjonalnymi, a jej forma pozostaje na drugim planie w percepcji budynku, ustępując miejsca sprawności i wydajności. Odwołując się do badań nad wpływem architektury na proces leczenia, jakoś prze-strzeni nabiera znaczenia, jako katalizator złożonych procesów, przełamując społeczne tabu. Artykuł prezentuje przykłady, w których nierealna i futurystyczna forma wpisuje się w cele *patient-centered design*, *evidence-based design* oraz personalizację w procesie leczenia.

Słowa kluczowe: architektura ochrony zdrowia, forma, technologia, szpital

1. INTRODUCTION

1.1. HEALTHCARE ARCHITECTURE

Hospitals are one of the most important buildings in the city. Their main function is to treat and protect patients' health. Their architecture is to support and catalyze complex and highly specialized processes taking place inside, and be a container for the latest medical technologies. For many years, the literature has provided abundant evidence of

the extremely important and supportive role of architecture in the healing process¹. These defined evidences, in the case of specific and deliberately used tools in the field of health-care architecture, transform into effective and efficient therapy. Such implementations refer to both functional and formal solutions. The most popular of them are, for instance, single patient rooms, which significantly improve the comfort of patients, the quality of their sleep, and contacts with family. As a consequence, they affect the reduced amount of painkillers taken, or the actual shortening of the hospital stay.



Ill. 1. Technology in the design of hospitals of the future. RIBA. Source: <https://www.ribaj.com/intelligence/future-of-healthcare-design-in-post-pandemic-world> (access: 20.05.2022).

Research related to the design of the architecture of health facilities is crucial because, according to Reinier de Graaf, a Danish architect, urban planner and theorist, hospitals age the fastest among buildings with various functions, often even before they are completed.

It is caused by the incomparably fast development of medical technologies. Hence, one should think of a hospital, not as a facility that is to be completed, but a facility that is to be constantly evaluated, the construction or adaptation of which will in fact never be completed. Not like a building, but like a living organism.

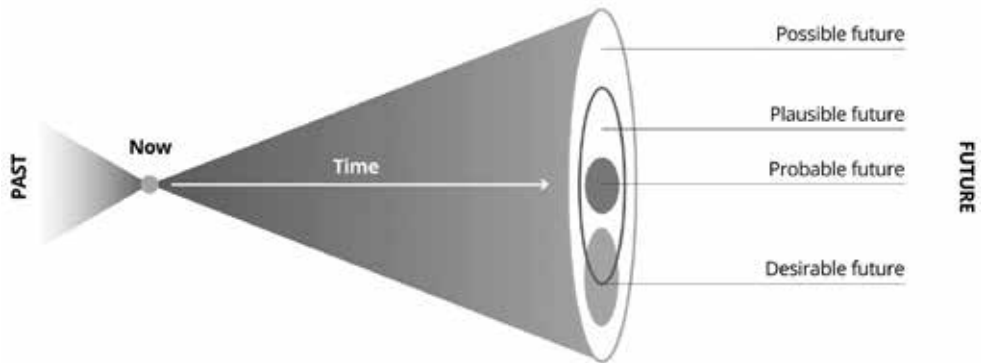
1.2. FUTURISTIC STRATEGIC DESIGN IN HEALTHCARE

In what direction is the design of healthcare facilities heading, therefore, is an important question, especially in view of the increasing demand for medical services.

¹ R. Ulrich, X. Quan, C. Zimring, A. Joseph, R. Choudhary, *The role of the physical environment in the hospital of the 21st century: A once-in-a-lifetime opportunity*, "Journal of Management Policy and Practice", 2013, Vol. 14(2).

In designing health care facilities for the future, among others, it is common to use speculative futuristic methods, e.g. cone of the future by Trevor Hancock and Clement Bezold², presented by them for the first time after the WHO convention in 1994. They referred to an earlier theory by the Canadian futurist Norman Henchey in 1978, who distinguished four ways of perceiving the future:

- *the possible future*
- *the plausible future*
- *the probable future*
- *the desirable future*.



Ill. 2. Future Cone by A. Gawlak, based on: T. Hancock, C. Bezold, *Possible Futures, Preferable Futures*.

These four variants of the future are differentiated by their probability of occurrence. The possible future contains all possible variants that could happen, even the most unlikely, the most surprising and the most unpredictable.

The plausible future contains more plausible scenarios – events that might happen in the future, based on the knowledge we have today. It may concern the prediction of trends, the seeds of which are happening now or are very likely.

The probable future includes quite likely events relating to the outcomes and evaluations we are currently carrying out. This kind of predicting the future is seen as a direct extension of the present. The last type of future described by Henchey is the desirable future, that is, the future that we would expect and want the most at the same time. It is sometimes called prescriptive futurism or normative forecasting. It refers to the most desirable vision of the future, which seems to be the most favorable at present. With regard to health protection and architectural design, it may have the potential to initiate changes and direct its development to the desired effect. Returning to the theory of predicting trends in relation to the architectural design of health care facilities, it should be noted that the current times are very turbulent. The context includes relatively quick changes in the field of technological solutions in medicine and construction, telemedicine and ICT solutions, progressive and global aging processes, which in turn causes an increase in the demand

² T. Hancock, C. Bezold, *Possible Futures, Preferable Futures*, “The Healthcare Forum Journal”, March 1994, 37(2), pp. 23–29.

for medical services in health care, what consequently forces new and precise architectural solutions³.

1.3. METHODOLOGY

In the preparation of this manuscript, methods of knowledge synthesis, literature studies (the so-called research desk) and descriptive analyses were used, as well as the methodology of contextual knowledge discovery and processing. National and international scientific publications, databases, reports and proprietary documentation of health care projects were used in order to systematize the knowledge about solutions in the architectural design of healthcare facilities apparently not directly related to the function. On the other hand, paradoxically, they are related to it more than one might assume at first glance.

Expressionist forms of hospitals, alternative functions introduced to these facilities, integrated systems of visual identification, or finally, art facts in the form of valuable works of art create a new quality of the environment for treatment, fitting into the modern avant-garde trend and breaking social taboos related to hospital facilities.

2. OVERVIEW

2.1. A FORM THAT DIRECTS ATTENTION

The architecture of hospitals is often connected with isolated buildings devoid of details, overwhelming scale and lack of personalization. According to M. Czyński⁴, hospitals are associated with certain negatively established features, such as:

- ISOLATION – isolating the location of hospitals outside the city, making it difficult for patients and visitors to travel,
- BIG HOSPITALS – the size of hospitals – facilities designed for several hundred beds create the impression of “treatment machines”, impersonally serving patients,
- UNIFICATION in terms of the form of architecture – buildings devoid of details, with flat facades, with the rhythm of window openings,
- INDISPENSIBILITY of signs for walkways and access roads to the hospital building, which increase stress, alienation and the feeling of being lost,
- LACK of attractively designed areas around the hospital with hospital gardens or parks.

On the other hand, this common phenomenon can be more and more often contrasted with projects devoid of these stigmas. Hospitals, which on the one hand are ultra-modern centers, and on the other hand, very individualized facilities, which is followed by a new quality of hospital interiors. The icon that introduces unreal forms of the building to hospitality is undoubtedly the Lou Ruvo Center for Brain Health by Frank Gehry in Las Vegas.

³ Chapter based on the author's monograph. Source: A. Gawlak, *Mieszkanie – przestrzeń zdrowego starzenia się. Projektowanie dla przyszłych seniorów*, Wydawnictwo Politechniki Poznańskiej, Poznań 2022.

⁴ M. Czyński, *Architektura przestrzeni ludzkich zachowań. Wybrane zagadnienia bezpieczeństwa w środowisku zbudowanym*, Wydawnictwo Uczelniane Politechniki Szczecińskiej, Szczecin 2006.



Ill. 3. Lou Ruvo Center for Brain Health by Frank Gehry in Las Vegas. Photo: contractdesign.com.

The hospital is located on a plot of 25 ha, and the usable area is 6 thousand square meters. The architecture itself, on the one hand characteristic of Gehry's works, so peculiar in the context of the function of the building itself, caused considerable controversy, in particular that the building is intended for the mentally ill. Nevertheless, the originality of the form is certainly the case in an individual approach to the patient and can be considered a synonym for personalization in the treatment process.

Another very futuristic and at the same time prototype project are unreal hospital waiting rooms by Jeffrey Inaba, designed as independent modules, being a functional complement to the Roman hospital Policlinico Umberto I. The aim of the project was to introduce an atmosphere different from the hospital nature and, through architecture, distract patients from the painful discomfort associated with illness, pain or uncertainty. The added value is pro-ecological solutions, including photovoltaic panels supplying units with energy. This draws attention to another problem – high energy consumption of hospitals in the face of efforts to protect the climate⁵.

Although over the years there have been radical changes in thinking about the architecture of hospitals, it is still difficult to deal with stereotypical notions. Apart from new realizations, other projects are created on the border of architecture and art, and which indicate the inevitability of changes and new directions of transformation of hospitality.

An example of this is the installation realized on the site of the former Ospedale Maggiore in Milan by the architect Filippo Taidelli. The temporary pavilion form presents two contrasting concepts of the hospital of the future: one is based on the vision of the hospital as a domesticated space, and the other on the vision of virtual health care as a consequence of “de-hospitalization”. In both cases, the recipient of this work confronts his own experiences and knowledge, probably basically a fairly conventional approach, with a vision of the future of health care, which has not been fully defined⁶.

⁵ According to the Global Compact Net Work Report published on June 28, 2022, healthcare architecture is responsible for 4.4% of carbon dioxide emissions in the world, and 71% of GHG emissions come from the supply chain for the health sector, i.e. production, transport of drugs, medical devices, food and equipment for hospitals.

⁶ Source: A. Gawlak, *op. cit.*



III. 4. Hospital model of Jeffrey Inaba's waiting room. Photo: Jeffrey Inab.



III. 5. Hospital of the future, according to Filippo Tadelli. Photo: Andrea Martiradonna.

2.2. A FUNCTION THAT COMPLETES THE PROGRAM

Alternative functions in healthcare facilities accompany the treatment process, supporting patients in their therapy. They can be directly related to treatment, such as horticultural therapy and therapeutic gardens. Green spaces inside and outside the building undoubtedly affect the quality of space and the quality of stay. These can be functions less directly related to treatment, such as cinemas, galleries, shops, hairdressing salons and wellness salons.

A frequent element that effectively implements the postulates of “healing environment” is greenery in the structure of the building and the so-called therapeutic gardens. They constitute an environment for both passive and active therapy, where activities individually selected by therapists, conducted in garden arrangements specially adapted to the needs of disabled people, increase the efficiency of patients, reduce tension and stress. One of the most famous hospital premises is the Prouty Garden at the children’s hospital in Boston, founded by Olive Prouty in 1956. It was created before the idea of the influence of therapeutic gardens on the well-being of patients was even investigated. However, it includes in its space almost everything that such a garden should have: wide spaces of lawns, clear compositions of paths, water reservoirs, magnificent shaded trees, shrubs and perennials marked with identification plates, moreover, more and less private seats, some of them mobile, located both in the sun and in the shade, and sculptures hidden in greenery.



Ill. 6. Pediatric Hospital in Zurich, Switzerland. Competition design 2012: Herzog & de Meuron, see: A. Frearson, *Children's Hospital Zurich by Herzog & de Meuron*, Dezeen, <https://www.dezeen.com/2012/06/13/childrens-hospital-zurich-by-herzog-de-meuron/> (access: 25.09.2022).

The current research results inspire founding bodies of modern hospitals and project teams to dedicate part of the area to the organization of hospital green areas. On the basis of the conducted research, it was concluded that creating a garden that will actually have

a therapeutic effect on users requires the legibility of architectural solutions, marking its presence in the hospital interior, and the use of a clear visual information system⁷.

The examples show that hospital interiors – especially the common and public spaces lose their typical hospital character, are associated with recreational places, city spas or hotel facilities, such as the orthopedic children's hospital in Aschau, where a climbing wall was designed in the foyer, in the emergency room, as an original, relief wall decoration, but also as an element that effectively distracts the attention of pediatric patients.



III. 7. Orthopedic Children's Hospital, Aschau, Germany, design: Nickl & Partner Architekten, 2004, source: www.nickl-partner.com (access: 25.05.2013).

⁷ S. Pasha, *Barriers to garden visitation in children hospital*, "Health Environment Research & Design Journal", 2013, 6(4), pp. 76–96.

2.3. A WAY-FINDING SYSTEM THAT NOT ONLY NAVIGATES



Ill. 8. Way-Finding System in County Hospital, Chrzanów, Poland. Source: MUSK Kolektyw.

The psychophysical state of patients is of great importance for the correct diagnosis at the time of admitting patients to the ward. Difficulty in finding a way, an unclear identification system causes stress and a feeling of being lost in the patient.

Research indicates the importance of consistent and conscious color solutions of paramount importance for elderly hospital patients who need clear and unambiguous graphic and color markings. Moreover, it is a group of patients who need more time to read visual information or visual code⁸. It is suggested to use unambiguous colors in the wayfinding system, e.g. yellow, red or blue. Introducing a turquoise color, for example, could turn out to be an ambiguous and illegible hint; the color turquoise is too often confused with both green and blue.

The use of gray is similarly risky – many shades of, for example, violet, under certain lighting conditions, may appear gray, just like bright pink viewed through yellow lenses worn by the elderly.

On the other hand, graphic signs, which have very high aesthetic value, are often too individually designed, to such an extent that they lose their unambiguity and are more difficult to interpret. Consequently, instead of navigating effectively, they intensify the feeling of being lost.

The colors in the treatment and laboratory rooms are much more restrictive than in common rooms, due to the technological processes taking place in them. The research has

⁸ H. Dalke, J. Little, E. Niemann, N. Camgoz, G. Steadman, S. Hill, L. Stott, *Colour and lighting in hospital design*, "Optics and Laser Technology", 2006, 38, pp. 343–365.

shown that the color gray is definitely recommended for rooms where diagnostics related to the assessment of skin color are carried out⁹.



Ill. 9. Intuitive way-finding system ID-LAB in Box Hill hospital, Melbourne. Source: Box Hill Hospital.

Identification systems with high potential for intuitive use are the most effective (Ill. 7).

In 2006, a qualitative survey of patients in the country's largest general hospitals (400–1200 beds) was conducted in the UK to assess the quality of space and the impact of color and lighting in architecture on patients, staff and visitors.

First of all, the staff emphasized that the quality of the architectural space determines the behavior and increases the morale of employees. Moreover, one of the main expectations of the staff was access to isolated rest areas, even for only a few minutes during the day. It was noticed that the colors of the interior are important in the case of orientation in the building for newly hired staff. Nursing staff emphasized the need to display their workstations through color and light, which facilitates communication and organization of work in departments. At the same time, attention was drawn to the need for harmony and balance in the interior design of the hospital, so necessary for rest and convalescence.

2.4. AN ART THAT KEEPS UP THE SPIRIT

Research published in 2012 and carried out jointly by the Karolinska Institute in Norway, the Universities of Stockholm in Norway and Wasa in Finland¹⁰, showed an integral relationship between the environment, the design of the hospital interior, the broadly understood hospital design and the relationship between patients and hospital staff.

The survey showed the inspiring role of art and design, its impact on dialogue between staff, stress reduction and positive emotions. Stress is also the biggest problem for patients, including their families and visitors.

Moreover, it was unequivocally stated that there are no barriers to implement various forms of art in various types of hospital interiors, not only public common spaces, but also bed departments, treatment rooms, etc.

⁹ *Ibidem*.

¹⁰ B. Wilkstrom, E. Westerlund, J. Erkkila, *The healthcare environment – The importance of aesthetic surroundings: Health professionals' experiences from a surgical ward in Finland*, "Open Journal of Nursing", 2012, 2, pp. 188–195.

It was assumed that the environment around the patient constantly influences his senses, stimulating him physically and mentally. Therefore, it is important that the enriching role of art can be incorporated into the healing environment.

These activities are confirmed by the exhibition of works from the MOCAK collection at the University Hospital in Prokocim. Works by such artists as: Edward Dwurnik, Pola Dwurnik, Maya Gold, Agata Kus, Zbigniew Makowski, Muntean / Rosenblum, Shinji Ogawa, Yigal Ozeri and Beata Stankiewicz were presented in the hospital interiors. Cultural activities perfectly fit into the assumptions of art therapy, having a positive effect not only on patients, but also on hospital staff and visitors.



III. 10. Paintings from the MOCAK collection at the University Hospital in Prokocim. Photo: Krzysztof Kalinowski/Lovekraków.pl.

3. SUMMARY

The article presents avant-garde ways of treating hospital space in the context of enriching and improving the quality of the therapy process. Activities on the border of art and architecture, interfering with the form of a building or its internal space, can actually accelerate the healing process. In particular, common spaces in social hospitals have a very large arrangement potential. As a consequence of the great freedom in shaping these areas, it is possible to consciously create an environment conducive to therapy, healing processes, i.e. interiors that increase the sense of security, peace and confidence.

In the area of the emergency room, especially for children (but equally for older people), architecture may increase the sense of security and the so-called therapeutic-friendly accommodative activities. It may be the other way around. It may be the opposite, architectural and spatial solutions may increase anxiety, fear, panic, closure, thus hindering contact with the patient, the diagnosis process¹¹, etc. Consequently, following prof. A. Bańka, the comfort

¹¹ T.O. Cadirci, A.E. Akmaz, *The Impact of Healthscape on Customer Satisfaction and Loyalty in Public and Private Healthcare Institutions*, "Yildiz Social Science Review", 2017, Vol. 3, pp. 81–96.

and well-being of patients significantly influences the work of the staff and the organization of the hospital. While the stereotype in the perception of hospitals is still firmly established, the new realizations break this taboo.

By analyzing the theses of the conference, they can be fully confirmed, i.e.: "(...) The building could no longer be obvious, the shapes of the buildings no longer expressed their function. Expressionist sculptures appeared and there occurred a detachment from the original purpose of objects and their intellectual transformation" or "Contemporary architecture no longer has problems with the unreal form of buildings. The form, not the function, has become the main goal and anything that will shock the recipient is allowed". However, it should be added that all these activities, which are the competence of architects, make sense, especially in the case of health care facilities, when they follow Le Corbusier's ideas, i.e.: "... in architecture, the whim of an individual gives way to the fact that it is to serve human being ..."¹².

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¹² According to the Conference's thesis (International Conference – Defining the Architectural Space), source: <https://dpa.arch.pk.edu.pl/thesis-in-polish-2022/> (access: 24.04.2022).

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