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HOSPITAL COMPLEX AS AN URBAN PLANNING ENTITY – CONTEMPORARY CHALLENGES FOR THE URBAN DESIGN OF HEALTHCARE FACILITIES

KOMPLEKS SZPITALNY JAKO ZAŁOŻENIE URBANISTYCZNE – WSPÓŁCZESNE WYZWANIA WOBEC URBANISTYKI ZAŁOŻEŃ SZPITALNYCH

Abstract

The article presents the results of an analysis of the urban form of historical and contemporary European hospital complexes, taking into account: building structure, urban composition, clarity of layout, transport links, and green space. The aim of the research was to examine the extent to which the currently functioning urban layouts of hospitals correspond to contemporary design trends and what potential is contained in historical layouts. Some historical hospital layouts may respond to contemporary needs. Greenery within planned urban layouts has particular potential.

Keywords: contemporary hospital, healthcare architecture, hospital complex, urban planning

Streszczenie

Artykuł prezentuje wyniki analiz formy urbanistycznej historycznych i współczesnych europejskich założeń szpitalnych, która uwzględnia: strukturę zabudowy, kompozycję urbanistyczną, czytelność założenia, układ komunikacyjny oraz zasób zieleni. Celem badań była analiza na ile funkcjonujące obecnie układy urbanistyczne szpitali odpowiadają współczesnym tendencjom projektowym oraz jaki potencjał zawarty jest w założeniach historycznych. Niektóre historyczne założenia szpitali mogą odpowiadać na współczesne potrzeby. Szczególnym potencjałem jest występująca w ramach planowanych układów urbanistycznych zieleni.

Słowa kluczowe: współczesny szpital, architektura ochrony zdrowia, kompleks szpitalny, urbanistyka

1. INTRODUCTION

Contemporary hospitals, both those newly designed and those operating within historical development complexes, are an important element of a city's urban structure. Current challenges call for a redefinition not only of hospital architecture but also of its relationship with

its surroundings. In this context, the issue of the urban composition of hospital complexes and their integration into the urban fabric, as well as the humanization of hospital spaces, is becoming particularly important. The urban forms of hospitals resulted primarily from the functional solutions in force in a given period of medical history, being an expression not only of the state of knowledge regarding hygienic and sanitary requirements, but also the translation of function-specific urban planning solutions into them.

Hospital space, once isolated and subordinated almost exclusively to the function of treatment, is increasingly seen as a part of the city that can and should also perform social, recreational, and service functions. The criteria for assessing the quality of the hospital environment are also changing – factors such as access to greenery, daylight, and human-scale spatial design are gaining in importance. A special case in point is historic hospitals, whose spatial and architectural potential provides an opportunity for the continuation of medical functions, provided they are skillfully adapted to modern standards.

This article attempts to analyze the urban potential of historical and contemporary hospital complexes. The aim is to identify spatial, architectural and compositional factors that determine the possibilities of their development and adaptation to current health and social challenges. Special attention is paid to contemporary design trends, which increasingly emphasize the need to humanize and de-institutionalize hospital spaces.

2. RESEARCH METHODS

The article presents a study of the urban form of European hospital settings. The preliminary research included a review of the literature on the subject to identify representative hospitals reflecting design trends across different periods in Europe. A total of 18 hospitals were subjected to detailed urban analysis. The first group included hospitals from the 15th-20th century from France (5), Great Britain (3), Poland (2), Austria (1), Spain (1), and Italy (1). The second group included contemporary hospitals of varying forms from the territories of Denmark (2), Finland (1), France (1), and Spain (1). The analysis of urban form included the following aspects: building structure, urban composition, clarity of layout, traffic circulation, and green space. In addition to examining and comparing the various hospital assumptions themselves, attention was paid to whether key elements characteristic of contemporary hospital design trends were present in the urban context. Particular attention was paid to the humanistic dimension of hospital complexes and the relationship with surrounding buildings.

3. HISTORICAL CONTEXT

The evolution of the urban forms of hospitals in Europe took place in connection with changes in the modes of treatment, as well as in the understanding of the essence of institutional care.¹ Initially, hospitals were associated with monasteries (e.g., the Brothers of St. John of God or the Order of the Holy Spirit) that ministered to the sick and were located outside

¹ Hospital complexes also existed in antiquity and in non-European cultural circles, but they are not the subject of this research.

the strict urban layout. Christianity contributed to the development of hospitality primarily by fostering an attitude of compassion and care toward the sick. Medieval hospices, which initially served as places of refuge for pilgrims and messengers traveling between bishoprics, evolved over time into institutions resembling modern hospitals. With the founding of a monastery and hospital at Monte Cassino in Italy in 529, St. Benedict of Nursia launched one of the most influential medieval initiatives in hospital care. He emphasized excellence and devotion in caring for the sick, and his Benedictine Order became a model for later monastic communities over time.²

In the Middle Ages and at the beginning of the Renaissance, some universities in Europe began to educate in medicine, promoting the idea that proper treatment can lead to recovery and that serious illness need not mean inevitable death. However, until the Renaissance, hospitals cannot truly be described as places for treatment and therapy, they were rather shelters or institutions providing care for the sick, dependent, poor and elderly. Their founders were sometimes prominent rulers. The more affluent were treated at home. The monastery hospitals of the Middle Ages can be considered the first urban forms of European hospitals. Hospitals were shaped on the model of monastic buildings, and depending on their size they took the form of single clear-span halls or complexes of pavilions linked by cloisters to an inner courtyard. An obligatory element of the assumptions were chapels. In the Middle Ages, health care in Islamic countries surpassed the standards of Christian Europe.³

The largest hospitals were located in Baghdad, Damascus and Cairo. They were affiliated with medical schools, and in addition to medical pavilions contained libraries, kitchens and rooms for medics. The largest in the 12th century was the Mansura Hospital in Cairo, whose construction was personally supervised by the sultan. Separate buildings were used to treat various diseases: diarrhea, fever, injuries, women and those suffering from eye diseases. Each ward had separate rooms for convalescents, who were given five pieces of gold at their departure, allowing them to live in peace until they returned to work. In Christian Europe beginning in the 11th century, medicine began to be taught in universities. The epidemics that haunted Europe in the following centuries demonstrated the effectiveness of isolation and quarantine as methods of relatively limiting the effects of disease. The 16th century saw a significant spread of new infectious diseases (typhoid, diphtheria, smallpox and measles), while leprosy behavior declined, allowing a large number of leprosaria to close. Hospitals were under the care of municipal authorities. The problem of a large number of tossed children led to the creation of a new type of hospital – a shelter with a completely new architectural form. Italian children’s hospitals had a wide front with covered arcades, under which unwanted offspring could be brought safely and relatively anonymously.

It was not until the 18th century that a revolution in medicine, and thus in hospital care, was brought about. The influence of Enlightenment ideas – greater emphasis on order, hygiene, rational treatment, as well as the increasing secularization of healthcare, professional training of doctors and the development of battlefield medicine – led to the emergence of new architectural and urban forms. The hospital in the 18th century was an institution at the intersection

² F. Retief, L. Cilliers, *The evolution of hospitals from antiquity to the Renaissance*, “Acta Theologica” 2010, no. 2, suppl. 7, pp. 213–232.

³ A.S. Lyons, R.J. Petrucelli II, *Ilustrowana historia medycyny*, Penta, Warszawa 1996, p. 317.

of the old and new approaches to health care. It still served a caring function, but reforms began to be introduced to turn it into a more functional place of treatment. Most often, the tried-and-true model of the multi-bed room – a long, shared room where patients with different conditions lay in one room – was used. The first designs for separate rooms for specific diseases appeared – the beginnings of the later pavilion system (that is, separate buildings or wings).

Eighteenth-century hospitals (especially those associated with universities) had anatomical theaters, although they were not part of every hospital. One of the most influential figures in the evolution of the design of architectural forms of hospitals was nurse Florence Nightingale. Her observations on the link between hygiene and patient survival, translated into the publication of *Notes on Hospitals* (1863), led to a new approach to hospital design: spacious pavilion-like complexes, with good ventilation and sunlight, in attractive landscaped settings. The theory was first translated into practice in the expansion project for St. Thomas Hospital in London (1861–1865), designed by H. Currey.

The 19th century was a period of revolutionary discoveries in medicine: the discovery of microorganisms led to special attention to asepsis, and the spread of anesthesia enabled the development of surgery. It was a period of the organization of medical professions and hospital care, as well as a growing interest in public health. In the 19th century, the connection between housing conditions, access to greenery, and urban infrastructure and the health of the population was clearly recognized. Hospitals built in the 19th century were buildings that used the latest architectural and technological solutions, and their urban design created thoughtful complexes in which medical specialization played a key role. The location of the hospital was dictated by functional and sanitary considerations, including access to green areas, clean air, and an independent water supply.

The 20th century brought the institutionalization of healthcare in European countries, which was reflected in the location decisions of more hospitals. The country with the largest number of landmark buildings, whose architecture reflects the prevailing trends (medical, social, design) of the 20th century, is Great Britain.⁴

4. HOSPITAL COMPLEXES OVER THE CENTURIES: ANALYSIS OF URBAN FORMS

4.1. HOSPITAL LAYOUTS FROM THE 15TH TO THE MID-20TH CENTURY

The urban composition of hospital complexes carried an important layer of meaning. Axial layouts, with a clearly emphasized entrance zone, built the seriousness and rank of the institution. Enclosed courtyards served a communicative function and facilitated patient control by limiting the accessibility of outsiders. The compositional patterns of the first hospital layouts were derived from the architecture of monasteries (Ill. 1A). An important role was played by carefully planned greenery, the therapeutic importance of which was recognized very early on. The dominant element of the layout was the chapel or church.

The urban forms of hospitals resulted primarily from the functional solutions in force at a given moment of time, being an expression not only of the state of knowledge regarding

⁴ S. Francis et al., *50 years of ideas in health care buildings*, Nuffield Trust, London 1999, pp. 4–10.

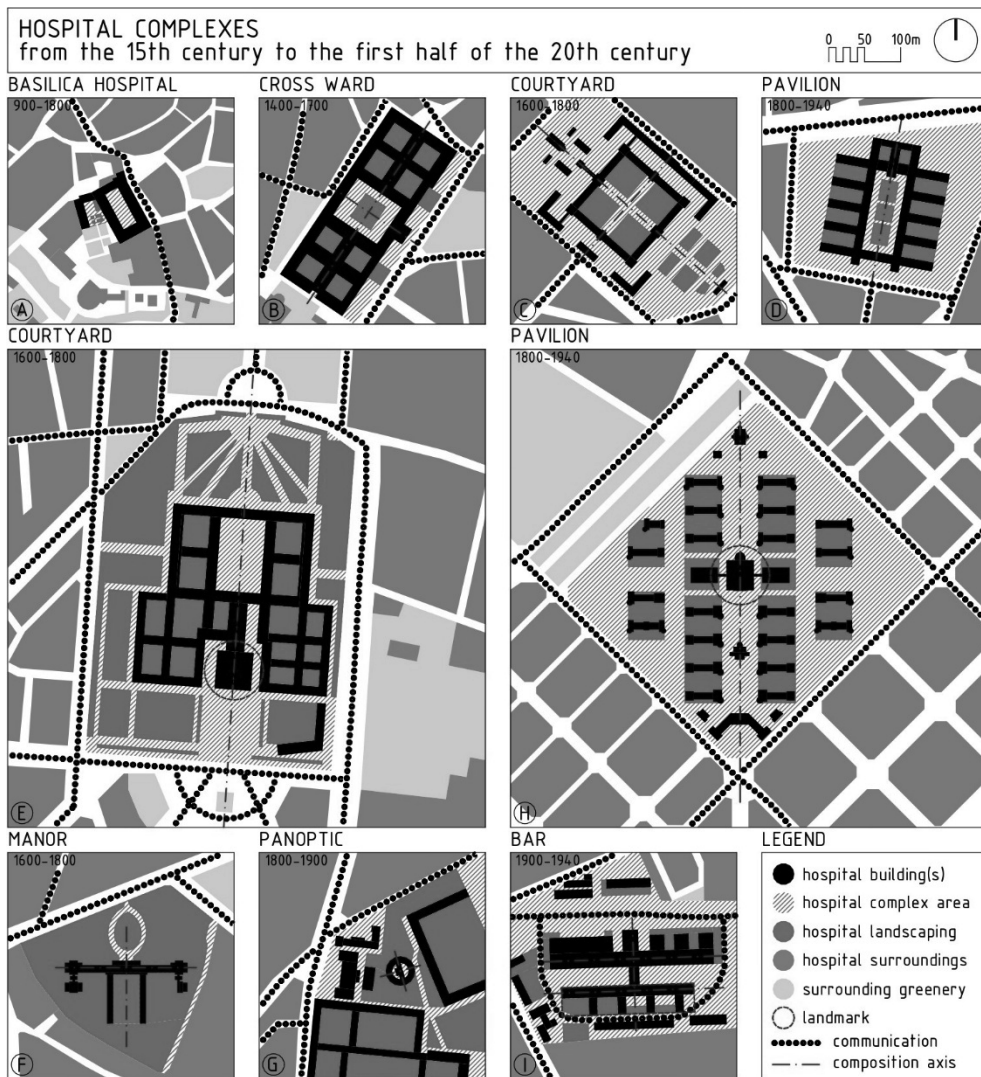
urban solutions, but also of hygienic and sanitary requirements and available medical technologies. The basic feature of hospital layouts (in the case of large units) occurring since the 17th century is their complexity and independence from surrounding buildings, as well as the clear zoning by means of urban solutions of accessibility to individual zones (III. 1B). At the end of the 18th century, on the initiative of King Louis XV, a process of transforming hospital architecture began in Paris. A special committee was formed to develop new standards aimed at thoroughly reforming hospitals. The impetus for this effort was a growing awareness of the importance of hygiene and access to fresh air as key elements affecting the health of patients – especially in the context of hospital space. Reformers were convinced that health could be effectively promoted not only through medical treatment, but primarily by creating a healthy, natural environment (III. 1C, E). As a result of these reforms, two new architectural and urban planning models were proposed: the radial layout and the pavilion system (III. 1D, H). It was the pavilion system that proved to be the most significant, and the first example in this trend was the Paris Lariboisière Hôpital, (1839–1854) designed by M.P. Gauthier.

Historical forms of hospital complexes existed in different periods simultaneously. In addition to the early municipal and monastic hospitals, which were built as a wing or building adjacent to the monastic complex, the use of axial layouts, symmetrical to the main entrance, is noticeable. The dominant feature of the complex was the main building or chapel. Already from the 15th century, one can notice the desire to zone the accessibility of circulation routes: the representative main entrance and auxiliary rear accesses. The basic element of the urban composition was the pavilion/segment (with a corridor layout), the width of which was defined by the availability of daylight in the rooms and the design of the covering and ceiling. The urban composition of the hospital complex clearly defined the accessibility of the various zones of the hospital. Axiality and monumentalism were readable not only as a premise, but also from the human level.

A major influence on the emergence of new architectural and urban forms of hospitals in modern times was the change in the approach to psychiatric treatment. Two new urban forms are noticeable: references to residential architecture (manor houses) and to central, closed forms resembling prisons (panoptic), while allowing quick surveillance of all areas of the patients' residence. These facilities were built from the 17th to the 19th centuries. The two different architectural and urban planning concepts were associated with contrasting approaches to the treatment and isolation of those affected by mental illness (III. 1F, G).

The urban planning of hospital complexes from the turn of the 20th century is dominated by symmetrical layouts, usually not exceeding four stories, in which greenery enters the complexes both as a landscape and an isolating element and as a therapeutic element (parks or inner courtyards). With the emergence of modernist and functionalist trends, as well as new construction technologies, there was another change in the approach to shaping hospital layouts and building architecture. The interwar period was also a time of new hospital investments in government programs. At that time, hospitals of various classes and sizes were being built in many European countries, to provide healthcare not only in the largest centers. In the case of Poland during the interwar period, access to healthcare was one of the main problems faced by the government of the reborn state. Rationalizing ideas and proposing model solutions for repetitive layouts, based on the joint thoughts of doctors and architects, characterized the facilities built during this period.⁵

⁵ N. Przesmycka, *Modelowe kształtowanie szpitali powszechnych w okresie międzywojennym na przykładzie szpitala w Puławach*, "Teki Komisji Architektury, Urbanistyki i Studiów Krajobrazowych" 2020, no. 1, pp. 94–106.



Ill. 1. Hospital complexes from the 15th century to the first half of the 20th century. (A) Hôtel-Dieu, Beaune, France, 1443; (B) Ospedale Maggiore, Milan, Italy, 1457; (C) Hôpital Saint-Louis, Paris, France, 1607–1612; (D) Lariboisière Hospital, Paris, France, 1839–1854; (E) Hôtel des Invalides, Paris, France, 1675; (F) Bethlem Royal Hospital, London, UK, 1676; (G) Narrenturm, Vienna, Austria, 1784; (H) Hospital de Sant Pau, Barcelona, Spain, 1905; (I) Beaujon Hospital, Paris, France, 1935. Source: authors

The 1930s brought a new concept of the large-scale corridor hospital (bar), based on a corridor layout, with the use of elevators allowing the erection of multi-story hospitals (Ill. II). This revolutionary approach made it possible to locate different specialties in a single building, on individual floors that were separate functional zones. This layout also

allowed for optimal room lighting and natural ventilation.⁶ By the middle of the 20th century, the historical trend of composing hospital buildings according to the sides of the world persisted, locating patient rooms on the east and south sides, while auxiliary zones were placed on the north side.

4.2. HOSPITAL LAYOUTS IN THE SECOND HALF OF THE 20TH CENTURY

Block layouts dominated in the second half of the 20th century and were driven by the concept of the modernist “treatment machine.” They were characterized by compact, minimalist blocks in which technology played a key role. The role of daylight in many spaces was replaced only by artificial lighting, and natural ventilation was replaced by mechanical ventilation.⁷ The hospital became an independent entity, not functionally integrated with its surroundings. New hospital complexes were located some distance from dense urban centers, equipping them with extensive parking zones, a circular layout of communications and greenery, whose role was still seen as an isolating factor. New urban layouts and, above all, the scale of the facilities and the change in the approach to treatment (shorter patient stays) meant that atriums and courtyards for patients began to be less and less accessible.⁸

In the second half of the 20th century, the urban composition of hospitals was influenced by functionalism, and the large-scale complexes that emerged took on horizontal (mat type, Ill. 2A) or monoblock (Ill. 2B) forms.⁹ The precursor of the mat hospital was Le Corbusier, and the Venice Hospital project in 1965 marked a new direction in thinking about the urbanism of the hospital complex.¹⁰ The hospital was to become an opposition to historical architecture also in symbolic and material terms; the use of concrete was a kind of manifesto.¹¹ The mat hospital was characterized by a horizontal arrangement of groups of spaces and courtyards between low pavilions. This is an example of a composition based on an open form capable of multiplication and organic growth. The scale of the hospital (1,500 beds) was also impressive. The bed wards were one story high, and a significant functional drawback of this layout was the extended staff pathways.

⁶ M.P. Murphy, J. Mansfield, MASS Design Group, *The architecture of health. Hospital design and the construction of dignity*, Cooper Hevitt, Smithsonian Design Museum, New York 2021, p. 46.

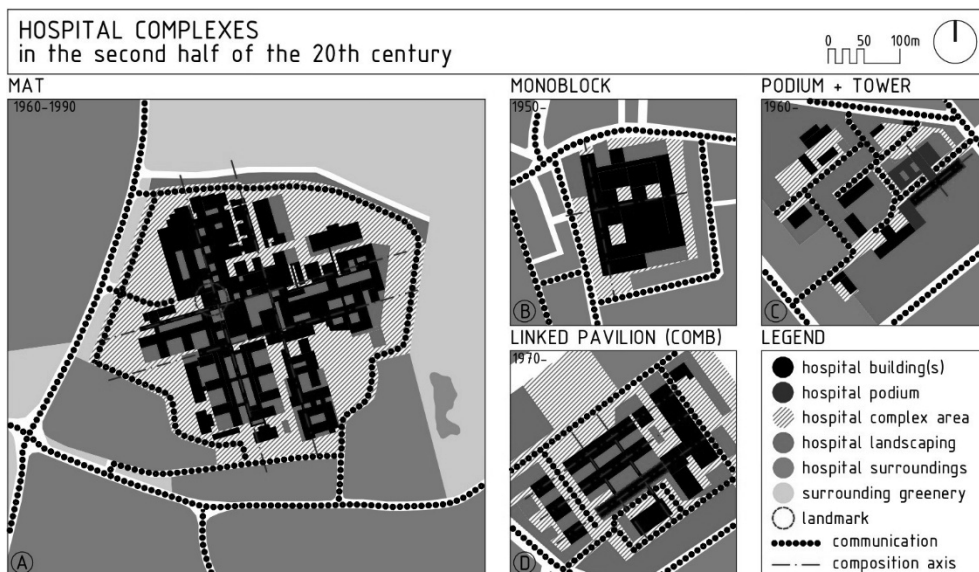
⁷ *Ibidem*, p. 47.

⁸ The continuously designed green atriums and courtyards were transformed over time into ancillary delivery areas, and patient access to them was limited, with the focus on treatment inside.

⁹ Juraszynski distinguishes three types of layouts related to the method of functional-spatial solution: centralized or compact – block, decentralized – pavilion, and mixed block-pavilion. J. Juraszyński et al., *Projektowanie obiektów służby zdrowia*, Arkady, Warszawa 1973, p. 26.

¹⁰ M.P. Murphy, J. Mansfield, MASS Design Group, *op. cit.*, p. 50.

¹¹ “Do what you have to do, building with the most modern architecture possible, and let those who have the right to do so set the lighting and ventilation standards that will shape the elevations. Use reinforced concrete to implement these standards and don’t try to imitate the hand-formed brick of old Venice.” Le Corbusier, *Counterfactual Venice II – That time Le Corbusier was about to transform the city* [in:] Venice Design Biennial, <https://www.venicedesignbiennial.org/the-platform/that-time-le-corbusier-was-about-to-transform-venice> (access: 10.06.2025).



Ill. 2. Hospital complexes in the second half of the 20th century. (A) Wexham Park Hospital, Slough, UK, 1965; (B) Greenwich District Hospital, London, UK, 1970; (C) Puławy Hospital, Puławy, Poland (1975); (D) Voivodeship Specialist Hospital, Lublin, Poland, 1974–1992. Source: authors

Hospitals of the monoblock type were built at different scales and their urban composition was limited to accentuating the entrance area. Deep tracts housed a number of rooms that were mechanically ventilated and illuminated only by artificial light (diagnostic, operating, auxiliary), and the use of prefabrication technology allowed the rapid erection of such buildings. The atriums found in this type of hospital, due to their scale, were rarely zones of recreational greenery, being limited to the function of illumination and internal communication. Individual wards were arranged on successive floors.

A common hospital model of the second half of the 20th century is a tower with a podium, which, depending on the size of the building, could take on different scales (Ill. 2C). The ground-floor, one- or two-story part houses the public areas (admission area, outpatient clinics, diagnostics, etc.), while bed wards are located on the upper floors. This form is usually a height dominant in the surroundings. The urban composition of the complex of interconnected pavilions (various forms of comb composition) allowed for fairly easy further expansion of the complex, but the lack of a common part of the first floor (podium) resulted in rather long traffic routes (Ill. 2D).

4.3. SPATIAL LAYOUTS OF HOSPITALS IN THE 21ST CENTURY

Nowadays there are many types of specialized hospitals (including general, specialized, university-affiliated) presenting different spatial layouts and urban compositions. Spatial layouts of specialized hospitals can also sometimes be found in the designs of general hospitals. In the case of specialized facilities, the most common type is the atrial layout, in which green courtyards or glazed atriums are the dominant element. Often, the atrium is a form

of representative and spacious entrance area to the hospital. There are also centralized layouts for smaller buildings as well as linear layouts. As in the 20th century, the ridge layout is still sometimes used, and in some hospitals it has evolved into a new form – the finger-like layout. It is characterized by the positioning of individual segments at different angles, emerging from the central core of the building. These provide better views and illumination, and, most importantly, eliminate the “window-into-window” view effect from the bed wards. A popular layout in psychiatric hospitals is the cluster layout, which consists of segments with green courtyards connected to the central core. Analogous to the podium tower layout of the 20th century is the contemporary plinth layout, where the first floors with diagnostic and treatment areas form a “plinth” above which slightly smaller bed wards are located.¹²

In the case of general (multi-specialty) hospitals, which are usually much larger, there are other layouts that allow the functional arrangement of many separate units dedicated to different specialties within a single building or building complex. Some of these layouts have features found in specialized hospitals.

A study of spatial layouts characteristic of hospitals of the first quarter of the 21st century in Europe was carried out, including examples of complexes built from scratch that do not have remnants from previous centuries. The layouts of new hospitals that are identical to those of the 20th century, such as ridge (linked pavilion according to Sunand Prasad’s classification), were omitted.¹³ Instead, examples were selected that are modern interpretations of layouts from the previous century.

The first arrangement that can be distinguished is the monospace, whose roots can be traced to the monoblock arrangement (Ill. 3A). The concept of this layout is to serve the medical function for as long as possible. It is characterized by a compact form, neutral frame, flexibility of structure, and uniform height between floors (isotopy). Monospace offers regular, reversible, and modular spaces with access to light that are amenable to modification regardless of scale. The layout is rectilinear, which also generates a simple structural system.¹⁴ Daylighting of individual spaces is provided by small courtyards with or without greenery, which on a smaller scale would more appropriately be called “wells” for daylighting. The humanistic dimension of space in such a building layout is limited. While the buildings are mostly low-rise and therefore preserve the human scale, the compact structure and large interior spaces with access only to small courtyards remain reminiscent of the idea of the “treatment machine” of the 20th century. This effect can be offset by the appropriate size of courtyards of at least 15 to 20 meters. In this case, the layout is close to the atrial type. Compositionally, the monospace layout is formed by parallel axes forming rectilinear passageways connecting the various zones of the hospital, between which are daylit courtyards with greenery.

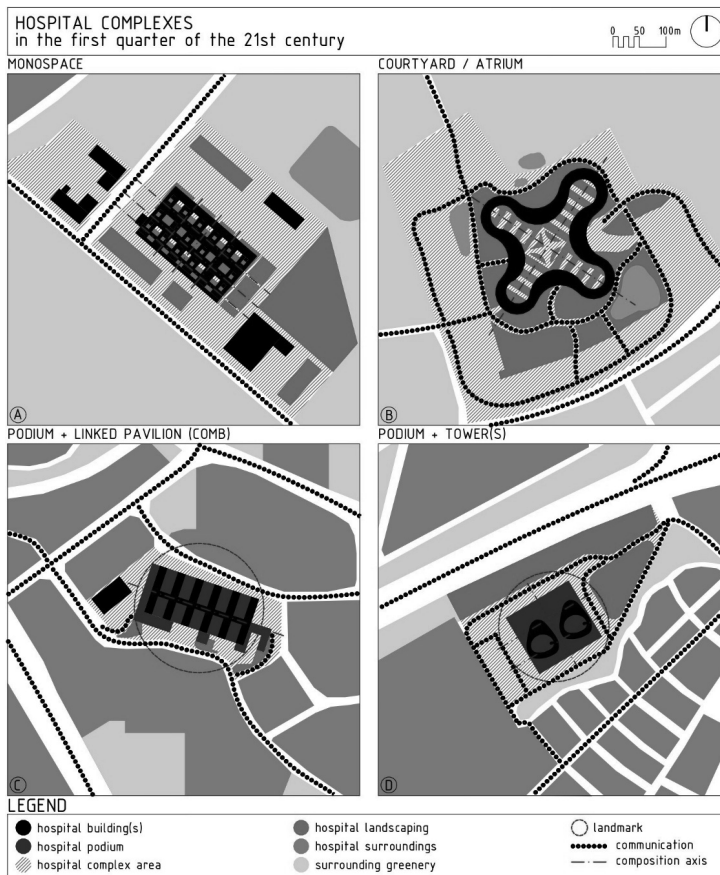
In the atrial layout, the dominant feature of the massing is the green courtyard or glazed atrium (Ill. 3B). Courtyards act as greenery accessible directly from the interior of the building and are important especially in general areas, making them usable by more groups of users. They provide a quiet space for relaxation, important for the well-being of patients, staff and other users. Glazed atriums, on the other hand, most often serve as the entrance zone of a hospital, with a main circulation riser connecting all functional levels of the facility.

¹² R. Strojny, *Współczesne tendencje w projektowaniu szpitali specjalistycznych w Europie*, Wydawnictwo Politechniki Lubelskiej, Lublin 2024, pp. 205–210.

¹³ P. Sunand, *Changing hospital architecture*, RIBA, London 2008, pp. 9–11.

¹⁴ J. Brunet et al., *Eco-friendly hospital architecture*, “Journal of Visceral Surgery” 2024, no. 2, pp. 54–62.

They are open, accessible spaces, often with accompanying functions (gastronomy, shops, hairdresser, florist, etc.) by which they resemble more the interior of a shopping mall or other service building rather than a hospital. In the smallest variant, hospitals with an atrial layout have one or two courtyards or atria. On a larger scale, there may be more of them in various configurations in both symmetrical and asymmetrical arrangements. Other variants of this layout can also be found. The best example of this is the New North Zealand Hospital in Denmark, which has a single courtyard, in which the undulating building form creates four interconnected courtyards. The building's horizontal layout cleverly conceals beneath the green courtyard a large-scale building plinth housing diagnostic, treatment, and other areas. Above it are bed wards with views of the greenery in the courtyard and the hospital environment.



Ill. 3. Hospital complexes in the first quarter of the 21st century. (A) Centre Hospitalier de Marne-la-Vallée, Jossigny, France, 2012; (B) New North Zealand Hospital, Hillerød, Denmark, 2013–2026; (C) Hospital Nova, Jyväskylä, Finland, 2020; (D) Rey Juan Carlos Hospital, Móstoles, Spain, 2012. Source: authors

The ridge layout, in the form of regularly spaced pavilions connected to a linear core (a design used in the 20th century), is still found in some hospital designs. It is a clear urban composition, and the simple building structure allows the creation of semi-open courtyards

filled with greenery and accessible to users. They also occur in non-standard variants, as in the case of Hospital Nova in Finland (Ill. 3C). Its structure is a multi-story plinth housing diagnostic, treatment, service and other areas. The plinth is crowned by six pavilions with a ridge-like arrangement. It is a compact, tall block that is a landmark of the district in which it is located. The main compositional axis is marked by a central circulation line (a linear segment connecting perpendicularly attached pavilions). There are also hospitals with a combined pedestal and palisade layout.¹⁵

An arrangement of one or more towers with a podium is a popular solution in large hospitals (Ill. 3D). A spacious podium with a multi-corridor layout houses the hospital's service, diagnostic and treatment areas, many of which most often do not need access to natural light. Above the podium are building segments (atrial, linear, centralized), which contain zones that require direct access to daylight, including bed wards. This building form creates a compact mass, in which the greatest opportunities for introducing greenery are in the outdoor spaces around the hospital. Sometimes a podium roof is used, on which green roofs or occasionally gardens accessible to users are designed. One large block with a vertical layout provides an urban landmark for the immediate area (in the case of larger hospitals, horizontal layouts with a podium may also occur).



Ill. 4. Hospital complexes in the first quarter of the 21st century. (E) Aarhus University Hospital, Aarhus, Denmark, 2007–2019. Source: authors

¹⁵ R. Strojny, *op. cit.*, pp. 206–209.

The hospital-city is the most complex arrangement of modern hospitals. Its structure resembles the morphology of a city (Ill. 4E). The development structure consists of groups of buildings, often with central courtyards with greenery, resembling quarters of buildings. Together, they form groups of quarters connected by linear connectors, which mark the main axes of the urban composition. An example of this way of shaping hospitals is Aarhus University Hospital in Denmark, whose structure is modeled on the concept of a Danish town. Quarters connected by traffic routes form an elaborate horizontal structure. The buildings' height is low on the periphery of the structure and rises toward the landmark, which has 13 stories. The rest of the buildings range between 1 and 5 stories above ground. The hospital-city structure creates diverse spaces and urban interiors. In addition to courtyards with greenery, one can distinguish outdoor spaces in the form of landscaped greenery (parks, gardens, green squares) and public squares. Surface parking lots are organized around the hospital. Aarhus Hospital is strategically located – on the western side it is adjacent to a natural green landscape and on the eastern side it is adjacent to multifunctional neighborhoods (including service, residential areas). It is an area that is well connected to the rest of the city by providing several modes of transportation that can be used. The biggest advantage of such a hospital layout is the concentration of a large number of departments devoted to various medical specialties and functions in one location while preserving the human scale of development and urban interiors filled with greenery. An important advantage of the hospital-city layout is its flexibility and ease of adaptation and expansion. Despite the compact structure, the hospital in this layout is composed by independent buildings connected by traffic routes. For this reason, the hospital's spacious grounds and horizontal structure allow for easy expansion without disturbing the legibility and composition of the entire layout.

Urban layouts of modern hospitals can be divided into compact structures (in the form of one large building housing all functions with an internal communication system) and extended layouts (hospital-city models). They can have both horizontal and vertical characters. Their urban composition is simple, and the surroundings of the hospital within the complex are parking spaces and green areas in different proportions. The greatest amount of greenery and its diversity can be seen in hospital layouts with courtyards/atria. These hospitals are most often located close to developed areas directly adjacent to the natural landscape. The second group of contemporary hospital layouts is the hospital-city concept with a complex urban structure, which is formed by groups of buildings with a horizontal character resembling the layout of a small town with green areas, plazas, squares, and development quarters. In this case, communication takes place both inside the building through axial linear lines of communication, as well as through the network of external communication. The extensive structure of the development and the multiplicity of buildings generate the need for several entrances to the hospital, a variety of zones that require separate service zones, public transportation (including separate bus stops, parking spaces, etc.).

5. CONTEMPORARY HOSPITAL DESIGN TRENDS

Dynamic technological changes and the associated significant development of medicine are the main factors that affect the way hospitals are designed in the 21st century. At the same time, the basis for creating today's best hospitals is the humanization of the

treatment environment, resulting in spaces with a friendly, non-institutional character. Thanks to the fact that numerous studies on the built environment and its impact on users have been produced since the 1980s, there are many elements that are being incorporated into contemporary hospital designs and that set new trends. The solutions used in an increasing number of hospital projects, especially in recent years, are based on research and evidence-based design (Evidence-Based Design). Both the interior and exterior spaces of hospitals should be guided by the idea of a healing environment (Healing Architecture). This is also manifested in biophilic design, which introduces solutions that realize the innate human tendency to get in touch with nature and other forms of life.¹⁶ These ideas also include preserving the human scale of buildings so that they are not overwhelming (preferably one to four stories).

The development of medicine in the last century has resulted in the emergence of more medical specialties, new diagnostic methods, and treatments. It continues thanks to intensive advances in technology, and for this reason modern hospital layouts must be easily adaptable to rapidly changing needs and standards. Functionality and ease of space modification are key, which is made possible by open-plan hospital layouts, in which various zones are shaped by partition walls. Modern structural solutions and large spans of structural elements allow modification of internal spaces. In turn, the possibilities of building expansion depend on the structure and form of the hospital.

The location of hospitals is in line with contemporary ideas of shaping the “15-minute city”, urban densification, good transport access, and multifunctionality. Hospitals are located close to human concentrations, particularly residential and mixed-use districts. In the case of large hospitals, their scale forces them to be located on a large plots of land, and these are available on the outskirts of the city. Nonetheless, they are integrated with the city through several different forms of transportation (private, public transit, etc.). They are built on the border between developed areas and green spaces. The hospital complexes are one of the bonding elements of the city’s structure and are also intended to initiate integration with the environment and society. This is ensured, among other things, by services in the spacious entrance areas of the hospitals (gastronomy, shops, etc.) and a variety of outdoor spaces (landscaped greenery, plazas, squares). Greenery is most often found in the form of green courtyards and hospital gardens. Green roofs are also used, and in some hospitals, the inclusion of the natural landscape in the immediate vicinity is provided thanks to the right location.¹⁷

In the 19th and 20th centuries, patient rooms were located on the south side, which influenced the way hospital buildings were located on the plot. In the 21st century, among other things, due to a significant reduction in the length of inpatient stays, this dependence no longer exists. However, the role of daylight is one of the key factors influencing the structure of the building and its spaces.¹⁸ Bed wards, specialty areas and general areas are permeated with natural light thanks to various types of glazing, appropriate circulation design, and courtyards and/or atriums. Glazing additionally provides views of greenery, while courtyards/atriums provide direct access to it, which positively affects the comfort and well-being of facility users. In the interiors, art and wayfinding are another element of space shaping. Art

¹⁶ C. Nickl-Weller, H. Nickl, *Healing architecture*, Braun, Berlin 2013, pp. 12–16.

¹⁷ R. Strojny, *op. cit.*, pp. 198–200.

¹⁸ *Ibidem*, pp. 246–248.

also appears on the exterior, such as in the form of sculptures or architectural details. Wayfinding is crucial for facilitating navigation and orientation in the building and across the entire hospital complex. The clear structure of the building and the entire complex makes navigation easier, increasing accessibility and positively impacting users by reducing the stress of getting lost in hospital gardens. Green roofs are also being used, and in some hospitals appropriate siting provides views of the surrounding natural landscape.¹⁹

Most hospitals in operation today date back to the second half of the 20th century. Due to the dynamic transformations mentioned earlier, many of these facilities are difficult, and sometimes even impossible, to adapt to modern needs and requirements. In developed European countries, health policies are changing and must adapt to contemporary challenges (aging populations, climate change, economic issues). One of its main tenets is an emphasis on prevention to relieve the burden on hospitals and reduce hospitalizations. Through it, promoted healthy lifestyles, proper nutrition, and preventive examinations are expected to improve the overall health of populations. An example of this approach is Denmark, where after reforms the number of hospitals was reduced and more than a dozen new facilities were built to serve specific regions.

6. CONCLUSION – THE HOSPITAL COMPLEX IN THE URBAN STRUCTURE: FROM HISTORICAL HERITAGE TO MODERN CONCEPTS OF HUMANIZING SPACE

The analysis conducted showed that in the case of some forms of historical hospitals, the medical function continues and hospital complexes are developing. Development includes both modernization of existing buildings, their transformation and expansion, as well as complementing spatial designs with new facilities. Continuity of function depends on a number of factors (primarily, the ability to adapt existing, including historic, buildings to modern medical requirements), and one of the elements conditioning development is urban composition. It determines whether a given development complex is suitable for expansion and transformation, and whether it can meet modern sanitary requirements or challenges such as a pandemic outbreak.²⁰ The article is an attempt to analyze the urban potential of existing hospital complexes, in the context of defining contemporary design trends.

Humanistic tendencies in the design of hospitals emerged only during the Age of Enlightenment, most fully expressed in approaches to the mentally ill. Some of the facilities built at that time were composed in the form of attractive landscapes and architectural settings, which were supposed to promote the relative well-being of patients, while others still resembled prisons. The projects of the second half of the 20th century can be considered the least humanistic, primarily due to the scale of these facilities, as well as the prioritization of medical procedures over the well-being and comfort of patients. The height of the buildings, the length of access to the various zones, the move away from the idea of an all-access green

¹⁹ *Ibidem*, pp. 258–260.

²⁰ A. Gawlak, A. Ptak-Wojciechowska, *Pavilion hospital for venice. Whether Le Corbusier's design ideas could be the answer to today's pandemic challenges* [in:] T. Kozłowski (ed.), *Defining the Architectural Space – Architecture and the City*, vol. 1, Oficyna Wydawnicza ATUT, Wrocław 2023, pp. 109–123.

hospital zone, and measuring the quality of the facility by the number of beds, led to a situation in which the patient feels anonymous and like an object. Urban layouts of hospitals often lack a clearly accentuated entrance or a dominant feature that defines the layout.

Among contemporary hospital complexes, one can see a humanistic dimension, as well as features reminiscent of the “treatment machine” hospital of the second half of the 20th century. Nowadays, a particularly important element of urban composition, directly related to the humanistic dimension of architecture, is the natural factor. The inclusion of greenery in the urban composition is one of the primary goals inherent in the new ideas, theories, and concepts of urbanism.²¹ The use of greenery in various forms is detailed in the “catalog of methods and forms of humanization of urban spaces.”²² The hospital-city and atrial layout creates a variety of internal and external spaces (courtyards with greenery, plazas, squares), the scale of which is friendly to the human scale. The multifunctionality and diversity of spaces, as well as the structure of the development itself, integrate the urban tissue at the compositional, functional, and aesthetic levels, with architectural details defining the space.²³ It is a human dimension that defines the hospital not only as a place to treat patients, but also as a place that serves the city. The urban design of such hospitals also fits in with the idea of the “15-minute city” and offers a wider range of services beyond treatment (service, catering, and other zones in the first floors of hospital entrance areas). Contemporary design trends that create concrete solutions at the urban and architectural scale, the validity of which is confirmed by numerous scientific studies, include the key role of greenery outside and inside hospitals, the role of daylight, natural materials, elements and solutions referring to nature (biophilia), art, etc. This set of elements leads to the humanization of the environment of modern hospitals resulting in their de-institutionalization. The best examples of today’s hospitals do not resemble a typical hospital, and their external appearance often brings to mind buildings with the function of a luxury hotel, mixed-use or service buildings. This feeling is also heightened by the way the interiors of entrance and general areas in hospitals are created and arranged. Such designs of hospitals are closely linked to their surroundings, which are most often built-up areas but also natural landscape systems. Hospitals are now located close to population centers, unlike in previous centuries when they were often significantly isolated from the city.

In the case of monospace hospital layouts and various variants with podiums, which are characterized by a compact horizontal or vertical dominant mass, the very scale and form of the building reduce the humanistic dimension of the entire complex. The large mass is not adapted to the human scale. Nor is it divided into smaller segments that would create a design resembling the layout of a complex of buildings forming a larger whole, with a variety of spaces serving the community and unifying them. In the case of compact layouts, the surroundings of a hospital complex consist of parking spaces and green areas with

²¹ A. Zachariasz, *Parks, green areas and landscape in view of new concepts related to the shaping of structure and form of a city = Parki, tereny zieleni oraz krajobraz w świetle nowych koncepcji kształtowania struktury i formy miasta*, “Technical Transactions. Architecture. Czasopismo Techniczne. Architektura” 2014, no. 2-A, pp. 327–359.

²² M. Nowaczyk, *Katalog metod i form humanizacji przestrzeni miejskich (część I)*, “Zeszyty Naukowe Uczelni Vistula” 2017, no. 6, pp. 42–55.

²³ S. Gzell, *Detal architektoniczny widziany z urbanistycznej perspektywy*, “Czasopismo Techniczne. Architektura” 2012, no. 5-A1, pp. 145–146.

varying degrees of development (this can be low greenery, less often parks or gardens). In the case of a location in a densely developed area, the greenery in a hospital complex is kept to a minimum and uniform, which is a major drawback that intensifies the institutional feeling of the facility and reduces its human dimension.

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