

Ergonomics in Polish Outpatient Clinics

Agnieszka Gębczyńska-Janowicz

*Faculty of Architecture
Gdańsk University of Technology
Gdańsk, Poland*

ABSTRACT

Outpatient clinics are structures in which ergonomics plays a key role. This fact is associated with an often occurring risk of developing hospital-acquired infection. The risk increases with mistakes made in wrong planning of working places for the medical staff. On grounds of the profile of such an outpatient clinic, planning the functional and spatial lay-out is subordinated to high utilitarian requirements, including hygienic and sanitary, and technological requirements. A properly planned structure allows to reduce dangers more efficiently for its users: patients and medical staff. The aim of this article is to show the role of ergonomics in planning the safe space in medical facilities. It will present current regulations concerning the spatial planning of outpatient clinics as structures offering medical services in time not exceeding 24 hours, as well as analyses of practical solutions on architecture, technology and ergonomics, which increase user safety in Polish medical facilities offering primary care.

Keywords: architecture, ergonomics, outpatient clinic, harmful factors in the working places

INTRODUCTION

Outpatient clinics are public facility buildings for medical business providing medical and diagnostic services. These facilities are also called open health care units because of the temporal importance of the business. In contrast to hospitals, they offer urgent medical care within 24 hours. For many decades the main aim of outpatient clinics in Poland was to offer people medical services in their everyday environment: place of living, work, or school (Juraszyński, Nitsch, Prębowicz, Radwański, 1973). Nowadays, outpatient clinics are often built as specialized health care units: primary care, dental, ophthalmological, cardiologic, pediatric, rehabilitative, or connected with advanced diagnostic technology. They offer medical infrastructure adjusted to the specialization of a given medicine specialty, for example, an ophthalmologic outpatient clinic is able to conduct complex examination and treatment concerning eye diseases, beginning with basic examination in the consulting room, through advanced diagnostics, to surgery within 24 hours. Such activity significantly relieves inpatient health care units, but, at the same time, causes a shift of threat occurrence from hospitals to the area of primary health care units.

THE CHARACTERISTICS OF PRIMARY HEALTH CARE UNITS ARCHITECTURE

The architecture of medical facilities is characterized by functional and spatial arrangement, subordinate to stricter requirements concerning safety conditions while exploiting the building by patients and staff. Planning a new

outpatient clinic or modernization of an already existing one requires a detailed preparation of medical technology, which constitutes a very important directive for the designers.

The key general construction requirements concerning health care architecture are mainly: accessibility and adaptation of the rooms to the needs of disabled patients and patients having problems with moving. For this purpose some ergonomic guidelines concerning halls and corridors have been developed. An example of special treatment of medical facilities are the indications on designing stairs, included in the *Regulation of Minister of Infrastructure on technical specifications for buildings and their locations of 12/04/2012 (Rozporządzenie Ministra Infrastruktury w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie z dnia 12 kwietnia 2002 r.)* It is therefore forbidden to build, e.g. winder stairs and u-shaped staircases designed for patients motion. When designing staircases in outpatient clinics it is necessary to remember about compulsory requirements: minimum width of the flight should be 1.40 m (in public utility buildings 1.20 m), maximum 14 steps in one flight with maximum height of the step of 1.15 m (in other buildings of public utility maximum number of steps is 17, each of 0.175 m height). Additionally, it is required to put handrails on both sides of the flight and no stair nosings or trims.

Functional arrangement of the clinic can be divided into 5 main zones:

- *Proper medical zone (consulting rooms)*, these are the rooms where diagnostic and medicinal services are provided. Within this space there should be diagnostic consulting rooms and treatment rooms. Diagnostics may be specialized and form groups of X-ray laboratories, magnetic resonance imaging, etc. In the clinic there may also be groups of advanced surgeries performed within an operating theater. Such services are allowed in primary health care as 24 hours surgery, called also a one day hospital.
- *Patients social rooms zone*, it groups such rooms as general communication, waiting rooms, cloakrooms, and toilets for patients.
- *Staff social rooms zone* is a group of social rooms, as cloakrooms, toilets, and resting rooms for the staff.
- *Adjuvant – technical medical zone*, these are the rooms connected with technical infrastructure and stockrooms (with division into dirty and clean zones), cleaning supplies room, places of municipal and medical waste storage.
- *Administrative zone* with rooms in which administrative and office work is done (Bąkowski, Czabański, Gębczyńska-Janowicz, Pokrzywnicka, Poplatek, 2012).

Each of the aforementioned zones requires a detailed plan based on controlled flow of staff, patients and materials used for medicinal purposes. The biggest attention is paid to the medical zone, because it is a space, which is the most vulnerable for potential accidents at work.

According to the theory of Vitruvius, architecture should be subjected to three principles: durability (*Firmitas*), utility (*Utilitas*), and beauty (*Venustas*). All these features are very important in medical facilities, yet usability plays the key role. Function dominates over aesthetics of solutions, and durability depends on funds invested in the first stage of the emerging medical realizations. Clinic planning requires analyses concerning the choice of the most convenient conditions, which will ensure proper functioning of the medical facility providing safe medical services performance. Ergonomics plays an important role here. It increases staff's safety and comfort of work, facilitates safe and comfortable service performance, accelerates and increases the quality of medical activities and reduces the building and equipment exploitation costs.

A threat for proper implementation of ergonomic solutions in the space is the economic factor, which modernists added to the three principles by Vitruvius as an essential feature of contemporary architecture. Polish medical enterprises having financial problems often limit the realization costs for new units or modernization of already existing ones. It is common that it manifests itself in poor quality concerning safety and comfort of the building.

An example of contradictory influence of both factors is spatial planning of rooms in clinics. From ergonomic premises, bigger space adequately adjusted to a given activity performed at the working place is an optimal solution. For the investor who plans clinics, economic determinants multiply the number of work sites assigned to the available floorage. Increasing the number of units performing various medical services often takes place with simultaneous decrease in ergonomics in consulting rooms and groups of medical laboratories. Changes, which happened during last decade in Polish legislation on guidelines for subject running a medical business lead,

unfortunately, towards deterioration of medical rooms ergonomics. Until 2012 in Poland a law was valid that gave directives to use minimum space available, depending on classification of the medical room. Therefore, the *Regulation of Minister of Health on requirements for rooms and equipment in medical facilities concerning the professionalism and sanitary norms of 10/11/2006 (Rozporządzenie Ministra Zdrowia z dnia 10 listopada 2006 r. w sprawie wymagań, jakim powinny odpowiadać pod względem fachowym i sanitarnym pomieszczenia i urządzenia zakładu opieki zdrowotnej)* gave minimum parameters for space for a diagnostic room: 12 m², room for taking samples to analyze: 6 m², diagnostic-treatment room: 15 m², and additionally for the treatment room where general anesthesia is performed: 20 m². These were the indicators that allowed to ergonomically furnish the room. The new guidelines contained in the *Regulation of Minister of Health on requirements for rooms and equipment in a subject running a medicinal business of 26/06/2012 (Rozporządzeniu Ministra Zdrowia z dnia 26 czerwca 2012 r. w sprawie szczegółowych wymagań, jakim powinny odpowiadać pomieszczenia i urządzenia podmiotu wykonującego działalność leczniczą)*, do not define the size of the rooms.

The effect of such actions is the possibility to plan more rooms of smaller space within the clinic and considerably worse ergonomic conditions. The legal position looks a bit better in the case of specialized diagnostics. The surface of such rooms as X-ray laboratory, MRI laboratory or computed tomography laboratory is determined by the directives provided by the manufacturers of the diagnostic devices, along with additional specific provisions. Technical requirements of the device (e.g. media demand, weight and size) and an unquestionable demand to be secure from side effects influence, dangerous for health of people, resulting from the work of the device provoke more attention paid by the investor and the designer while planning ergonomic parameters for the room in which the equipment is to be installed.

THREATS AND OTHER HARMFUL FACTORS IN CLINICS

Mitigation of legalities creates an opportunity for many interpretations of requirements while planning work stations where medical activities will be performed. It is a dangerous situation concerning the specificity of work in outpatient clinics. In the work environment, medical staff has contact with harmful factors of various origin and they can be the cause of accidents or occupational diseases. Research on dangers occurring in the working process distinguished several categories of harmful factors: physical, chemical, biological, physical and mental, connected with work organization, and personal matters (Uzarczyk, 2009).

In reference to the outpatient clinic as a work environment, a significant number of threats can be distinguished which staff may encounter.

Biological harmful factors: In medical facility it is extremely important to analyze the possibility of biological threat occurrence because of the increased influence of bacteriological, mycological and viral harmful factors. A serious threat associated with them is the risk of hospital-acquired infection, which can occur in result of medical services performed, during patients-staff contact or patient-patient contact, and also as a result of contact with surfaces of divisional structures and medical equipment. Research on opportunities and techniques to mitigate the infections in hospitals and other medical facilities objectivized the need for cooperation between various occupational groups participating in medical processes: physicians, nurses, microbiologists, cleaning staff, administrative and supervision staff (Michalak, 2012). It seems justified to include also designers into this process because proper organization of space is able to support procedures preventing hospital infections implemented during exploitation of the building.

Physical harmful factors: In an outpatient clinic there may be performed diagnostic or medical treatments under the condition that the patient's condition after the operation will not require hospitalization. During operations the staff use needles, scalpels and other sharp instruments, which may cause harm to any staff member. Also in this case proper organization of the work station is able to prevent a significant number of accidents. Physical harmful factors possible to occur in clinics are also installations with medical gases and X-ray, ionizing and electromagnetic radiation associated with work of advanced diagnostic equipment, and ultraviolet radiation used occasionally to sanitize rooms. In the last decade, in Poland, the number of diagnostic equipment increased and this equipment is not only characteristic for specialized hospitals anymore. Devices such as magnetic resonance or computed tomography are becoming the equipment encountered in primary health care facilities. It creates the need to move ergonomic practices applied in hospitals to the space of clinics.

Chemical harmful factors: Medical staff having contact with chemical substances used in operations or sanitizing are vulnerable also to intoxication.

Physical and mental harmful factors: Physicians, especially ophthalmologists and dentists are highly vulnerable to health breakdown because of their posture during performance of diagnostic or treatment activities. In this case ergonomics is extremely important both in room's organization and furniture and medical devices construction.

An additional threat is the factor of social origin. The work of medical staff requires interpersonal communication. Moreover, people provided with medical services are mainly people who need special attention. Patients, as people who suffer, often show impatience and violence, which makes contact with them a very stressful experience.

RELATIONS BETWEEN MEDICAL MALPRACTICE OCCURRENCE AND ERGONOMIC CONDITIONS IN OUTPATIENT CLINICS

Abovementioned cases concern negative influence of work environment in an outpatient clinic on staff. Medical spaces are also the source of significant danger for clients coming from outside. Incorrectly conducted medical procedures may constitute the reason of health deterioration or health breakdown. The phenomenon of medical malpractice is associated with this aspect and it defines mistakes in staff's work or improper work organization in the medical facility.

In 2008 there was conducted an expertise on relations between inadequacy of ergonomic solutions and frequency of medical malpractice occurrence. The analyses conducted led to the conclusion that "medical malpractice preconditioned by ergonomic factors is a premise to an undesired event occurrence in the health care system. This premise results from ergonomic limitations in any link of the system" (Pokorski, 2008). According to the data contained in the cited study, the reason for accidents at work in medical facilities and medical malpractice occurrence during medical activities is not only human factor but also, to a large extent, improper organization in the multifaceted health care system.

The research conducted on functioning of work stations in medical facilities showed that the direct cause of medical malpractice occurrence caused by staff may be improper work organization resulting in exhaustion, haste and distraction (Kryst, 2011).

The majority of medical malpractices analyzed is associated with inpatient clinics. The space of outpatient clinic has been so far seldom analyzed because of easier medical procedures applied in primary health care. This should be altered because of structural changes in functioning of an outpatient clinic. Primary health care became a field of medical malpractice occurrence as a result of introducing advanced medical (groups of 24 h surgery) diagnostic technologies (magnetic resonance, computed tomography, etc.) into the space of a clinic. Medical technology progress is far beyond the adaptation possibilities of staff and architecture of already existing medical facilities.

Intense development of medical equipment follows two directions. On the one hand, diagnostic and medical devices become miniaturized. It results in better opportunities of introducing new devices into the existing structures without deteriorating ergonomic conditions. Additionally, negative influence indicators of medical devices on human environment are still being improved, which causes significant reduction of threats and necessity to use safety procedures.

What is worth noticing is the fact of ergonomics improvement in medical equipment. Unfortunately, because of the financial limitations in Polish medical facilities, it is very often that there are sets of equipment combined from parts from different manufacturers, which makes the set not acceptable concerning basic ergonomic solutions.

On the other hand, medical equipment follows the direction of positive medical spaces adaptation. Furniture and devices, apart from functionality, gain also aesthetical element, which mitigates the feeling of sterile coldness, so characteristic for outpatient clinics and hospitals. These changes provoke transformation of architectural guidelines. Aesthetics improvement provokes also changes in spatial parameters of the device, and this forces verification of ergonomic parameters applied in design.

CONCLUSIONS

Polish legislation takes into account the specific character of medical facilities exploitation. Valid acts (from, e.g., requirements of general construction, sanitary and work safety regulations) which contain guidelines for designing

subjects running a medical business. They regulate many spatial aspects, e.g. locating, rooms and construction elements parameters. In these regulations certain directives and restrictions concerning medical facilities are emphasized. Designers may also use the norms which enlist proposed indicators and parameters adjusted to the conditions of medical facilities, especially for lights, microclimate, acoustics, etc. However, these guidelines are of general character and do not describe requirements for many specific details.

There is a huge dearth of guidelines on work station organization for medical staff and equipment arrangement in the rooms. Such a situation demands interdisciplinary cooperation between specialists from different branches, such as architects, ergonomists, technologists and installers. However, the role of ergonomics becomes more important because of the dynamic technological development and wider knowledge about occurrence of threats of different background in the work stations. Modern medical equipment requires extra ergonomic solutions allowing proper exploitation.

Hyper-technization of medical facilities improves quality of medical and diagnostic services provided, and, at the same time, there are more harmful factors occurring in work stations. Therefore, it is necessary to introduce changes in staff safety planning. The aim of ergonomics in medical facilities should be to maintain safety of building exploitation, decrease the frequency of medical malpractices occurrence, and limit the influence of harmful factors occurring in work stations. Ergonomic environment in outpatient clinics is able to ensure efficient working process which translates into bigger number of patients enrolled and reduction of exploitation costs. It is a strong argument in the conflict between ergonomic and financial factors determining the designing process in medical facilities realizations.

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