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INDOOR THERAPEUTIC GARDENS AS SUPPORTIVE ELEMENTS IN HEALTHCARE ENVIRONMENTS

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Abstract

People are spending less time in contact with natural elements in contemporary built environments, a situation that raises particular concerns in healthcare settings. Previous studies indicate that exposure to vegetation and nature-inspired design can support both physical recovery and psychological well-being. This paper examines the role of indoor therapeutic gardens as supportive components of hospital environments, with an emphasis on landscape and horticultural design. The research is based on a review of the literature on biophilic design and healing landscapes, combined with an analysis of international case studies and a site-specific evaluation of a medical recovery hospital in north-eastern Romania. Based on these approaches, the paper proposes a conceptual indoor garden solution that integrates vegetation, natural materials, daylight, and spatial organization, while complying with health and safety requirements. The results suggest that properly managed indoor greenery can reduce stress, improve environmental quality, and support patient recovery, while also contributing to better working conditions for medical staff. The study highlights the importance of landscape architecture and horticulture in developing healthier, more sustainable hospital environments.

Key words*: therapeutic gardens, biophilic design, healthcare environments, landscape architecture, horticultural design.*

INTRODUCTION

Modern healthcare environments are increasingly designed with attention not only to medical treatment but also to the quality of the surrounding environment. Hospitals are often perceived as stressful places, where patients may experience anxiety, discomfort, and psychological pressure during treatment and recovery. In this context, the integration of natural elements into healthcare facilities has become an important topic of research in healing environments and environmental design.

Several studies suggest that contact with vegetation and natural elements can contribute to improved physical and psychological well-being. Exposure to plants or views of nature has been associated with reduced stress, lower blood pressure, decreased anxiety, and improved patient satisfaction in hospital environments (Jiang et al., 2018; Zlati et al., 2022). For example, the study by Park & Mattson (2009) found that patients recovering in rooms with indoor plants reported lower levels of pain, anxiety, and fatigue than those in standard hospital rooms.

Beyond passive exposure to plants, therapeutic gardens represent a broader approach to integrating nature into healthcare settings. Therapeutic gardens are designed spaces that combine vegetation, sensory stimuli, and accessible spatial layouts to support healing processes and improve well-being (Stoica & Istrate, 2023). According to Yeo et al. (2020), indoor nature-based interventions such as horticultural activities, indoor plants, and garden environments can improve mood, social interaction, and overall quality of life, especially for older adults in care environments.

The concept of therapeutic landscapes is closely related to the principles of biophilic design, which emphasize the human need for connection with nature within built environments. Research indicates that natural elements integrated into interior spaces can create calmer and more restorative environments, which may positively influence both patients and healthcare staff. In this context, indoor therapeutic gardens represent a practical design strategy that can introduce vegetation, natural materials, daylight, and multisensory experiences into hospital

interiors (Grecu et al., 2023; Uwajeh et al., 2019).

Despite the growing interest in healing environments, indoor therapeutic gardens remain relatively limited in many healthcare facilities, particularly in Eastern European contexts. Their implementation often requires careful adaptation to medical regulations, spatial constraints, and maintenance requirements. Landscape architecture and horticulture, therefore, play an important role in designing feasible solutions that integrate vegetation within clinical environments while respecting sanitary and functional standards.

The present study examines the potential of indoor therapeutic gardens as supportive elements in healthcare environments. The research focuses on the Medical Recovery Hospital Arcadia located in Bârnova commune, north-eastern Romania. Based on a literature review, case study observations, and landscape design principles, the paper proposes a conceptual indoor garden intervention tailored to the specific conditions of this medical facility. The proposed design explores how vegetation, spatial organization, and natural elements can contribute to a more supportive and restorative hospital environment for patients, visitors, and medical staff.

MATERIALS AND METHODS

The present research combines literature analysis with a case study approach in order to explore the role of indoor therapeutic gardens in healthcare environments and to develop a landscape design proposal adapted to a real medical facility.

The study's theoretical framework is based on a review of the scientific literature on healing environments, biophilic design, and therapeutic gardens in healthcare settings. Previous studies examining the effects of indoor plants and nature-based interventions in medical environments were analyzed to identify the main design principles and potential benefits of integrating vegetation in healthcare facilities. Particular attention was given to studies that investigated the physiological and psychological effects of indoor plants and therapeutic garden environments on patients and healthcare staff (Park & Mattson, 2009; Uwajeh et al., 2019; Yeo et al., 2020).

The empirical component of the research is represented by a case study conducted at the Medical Recovery Hospital Arcadia, located in Bârnova commune, near the city of Iași, north-eastern Romania. The building and its interior spaces were analyzed to identify opportunities to introduce vegetation and nature-inspired elements within the hospital environment. The analysis considered spatial configuration, circulation areas, lighting conditions, and the functional requirements specific to a medical recovery facility.

Based on the results of the literature review and the spatial analysis of the case study site, a conceptual design proposal for an indoor therapeutic garden was developed. The design process followed principles commonly associated with therapeutic landscapes and healing environments, including the integration of vegetation, natural materials, daylight access, and spatial organization that supports relaxation and visual contact with greenery. The proposed intervention was adapted to the hospital building's existing architectural structure, while considering hygiene requirements and the operational conditions specific to healthcare environments.

The methodological approach, therefore, combines theoretical research with applied landscape design, allowing the study to explore both the scientific background of therapeutic gardens and their practical implementation in real healthcare contexts.

RESULTS AND DISCUSSIONS

Reference Case Studies of Therapeutic Healthcare Environments

To identify relevant design strategies for integrating nature into healthcare environments, several international hospital examples incorporating biophilic design principles and therapeutic garden elements were analysed. These reference projects provided insights regarding spatial organisation, plant integration, the use of natural materials, and the role of visual contact with nature in medical facilities.

One relevant example is Crown Sky Garden, located on the 11th and 12th floors of the Ann & Robert H. Lurie Children's Hospital in Chicago.

The project was designed by the landscape architecture studio Mikyoung Kim Design and represents an indoor therapeutic garden created specifically for paediatric patients and their families. The space integrates several principles of biophilic design, including natural light, vegetation, natural materials, and areas for relaxation and contemplation (Nemes & Mikyoung Kim Design, n.d.). Large floor-to-ceiling windows allow natural daylight to penetrate the interior space. At the same time, elements such as bamboo vegetation, wooden seating structures, and sculptural installations create an atmosphere similar to a small indoor forest (Figure 1). Curved resin panels serve as both decorative and functional elements, acting as planters and spatial dividers that offer a sense of privacy and comfort (Nemes & Mikyoung Kim Design, n.d.).



Figure 1. The waiting area at Ann & Robert H. Lurie Children's Hospital (Nemes & Mikyoung Kim Design, n.d.)

Another relevant reference project is The Royal Children's Hospital in Melbourne, Australia, a healthcare facility that integrates natural elements throughout both interior and exterior spaces. The design emphasizes visual contact with nature, with more than 80% of patient rooms offering views of surrounding green areas or landscaped courtyards (Figure 2). The hospital also incorporates terraces, gardens, and transitional spaces that connect interior environments with outdoor natural areas. In addition, interior spaces are designed around thematic concepts inspired by Australian landscapes, integrating graphics, art, and natural imagery that reflect local ecosystems. These design strategies help create a supportive, calming atmosphere for patients, visitors, and healthcare staff (HKS Architects, n.d.).



Figure 2. View of natural surroundings from a patient room at The Royal Children's Hospital (HKS Architects, n.d.)

A third example is the Shengavit Medical Centre in Armenia, where biophilic design principles were applied to transform waiting areas and public spaces into environments that resemble comfortable living spaces rather than traditional hospital interiors (Figure 3) (Archangel Architectural Bureau, 2018).



Figure 3. The waiting area at Shengavit Medical Centre (Archangel Architectural Bureau, 2018)

The design uses neutral colour palettes combined with warm accents such as green and blue tones, which are associated with calmness and emotional balance. Natural materials, such as wood, are used extensively for furniture and

decorative panels, while organic forms and soft lighting create a welcoming and relaxing atmosphere. The project demonstrates how relatively simple design interventions based on environmental psychology and colour theory can significantly improve the perception of healthcare spaces (Archangel Architectural Bureau, 2018).

Another important example is the Lucile Packard Children's Hospital Stanford, located in California, where therapeutic gardens and outdoor terraces are integrated throughout the hospital complex (Figure 4). The project includes rooftop gardens, individual terraces for patients and staff, and landscaped areas covering approximately 1.4 hectares. These spaces incorporate a wide range of plant species, including trees, shrubs, and flowering plants, which help create a natural and restorative environment. Large glazed surfaces allow daylight to penetrate interior spaces, while the extensive use of wood and natural colours enhances the connection between the built environment and the surrounding landscape (Allan & Perkins &Will, n.d.).

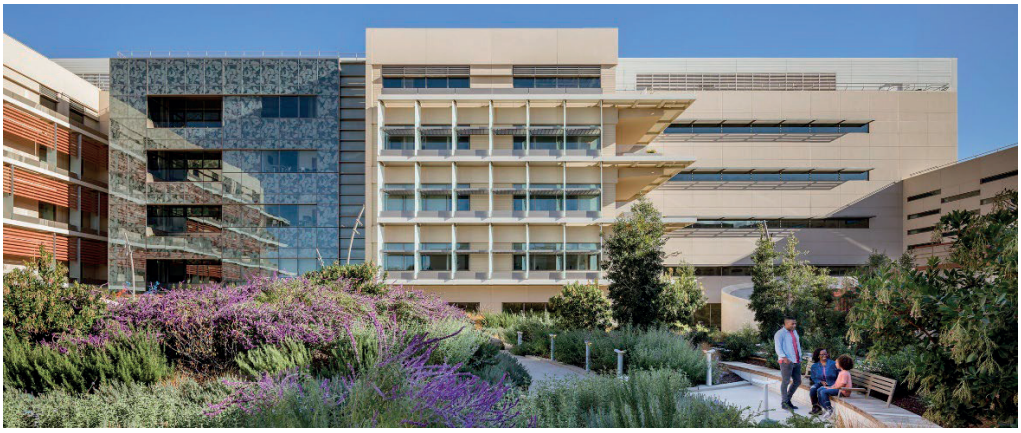

Figure 4. The therapeutic garden on the roof of Lucile Packard Children's Hospital Stanford (Allan & Perkins &Will, n.d.)

The analysis of these projects highlights several common design principles that support the creation of therapeutic healthcare environments. These include integrating vegetation into interior spaces, providing access to natural light, using natural materials such as wood, creating visual connections to nature, and creating spaces dedicated to relaxation and contemplation. These principles were considered during the development of the landscape proposal for the Arcadia Medical Recovery Hospital.

Case Study: Arcadia Medical Recovery Hospital

The case study selected for this research is the Medical Recovery Hospital Arcadia, located in Bârnova commune, near the city of Iași, in north-eastern Romania. The hospital is part of a private medical network and provides specialised services in medical recovery and rehabilitation. Facilities of this type typically host patients for extended periods during treatment and recovery, which increases the importance of the surrounding environment and the overall quality of interior spaces.

In healthcare environments dedicated to rehabilitation, patients often spend considerable time not only in treatment rooms but also in circulation areas, waiting spaces, and transitional interior zones. These spaces, therefore, play an important role in shaping the perception of the hospital environment and may influence patient comfort, stress levels, and overall well-being. Previous research indicates that environmental factors such as access to daylight, visual contact with vegetation, and the presence of natural materials can contribute to improved psychological comfort and patient satisfaction in healthcare facilities (Mohajer & Movahed, 2026).

The Arcadia Medical Recovery Hospital building offers several interior areas that could potentially accommodate elements of indoor greenery and nature-inspired design. Among

these, circulation zones and waiting areas represent spaces with high user interaction, frequently used by patients, visitors, and medical staff. Such areas provide opportunities for introducing vegetation without interfering with medical activities or clinical procedures.
The building's spatial characteristics, including natural light sources, interior openness, and available transitional spaces, make it feasible to consider integrating a therapeutic indoor garden (Figure 5). Introducing vegetation and natural elements in these areas may help create a calmer, more welcoming atmosphere within the hospital, while maintaining the functional requirements specific to healthcare facilities.

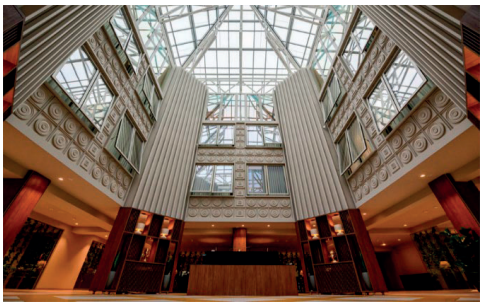

Figure 5. The central area inside Arcadia Medical Recovery Hospital (https://secp2024.feg.ro/event/vizita-la-spitalul-de-recuperare-arcadia-barnova/)

Based on observations conducted within the hospital building and design principles identified through analysis of reference case studies, a conceptual proposal for an indoor therapeutic garden was developed. The design aims to introduce vegetation, natural materials, and spatial elements that encourage relaxation and visual contact with nature, while respecting hygiene requirements and the operational conditions specific to medical recovery centres.

Spatial Analysis of the Interior Environment
The spatial analysis of the Arcadia Medical Recovery Hospital focused on identifying interior areas that could accommodate vegetation and nature-inspired design elements without compromising the facility's functional requirements. Healthcare buildings must respect strict circulation rules, hygiene standards, and accessibility requirements; therefore, any landscape intervention must be carefully adapted to these conditions.

Particular attention was given to circulation spaces, waiting areas, and interior transitional zones. These areas are frequently used by patients, visitors, and medical staff, and they are spaces where environmental design can visibly impact the hospital's overall atmosphere. In many healthcare buildings, such spaces are primarily designed for movement or waiting and often lack visual stimuli or natural elements. Introducing vegetation in these areas may improve spatial quality while maintaining their functional role.
Natural light availability was another important factor considered during the spatial analysis. Adequate daylight is essential for maintaining healthy indoor vegetation and creating comfortable environments for hospital users. Areas near windows or glazed surfaces were therefore considered more suitable for integrating plant compositions and landscape elements.
In addition to lighting conditions, the spatial analysis also considered accessibility and safety requirements. Circulation routes must remain clear to allow easy movement of patients with reduced mobility, medical equipment, and hospital staff. For this reason, the proposed design solutions focus on using controlled planting areas, integrated planters, and clearly defined spatial zones that do not obstruct circulation (Figure 6).



Figure 6. Close-up of proposed planters (original)

The analysis also highlighted the importance of visual contact with vegetation. Even indirect exposure to plants or green elements can help create a more calming environment and can improve the perception of healthcare spaces (Ulrich, 1984). Therefore, the proposed intervention focuses not only on the physical

presence of vegetation but also on ensuring that greenery is visible from multiple points within the interior space.

Based on the spatial analysis and design principles identified in the reference case studies, several interior areas within the hospital were considered suitable for the integration of an indoor therapeutic garden. These findings formed the basis for the conceptual landscape proposal developed for the Arcadia Medical Recovery Hospital.

Conceptual Design of the Indoor Therapeutic Garden

Based on the spatial analysis of the Arcadia Medical Recovery Hospital and the design principles identified through the reference case studies, a conceptual proposal for an indoor therapeutic garden was developed. The intervention aims to introduce natural elements into the hospital interior, creating a more calming and supportive environment for patients, visitors, and medical staff (Figure 7).



Figure 7. Aerial view of the proposed concept (original)

The proposed design focuses on integrating vegetation, natural materials, and spatial elements to encourage visual contact with nature. Indoor plants are the central component of the intervention, as vegetation can help improve environmental quality and psychological comfort for hospital users. Previous studies indicate that the presence of plants in healthcare environments can reduce stress and anxiety and may contribute to improved recovery conditions for patients (Park & Mattson, 2009; Yeo et al., 2020).

The spatial organisation of the indoor garden is designed to maintain clear circulation routes while introducing areas dedicated to relaxation and visual interaction with greenery (Figure 8). Vegetation is arranged in controlled planting areas and integrated planters that define different zones within the interior space without obstructing movement. These planted areas serve as both aesthetic elements and spatial organizers, contributing to a more welcoming atmosphere.



Figure 8. Relaxation and waiting area (original)

The selection of plant species for the indoor therapeutic garden was based on several criteria, including adaptability to interior conditions, low maintenance requirements, and the ability to contribute to a calming visual environment. Species that tolerate indirect light and stable indoor temperatures were prioritised, as these conditions are typical for hospital interiors. Among the proposed plants are *Sansevieria trifasciata* (snake plant*), Zamioculcas zamiifolia* (ZZ plant), and *Epipremnum aureum* (golden pothos). These species are widely used in interior landscaping because of their high tolerance to varying light conditions and relatively low water requirements. Their vertical or cascading growth forms also help create visual structure within planted areas without obstructing circulation.

Additional species were selected to increase visual diversity and create a more natural and relaxing atmosphere. Plants such as *Chlorophytum comosum* (spider plant), *Nephrolepis exaltata* (Boston fern), and *Asplenium nidus* (bird's nest fern) introduce softer textures and more dynamic foliage forms, which enhance the perception of greenery within the interior space. Decorative foliage plants such as *Calathea orbifolia* (calathea) and *Philodendron hederaceum* (heartleaf

philodendron) were also considered for their ornamental leaves and adaptability to indoor environments. In addition, *Hedera helix* (English ivy) can be used in vertical or cascading arrangements, contributing to the visual continuity of the planted areas. The combination of these species supports the creation of a balanced interior planting composition that integrates aesthetic, functional, and therapeutic qualities within the hospital environment.

Natural materials were also considered an important component of the design proposal. Elements such as wood and natural textures were selected to reinforce the connection between the built environment and natural landscapes (Figure 9). Research on therapeutic environments suggests that natural materials can contribute to creating more comfortable and restorative interior spaces (Scott et al., 2016; Uwajeh et al., 2019; Vladimir & Cojocariu, 2024).



Figure 9. The vertical wall of ivy and the glass pillar (original)

Another important aspect of the design concept is the relationship between vegetation and light. Adequate natural light supports plant growth and enhances the visual perception of greenery within interior spaces. Large windows and well-lit areas, therefore, play an important role in integrating indoor vegetation and creating a more open and pleasant hospital environment (Figure 10).

The conceptual proposal developed for the Arcadia Medical Recovery Hospital aims to transform interior spaces typically associated with waiting or circulation into environments that offer moments of relaxation and a visual connection to nature. By introducing vegetation and nature-inspired design elements, the indoor therapeutic garden enhances the spatial quality of the hospital while maintaining the functional requirements specific to healthcare facilities.



Figure 10. Close-up of the glass roof (original)

CONCLUSIONS

The integration of natural elements within healthcare environments has become an important topic in recent research on healing environments and environmental design. The present study explored the potential of indoor therapeutic gardens as supportive components of hospital interiors, with particular attention to landscape architecture and horticultural design principles.

The analysis of international reference projects demonstrated that the presence of vegetation, natural materials, and visual connections with nature can contribute to creating more comfortable and restorative healthcare environments. These examples highlight the role of biophilic design strategies in improving spatial quality and supporting the well-being of patients, visitors, and medical staff.

The case study conducted at the Arcadia Medical Recovery Hospital in Bârnova, Romania, showed that interior circulation areas and transitional spaces can provide suitable opportunities to integrate vegetation without interfering with medical functions. Based on the spatial analysis and the identified design principles, a conceptual proposal for an indoor therapeutic garden was developed.

The proposed design aims to introduce vegetation and nature-inspired elements into the hospital environment in a controlled, functional manner. Such interventions may help reduce stress, improve environmental quality, and

create a more welcoming atmosphere for hospital users.

Overall, the study highlights the potential contributions of landscape architecture and horticulture to the design of healthier, more supportive healthcare environments. Further research and practical implementations may help expand the integration of therapeutic gardens into hospital buildings, particularly in regions where such approaches remain relatively limited.

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