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Lighting in Hospitals. Case Study: Military Hospital of Tirana, Albania

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Abstract. Hospitals must have adequate lighting so that medical personnel can do their duties and attend to the requirements of patients and visitors. A comfortable recuperation environment may be created with the aid of good lighting. The relationship between daylighting and artificial lighting and their role in the design process will be mentioned. Specific areas of the hospital will be under adequate lighting analysis. The areas taken into consideration are entrance and waiting areas, circulation areas, operating theatres and clean rooms, wards and bedrooms, ancillary areas, restaurant and kitchen, and exterior lighting. Some of these areas are also analyzed regarding the case study of the Military Hospital (University Trauma Hospital) of Tirana Albania.

The purpose of this paper is to compare different lighting standards, the EU standards, and the Albanian ones. Solutions can be provided for lighting systems, starting from luminaries and lamps, to lighting controls and lighting management systems, from the early stage of design. The architect is the enabling partner to develop meaningful lighting solutions for all areas of healthcare facilities.

Introduction

The notion that the hospital setting affects recovery has recently gained popularity. Patient and staff happiness, patient period of stay, employee turnover, medical mistakes, infection rates, and eventually financial performance are all significantly improved by health facility design. Employing a method for controlling digital lighting is the most practical and effective manner of achieving ideal illumination.

Patients' healthcare experiences are enhanced by digital lighting control providing them certain influence over their surroundings. The lights can be turned off or turned on and can be set for reading, watching TV, or relaxing. As a result, patients feel at home and relaxed in their surroundings, which reduces their anxiety and raises their level of happiness.

Digital lighting control gives staff members the freedom to perform normal medical and housekeeping activities in more pleasant light settings or at higher brightness levels for patient examinations and medication delivery. Hospitals can take advantage of outside sunlight for energy savings and patient satisfaction by enhancing natural light. Digital lighting management, when combined with other facility design components like noise reduction and outside view, can create a hospital atmosphere attractive to the patients, keep users, and improve both the standard of treatment and the hospital's economic sector [1].

This article provides information on color usage and light in hospitals. The CIBSE Lighting Guide related to the "Hospitals and Healthcare Buildings" is mostly concentrated in public areas, such as lobbies, waiting rooms, bars, dining rooms, circulation areas, bedrooms, auxiliary spaces, hospital wards, and operating rooms [2].

Lighting may be either basic or quite complicated, depending on the visual process. It provides information about the world around us by producing a psychological experience that can provoke feelings of comfort, safety, enthusiasm, and many more. This psychological sensation can be created by deciding factors like a room's design, size, and color [3].

A lighting configuration should be efficient in terms of energy use as well as for human use. The importance of energy efficiency is rising. Utilizing energy-efficient lights, ballasts, and luminaries in conjunction with the right lighting controls may be very cost-effective and helpful in achieving energy goals. Either the appreciation for natural light or the efficiency of the power utilized for illumination are significant considerations. At the design stage, a good maintenance strategy should be created for both lighting and color.

There is some proof that the visual environment's design, regarding the balance of light and color, might improve users' well-being [4, 5]. In certain healthcare buildings, it has been revealed that the visual environment's quality has a positive outcome on staff productivity and patient recovery rates. But this design feature shouldn't be disregarded. The architect or the interior designer, (when one is hired), is in charge of the actual physical design of the structure. They may in turn hire a professional lighting designer and a color design consultant.

The psychological and emotional factors that might affect the health of patients should be taken into account when using color and design in users' accommodations. Providing a pleasant, friendly atmosphere that offers variety and attraction for clients and guests is one of the main goals.

Color may be utilized to manage reflected light, minimize glare, and maximize sunshine. The appropriate shade may remove fear and influence attitude. It has been demonstrated that people with mental health issues have extremely strong emotional responses to color [6].

The lighting design includes both electric and natural lights. The effectiveness of the users' performance on their tasks is correlated with the visual function and their capacity to make them feel comfortable.

Color plays a utilitarian and aesthetic role in altering the look of places, which contributes to the creation of a better atmosphere [7].

In order to provide varying brightness levels and perceived lightness, reflective materials are crucial in lighting design. Raising the brightness of a building's interior is significantly influenced by the materials' degree of reflection.

Maintenance is another important issue. It is needed to avoid as much as possible dirt, dust, and damage. Because of poor lighting maintenance or color scheme, money can be wasted, and also the efficiency of the environment.

The hospital involves a large number of occupants. Hospitals are often seen and perceived as stressful environments. According to a study related to patient recovery, the patients were sent home approximately 1.5 days earlier due to the change in the environment. The environment should be designed to facilitate connection with staff, also to the outside world [8].

The inner environment should provide confidentiality and privacy but some problems can be avoided, for instance, long corridors, and lack of seating. Color and lighting design can help the process. The choice of details such as landmarks, ornamentation, artwork, and interior landscape plays an important role too.

The elderly require more medical attention and must stay in the hospital for a longer period. They have specific visual needs for appropriate lighting and color design. A person's visual system changes with age in several ways [9, 10]. The eyes cannot focus to close range, retina receives less light, for instance, a 60-year-old received about 1/3 in terms of retinal illumination of what a 20-year-old received. The elderly become less sensitive to the blue end of the spectrum. The eyes become inefficient in adapting [11]. People with cataracts seem to show many problems with glare and the reduction of the ability to see short wavelengths.

The use of ceiling for orientation and special perception, skirting floor, skirting wall, door handles, and frames for identifying doors are used to ensure a comfortable environment for the patients.

The wheelchair users need lighting low-level control. From a wheelchair's perspective, signage has to be well-lit. These places should appear as bright as possible using lighting and color [12].

The young people have also a particular requirement for lighting and color design. Premature babies are particularly sensitive to strong light, which can be stressful [5]. Young children pay significantly more attention to color and shape than to form.

According to Xhexhi, K. (2021) the natural illuminance level of a building depends on the area deepness, the dimensions of the openings, and the orientation of the building [13, 14, 15].

In another survey conducted by Ullah, Z. et al., (2023) were selected 124 public hospitals and their sustainability performance was compared by LEED. The results show high energy consumption, high costs, variable healthcare regulations, poor administration, poor planning, political meddling, insufficient workforce, and traditional architectural designs. The use of eco-friendly materials, techniques in construction, solar energy, enhancing hospital operations, raising sustainability awareness among the general population, preserving energy and water, and implementing sustainable garbage disposal and mobility is crucial in order to improve patient safety, security, lighting, acoustics, thermal comfort, indoor air quality, and access to economical healthcare services [16].

Daylighting

The amount of natural daylight in an interior area is known as daylighting. There are some principles of good daylighting such as space geometry; windows and other apertures, including their position and orientation, and the interior surfaces' features.

There are a lot of surveys about windows [17] that showed the important role that they have. The window and the daylight are all the time in correlation with each other and of course in real harmony. People are very much interested in introducing the concept of the window in buildings. There are some benefits in certain cases such as sunlight provides healing and stimulating properties; access and communication to the outside world, particularly a viewpoint; sky-bound light which is typically preferred by humans compared to electric lights; fresh air that penetrates inside the building; windows can reduce the feeling of isolation and claustrophobia [18], and quicker recovery rate.

According to Ulrich [19] patients who can see trees heal quicker than those who can only see a stone or brick wall. According to the British Standard Code of Practice for daylighting, people like a view of trees, plants grass, and open spaces [20].

The window's size should be sufficient to offer an adequate view. There are some ratios regarding the external wall. If the window area is below 20% the satisfactory view is ruined, and above 30% of people are satisfied [21, 22]. The most pleasant view includes the foreground, some view of the sky, or some trees. Small spaces without any view of the outdoors or any interaction with it might seem quite confining [23]. The lack of windows creates a consistent environment that might be monotonous and gloomy. The staying length of the patient is shortened and diagnostic and therapeutic outcomes are closely correlated with sufficient daylight [24, 25].

The need for privacy is different in different parts of the hospital, for instance, there is a relatively different proportion of privacy levels in wards and different in the consulting room. Some precautions that should be considered to provide better privacy are curtains or diffusing glazing.

The light from the sky is rather necessary for hospitals. It is profitable for the color rendering needed [26].

Some strategies are used for daylighting the building. Also, electric lighting control is essential. When there is enough natural light, the lighting may be diminished or turned off. It is needed to control the zones and daylighting demands. The designer must choose the shading devices and glazing properties of the materials. In hospitals, certain areas do not require sunshine and are situated in the core that is not illuminated by daylight. Light distribution in hospitals is very important; some of the examples have few areas, with some roof glazing. This could lead to excessive heat.

The window-to-wall ratio (WWR) cannot be ignored in reducing glare and enhancing patient visual comfort. Toodekharman, H. et al., (2023) conducted a simulation and revealed that the facade with WWR 60% has a better overall performance [27]. Furthermore, according to another study conducted by Xhexhi, K. (2023), it was revealed that within a specific neighborhood of Tirana, built during the socialist period, WWR was 19.7% and WFR (window-to-floor-ratio) was 10.8% [28]. Origami is an excellent illustration, which influences the design of facades and has been extensively studied from the perspective of natural light and energy [29, 30].

The quantity of daylight in a space is based on the average daylighting factor DF. It is needed at least 2% of DF to consider the day-lit. For the hospital spaces, the recommendation values are 3%. If the value passes through to 5% DF, there is a danger of overglazing. The condition of the windows can also affect how much light penetrates a space. Especially for the high-level windows and roof lights maintenance is crucial. The deepness of the space plays also a crucial role in lighting design. If the area is very profound, the interior will appear dark compared to perimeter window lighting [31].

When taking into account the type of facade, Alzoubi et al., examined the Daylight Factor (DF) in the patient's room in a hospital. In this study, the simulations of the ideal condition and the current situation are compared. Due to indoor surfaces' greater reflection, the second one has higher internal illumination levels. The findings demonstrated that elements in interior design, including furniture and interior surfaces, had a direct impact on the brightness of indoor spaces [32].

By using models and field measurements, another study investigated the interior of the children's ward's daylighting quality at King Abdullah Hospital. Illuminance and brightness levels in the patient rooms to the south and north exceeded CIBSE requirements, necessitating shading of the hospital facade [33].

According to Longmore and Neeman's questionnaire [34], 91% of the people asked responded that sunlight for them was a pleasure. People prefer sunlight because it provides light and warmth. However, there are some circumstances when it is necessary to allow access to both sunlight and movable shade to prevent overheating and glare. For many hospitals internal curtains are one of the solutions. The material preferred for the shadings is metalized fabrics which reflect the extra solar heat.

It is important to mention also the Louvred blinds which give better control to sunlight and reduce glare effectively, particularly in non-cleaning areas. The use of the mid pane blinds is the most hygienic and proper choice. In the summer, the sun can be blocked by horizontal or vertical shade above windows, canopies, overhangs, and swings.

For instance, indirect glare can happen when the wall's brightness level is unacceptably high. By lowering the incident flow, the degree of contrast, and the brightness of the windows, one may regulate the penetration of natural light into the structure. Control mechanisms are crucial for reducing glare. There are many types of shading devices to be considered according to the demands of the users. These systems may consist of stationary or mobile external equipment [15], as seen in Figure 1.

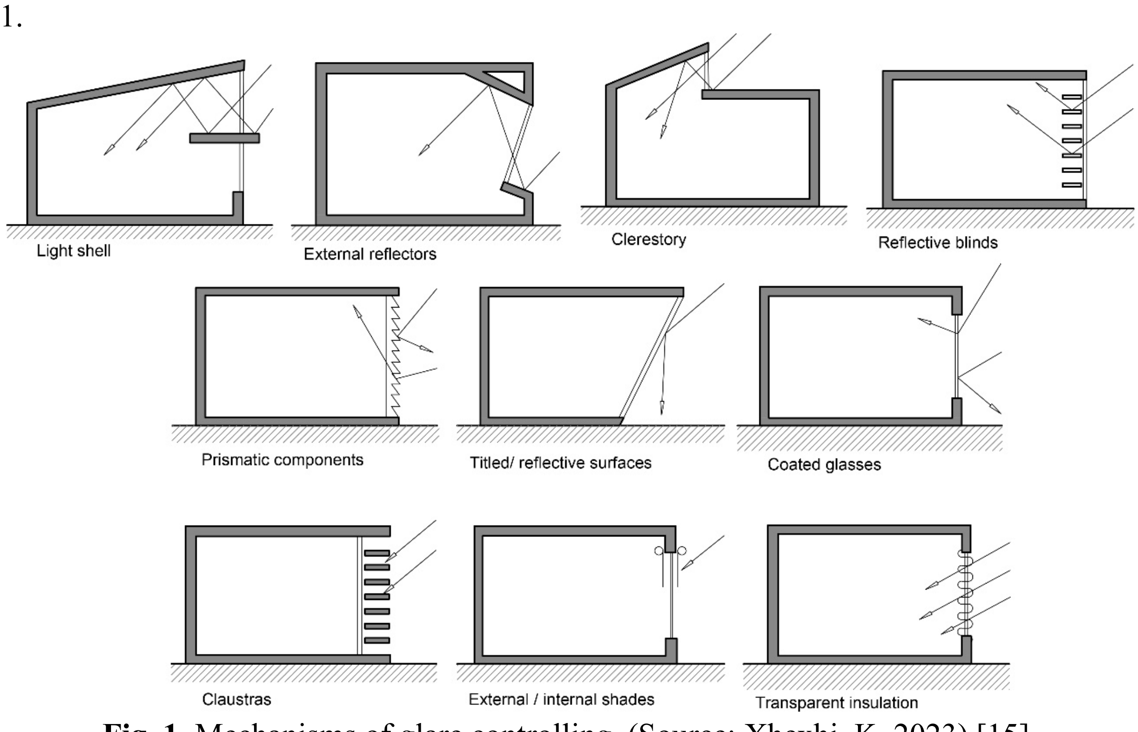

Fig. 1. Mechanisms of glare controlling. (Source: Xhexhi. K. 2023) [15].

Lighting design

Some factors that influence directly lighting design are lighting appearance; task illumination; architectural integration; energy efficiency; lighting maintenance; and lighting cost [35, 36].

The visual environment enhances the user's feeling, but it also can affect the patient's recovery. The harsh lighting can stress the users while the appropriate lighting can improve their development, their sleep patterns and reduce retinal damage [37].

Task illuminance is another key factor. Is needed to have different solutions if the occupancy is elderly with perhaps poor sight, and if the patients are teenagers.

There are some specifications. For instance, for the circulation area (corridors night and day) the level of illuminance is 50-150lux, for the reading area the level of illuminance is 200-500lux, and for examination and treatment 500-750lux. The persons who benefit from the right level of light are more focused on the work, improving visibility.

Color representation is also very important in lighting design. The color of the surface is important to avoid errors [38]. For instance, lamps must render color in a good way. The strong saturated color must be avoided and controlled. The CIE general color-rendering index [2], sometimes known as Ra, can be used to define how the lamp renders colors. There is a maximum and a minimum on the Ra scale. Her maximum scale is 100. In most of the hospitals, her values go up to 80.

Good performances require the bypass of the glare and the discomfort. Glare problems can occur in daylight, especially in direct sunshine, and also combined with electric lighting.

Occupants would like to have a room according to their "visual interest". It is important to mention an example related to the degree of lightness in a restaurant. The equal amount of light and shadow in every area of the restaurant is often disliked by the customers. The brightness of the surface can determine the lighting appearance. There are admissible here, the walls, the furniture, the ceiling, etc. [39]. The walls will look gloomy if there is little light on the ceiling. It is needed to ensure that some walls receive partially direct sunlight otherwise there will not be enough perception of light and shadow.

Another element of lighting is the color appearance of lighting. There is a different range of colors, those that give a cool appearance and those that give a pleasant appearance. It is important to mention electric lamps, specifically fluorescent lamps. The color temperature is measured in degrees Kelvin (K) [2]. In some cases, in hospitals, it is usually preferred to use a lamp color that merges with daylight. For instance, a lamp with 4000K is recommended [2] as seen in Table 1.

Table 1. Color temperature. (Author's elaboration).

	2500K	2700K	3000K	3500K	4000K	6500K
Color temperature	Extra warm white	Warm white	Warm white/white	White	Cool white	Daylight

The role of the designers in lighting system

How does the architecture fit with all these problems? There are some responses which include: the style of lighting equipment (which respects the architectonic style), physical integration, incorporation of electrical wiring and electric illumination with daylighting, and meaningfulness to the light patterns.

Sometimes is necessary for the architect to change the level of the illuminance on different floors and different colors between the walls and the ceiling. Also, the architects operate with concealed lighting incorporated into the suspended ceilings. There is a risk here of interfering with the ductwork passing through the ceiling.

Another important point is the intersection of daylight and the optimum level of efficiency. The process should be controlled in order to have the best possible performance. The aim is to make the lighting part of the architecture. Energy efficiency has a direct relation with cost. The aim is to reduce as much as possible the use of electricity. According to another survey, if all the T12 fluorescent tubes were converted to T8, in a hospital, it is possible to have an annual saving of around 31,465 Euro [40]. This energy is calculated based on the amount of light produced and the energy it consumes. The lamp provides light and this light is measured in lumen and the energy that it consumes is measured in watts. In the end, the energy efficiency of the lamp is calculated in lumens per watt. The percentage of light that emerges for the luminaries in the desired direction is known as the lighting output ratio (LOR) [2]. Nowadays exists some modern ballast that improves energy efficiency and operates at high frequency. Also, the users can use lamp-dimming facilities to improve energy efficiency. The architects and the engineers design the lighting installation in order to perform better [41]. For instance, the lighting close to the windows can be turned off, while the lighting farther away from the windows can be left on as needed. This is possible by the automatic controllers.

Lighting maintenance serves as a crucial function in the indoor area. It is strains related to the visual condition required.

If the luminaries become dirty, they lose the efficiency of their original reflective value. There will be some loss of the reflected light. So, it is needed to maintain a good level of care in order to satisfy the space's needs. Also, the replacement process should be performed correctly by ensuring that the proper type and color of lights are substituted. Some regulations do not allow performing the process of cleaning less than once per year, and in certain instances, more frequently, for sanitary reasons. The positions of the luminaries are very important, and they should be situated in an area that is simple to access [2]. Of course, the maintenance program should be supplied by the designers. It can reduce labor costs and minimize the potential disruption to hospital staff and patients. After being replaced, the lamps should either be disposed of in a landfill or recycled [42]. Also, the windows and the blinds need to be cleaned in order to perform better.

Unfortunately, often happens that lighting equipment is put in place at the end of a facility program. The lighting installation will last for about ten years maybe more. If there is no good lighting, the personnel won't be able to work effectively, and obviously, the patients' recuperation might deteriorate.

Hospitals' generic areas compared to the Military Hospital of Tirana

Hospitals and healthcare buildings are complex. There will be a wide range of color and lighting needs for various regions of the building. Hospital areas are often organized into seven general categories.

1. General areas (entrance and waiting areas)
2. Circulation areas
3. Operation theatres and cleaning room
4. Wards and bedroom
5. Ancillary Areas
6. Restaurants/Kitchens
7. Exteriors

Entrance and waiting areas. The illuminance level should be around 300lux for the entrance and waiting areas. The colors of the interior must be attractive and relaxing. The journal of the patients starts and ends in this zone and the first impression is created here [43]. Often hospital buildings use glass and steel materials for the entrances, but because of their tendency to reflect light, some materials may be problematic. For instance, the visual comfort of users is greatly influenced by the nature of the glass [44]. There must be a clear line of sight to the front desk.

The hospital's front desk serves as the initial point of contact because of this, this region ought to be the brightest within the visual field. Lighting over the front desk should be placed between the client and the receptionist. However, the receptionist will work on a computer and so the light should suit this task too.

Three major categories may be used to categorize the electric lighting in the atrium: general illumination, lighting for planting, and decorative lighting. Meanwhile, in the waiting area, the level of illuminance should be around 200lux. Wall-mounted lighting can replace or supplement ceiling luminaires to give a domestic-type feeling.

According to Albanian standards, the illuminance level at the entrance should be 200lux [45]. The main entrance of the Military Hospital of Tirana is easy to find and marked with beacons which are not positioned at an accurate distance from each other as seen in Figure 2. The main entrance is also marked with mounted luminaries in order to receive bigger importance as seen in Figure 3.

Fig. 2. Outside beacons (Source: Authors).

Fig. 3. Entrance area and the wall-mounted luminaries (Source: Authors).

Recently the Military Hospital of Tirana has faced a partial requalification. According to the expertise, the illumination level of the Military Hospital entrance is relatively low. It is difficult to measure without the right equipment but it is easy to observe the type of the luminaries. In order to have an accurate illuminance level it is needed to take some precautions such as putting in evidence the level of interaction between the users and the building. The reception area, lobby, and waiting areas have recently improved as seen in Figures 4A, B, and C. In order to feel comfortable and welcome in such zones, there is an urgent need for requalification that provides new spaces for sitting purposes for the occupants.

The concealed lighting is missing as also the lighting over the reception desk. The penetration of the daylight inside the building provides a good effect flowing in the area as seen in Figure 4C.

Fig. 4. A. Entrance area; B. Reception area; C. Lighting flowing in the corridor (Source: Authors).

Circulation areas. Attention needs to be paid to this zone, regarding the corridor lighting and the proper lighting of direction signs. The position of the luminaries in the corridor area is another important issue. Generally, are preferred luminaries centrally mounted for better performance. Well-lit corridor endpoints and emphasized direction changes should be used to draw attention to the route change. The circulation areas required lighting controls. Photoelectric switching can be used in stairwells and hallways that are illuminated during the day in order to utilize less electrical lighting during the day. Hospitals and healthcare buildings must have emergency escaping lighting [46, 47].

Corridors do not require a high level of illuminance generally between 150-200lux. The corridor appears wider due to the linear lighting that runs down it [43]. According to Albanian standards for residential and non-residential buildings, the illumination level for the corridors and stairs is 100lux [45]. Highly polished corridor flooring can cause a lot of reflected glare. In that case, a carpet is required. As the circulation area is often based on artificial light it is important to use high reflectivity and matt surfaces on walls and ceilings.

There are many suggestions to be underlined in such areas considering the Military Hospital of Tirana. First of all, the openings of the corridors to the outside seem to be very well designed. The natural integration to the courtyard, in order to avoid every type of silhouette as seen in Figure 5A is well considered. Some of the corridors do not receive natural light at all as seen in Figure 5B. It is observed that the floor level is high. Furthermore, the luminaries were mounted very high so their performance was low in terms of illumination.

Generally, the luminaries were centrally mounted. Some of the corridors lacked daylighting so the lamps were on all the time as seen in Figure 6A. It was a tendency to reduce the lack of daylight through some openings in the upper part of the door as seen in Figure 6B, C.

The materials used on the floor were rather reflective and also helped to reflect the light. The predominant color for the interior spaces was open green and white, and the color rendering was white (natural, 4000K). There are some different types of luminaries as shown in Figure 7. Generally, all the lamps were fluorescent ones, and a few of them were LED. In other words, it is known that LED lamps consume 20% less energy than fluorescent lamps and last longer, optimizing energy efficiency. Moreover, fluorescent lamps emit UV light.

Fig. 5. A. Lighting flowing in the corridor; B. Corridor without natural light (Source: Authors).

Fig. 6. A. Central mounted luminaries; B.C. Opening in the upper part of the door (Source: Authors)

Fig. 7. Different types of luminaries in the corridors (Source: Authors).

Operation theatres and cleaning room. The highest level of illumination is required in the operation theatres around 10.000-100.000lux. According to the Albanian Standards, the illumination level in these areas should be minimally 1000lux [45]. Fully recessed, sealed, and fluorescent lights are used to provide lighting in these areas including digital dimming control gear. These luminaries are easily cleanable and also use lamps with clinical-quality color rendering. Approximately the same level of visibility is required also for the preparation and inspection of pharmaceuticals and laboratories. Also, the design of the luminaries is very important. They should have a few surface voids and attachment points where germs might gather.

Wards and bedroom. Any ward unit's illumination must be adequate for both the daytime and nighttime needs of the patient and the nursing staff. Ward generally has one to four beds. A sense of optimism should be present in a ward.

Wards often have sufficient natural illumination, however, in some circumstances, it can be required to take into account supplemental lighting for the regions further away from the windows.

Generally, the level of illuminance for this area should be around 500-1000lux (this is due to the fact that the patients are also subject to examination). According to Albanian standards for residential and non-residential buildings, the illumination level for the bedrooms is 150lux. These norms do not consider patients' examination [45]. Lighting at the bed head for reading should be around 300lux and the level of illuminance in sleeping hours should be 5-10lux. The surroundings and the balance between the brightness and colors will help to reduce glare, creating an attractive atmosphere.

Lighting designers may encounter unique challenges with ceiling heights between 2.7 and 3 meters, particularly in bedrooms, especially when the curtains surrounding each bed are drawn. The objective is to offer just the right amount of light for the medical team without disturbing the patient if they are attempting to go to sleep again. Solutions often involve using recessed lights in the ceiling, wall-mounted lights, or lights incorporated into bedhead trucking. For wall-mounted luminaires, 1.8 m is the recommended mounting height.

The bedrooms in the Military Hospital of Tirana were almost overpopulated. The very high floor level is not helpful for a good illuminance level. In this case, it is needed to mount the hanging luminaries and not the ceiling-mounted ones. Lighting in the bed heads was recently improved. Fabric shutters were positioned in the upper level of the window just to avoid the glare as seen in Figure 8. The windows are in general well dimensioned and collect as much as possible sunlight but in general vertical or horizontal shadings were missing.

Fig. 8. The bedrooms and the type of luminaries used (Source: Authors).

Ancillary Areas. These areas are also very important for everyday activities. These areas require at least the minimum standards to be maintained. The illuminance level in these areas should be around 300-500lux. Different types of luminaires are used in the current example as seen in Figure 9.

Fig. 9. Ancillary Areas (Source: Authors).

Restaurants/Kitchens. Good lighting promotes safety and hygiene. For these areas, the color rendering should be around 80+ and with a color temperature below 4000K, typically 2800-3000K. The Albanian standard of illumination level for these areas is 200lux [45]. Despite certain sections in hospitals that serve very specialized purposes, others, such as support service areas like kitchens, laundries, offices, and stores, must be illuminated similarly to comparable spaces in other non-healthcare structures [48].

Exteriors. The positions of outside lighting are very important also for the safety of the patients. The beacon positions should lead the pathway intersections, entrances, hazards, and changes in level. It is needed to consider the height of the luminaries, the ingress protection, the typology of light, the effectiveness of the lights, and the level of vandal resistance provided. Roads car parks, and entrances, all need adequate lighting and the road to the entrance should be correctly defined and lit. The designers should avoid areas in total darkness.

There is an existing courtyard inside the complex, a sort of atrium in the Military Hospital of Tirana. The daylight flows inside the green atrium. Each part of the working plan had good lighting received directly from the sun as seen in Figure 10. Generally, the internal courtyards provide a good amount of physiological tranquility. Meanwhile, during the night, the level of illuminance in that area is very low. Some precautions must be taken in order to improve the situation such as increasing the numbers of the beacons, and their positions, in order to receive approximately the same level of illuminance all over the courtyard.

Fig. 10. Courtyard inside the complex (Source: Authors).

Future Work

There are several issues to be addressed in order to obtain more information and data regarding the illuminance level in hospital facilities. Future work will be focused on direct measuring with specific instruments of illuminance level during the day in all the generic areas of the hospital. The data should be further elaborated and compared.

Virtual and software simulation should be engaged too, in order to observe and correct the illuminance level in specific areas. Hospitals must allow the flow of natural light in the interior, in order to satisfy the user's demands. This can be done from the early stage of the design or during reconstruction. Energy savings will be significant when the methods are put into practice.

Conclusion

In order to achieve the proper goals, designers must take into account the visual surroundings and make the proper use of color and lighting. The aim is to make the hospitals also a pleasant place to stay not just for the elderly but also for the very young generation. According to some surveys, the recovery rates increase if there are implemented daylighting and artificial lighting strategies. Generally, hospitals are very complex buildings. Energy efficiency in lighting is a crucial concern in order to reduce costs. The appropriate selection and use of luminaries can predict a lot of benefits. These operating expenses, simplicity of maintenance, staff efficiency, and patient recovery must be considered in the cost prediction. The designers must consider the color design and lighting at the earlier stage of design. There is a gap between Albania's Lighting Standards the European Lighting Standards. An adequate need for requalification is needed especially for the Military Hospital (University Trauma Hospital) of Tirana.

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