



Hospital ambience: Qualification of spaces and perception and environmental awareness

Cristiane N. Silva

Universidade Federal do Rio de Janeiro – Doutorado em Arquitetura - PROARQ /FAU/UFRJ- Rio de Janeiro, Brasil

cristianensilva@gmail.com

Leonardo A. Ferreira

Instituto Israelita Albert Einstein – Pós Graduação Latu Sensu em Engenharia Clínica - Rio de Janeiro, Brasil

leonardo.a.f@outlook.com

ABSTRACT: One of the conceptions of the meaning of the term ambience refers to the pursuit of humanization through the balance of the elements of the environment, whereas, in the aspects of the built environment, the social, political and economic, culture and personal values of each individual which directly affect the perception of these about space. health care environments encompass several limitations of design due to the numerous regulatory provisions and home to a huge diversity of people from different classes, cultures and social positions. Research in environmental psychology have concluded that the characteristics of the hospital physical environment can significantly influence the physical and psychological health of users, ensure welfare conditions that can assist in the recovery of patients, and provide greater insight into the quality of care. Among the physical aspects to be considered in the evaluation of healthcare environments, highlight those related to valuation of environmental elements that interact with people - color, smell, sound, lighting, morphology, and other items that act as modifiers and qualifiers space, stimulating environmental awareness. Given the scope of the aspects to be considered in the apprehension and understanding of ambiances in EAS, this article Atera aspects that may interfere with the qualification of spaces, their possible influences and effects on the perception of ambience these spaces by its users. The study was prepared based on a review of review of hospital ambience and environmental awareness in health care buildings.

Keywords *Ambience, health care buildings, environmental awareness*

1. INTRODUCTION

As regards the environment survey focused on health care spaces, the adoption of the concept as presented by HumanizaSUS mentions the understanding of the design process as an act "beyond mere technical composition, simple and formal environments" (BRAZIL, 2013), as a major and necessary process of learning media habits, spaces, processes and even of people and values in order to adapt the health building projects not only to current legislation but also the effective use of it will be given to the designed spaces. Even if the assumptions made by Primer Ambiente the Ministry of Health are inherent to the broader concept of ambiente, do not consider more broadly the subjective aspects that are, in order to better achieve their goals related to the humanization of the health care spaces.

Health care spaces, simpler or more complex composition, cover several limitations of design due to the numerous legislative provisions attached to them, are home to a huge diversity of people from different classes, cultures and social positions that historically operate with verticalized power structures, whether due to its administration, services or own relationships between its various users. The study of ambiente in this building typology demand to understand how this interferes with the subjects and their interpersonal relationships, and they return the effect of this interference to the spaces and the other individuals around.

Among the physical aspects to be considered in the evaluation of healthcare environments, they are often mentioned, even in Primer Ambiente (BRAZIL, 2003), those related to the appreciation of the environmental factors that interact with people - color, smell, sound, lighting, morphology, and other items aimed at the comfortability of users, components that act as modifiers and qualifiers space, stimulating environmental awareness and, when used with balance and harmony, create cozy ambiente, providing significant contributions in the health production process. This study aims, through literature review on the topic, expand knowledge of the concept of ambiente, as understood by the booklet of the Ministry of Health of Brazil, scoring some of the aspects considered as qualifiers of health spaces and their possible influence and effects on perception the ambiente of these spaces by its users.

2. AMBIENCE CONCEPT

One of the conceptions of the meaning of the term ambiente is one that refers to the pursuit of humanization through the balance of all the elements of the environment, taking into account not only the aspects of the built environment, but also considering the role and participation of users the decisions that guide the design of these spaces (BRAZIL, 2003). A broader view of ambiente considers also, and primarily, the social, political and economic, as well as the culture and personal values of each individual, which directly interferes with the perception of space on attending.

According Bestetti (2014), the ambiente of the study brings considerable contributions to the understanding of the physical and emotional conditions of subjective well-being, and it is considered the stimuli to the behavior of subjects inserted in this context, improving your relationship with the spaces. It would then be necessary, be considered in the preparation of any architectural project, the moral environment, besides material means, setting all components in an interrelated system because, considering more than the architectural and

regulatory aspects, it is also required the analysis of environmental conditions perceived by the subjects, since this perception establishing guidance parameters, comfort and environmental quality with which the subjects are identified and can provide leadership and effective participation in activities carried out there.

There is, therefore, to consider the objective values, such as form, function, color, texture, ventilation, temperature, lighting and sound, but you can not do without considering the subjective values acquired on the basis of life experience and culture each person, since these will provide the establishment of the meanings, positive or negative, perceived by these stimuli perceived in relation to the environment as well as in relation to these environments. Ambiences are the material and moral atmosphere that gather thermal sensations, luminous, sound, but also cultural and subjective involving a particular place and its occupants.

Each individual uses spatial media to build their identity and establish their "place" in the world. The place is a concept raised by / for the user in the field of symbolization of experience in the search for identity links. In this process, the experience in place codifies the relations of belonging and structure negative or positive linkages between the user and the environment. Taking in consideration that an atmosphere is a positive condition and that recognition is given by the sharing of multiple sensory experiences that shape a personal identification, we understand that ambience can promote and accelerate the adoption of place through action: the symbolic appropriation and / or material is one of the first user actions of steps in the environment, a condition for a spatial experience. (DUARTE et al, 2008)

Building on the established assumptions, we conclude that the ambience, considered in this way, goes beyond the physical space and is now considered as the set of sensations and perceptions assimilated by each individual on this space, making it a place. One can also conclude that the perception of ambience can be positive or negative, directly influencing the relationship and the feelings of the subject with the same space.

3. AMBIENCE IN HEALTH CARE SPACES

According to Morais et al (2015), research in environmental psychology have concluded that the characteristics of the hospital physical environment can significantly influence the physical and psychological health of users. For these authors, an appropriate hospital environment can ensure not only the welfare conditions that can assist in the recovery of patients, but also improve the evaluations of these on health professionals, increasing their satisfaction with the services provided in institutions and provide greater perception of quality of care. With regard to health workers, these studies demonstrate that an appropriate physical environment may improve performance and job satisfaction. It is essential, then, understand, evaluate and monitor the perceptions of users, patients and professionals who live in health care environments on the quality of the physical environment, as well as the subjective environment quality, so to project environments meet the real needs of users and that can provide a "ambiance" that provides satisfaction, health and wellness. Penloup (2014) mentions the need to project considering both the constructed dimension, the social and sensitive dimensions of the living spaces. The study of ambience, according to the author mobilizes a set of disciplines, from the humanities to

the most technical sciences, through the acquisition of tools to model and instrumentalize interactions between built space and space sensitive, or perceived status.

Each site has its own ambience that characterizes and whose construction is everyday. It consists of physical, cultural, social, and use of temporality, among others, many of which operate unconsciously (Amphoux, 2004). If we consider that health spaces are essentially designed and intended for the care and rehabilitation of health, and the various theories and studies on the influence of the environment in the treatment of patients, it is important to understand how the ambience of units health has a fundamental role, not only in general for all who work there, but also for those who need them for treatment and care.

4. ISSUES AFFECTING THE PERCEPTION OF THE ENVIRONMENT

Vasconcelos (2004) states that the human being is constantly inserted in a space where develops its actions, whether work, leisure or rest, sheltering all the needs, expectations and desires of its members and which establishes an interactive relationship, where man receives environmental stimuli and react to them. These stimuli, derived from perception, first of all, depends on the physical and psychological conditions of the observer, the environment's ability to provide information and the social and cultural context in which that person-environment relationship is inserted.

Also according to Vasconcelos (2004), in hospitals patients may have limitations in sensory systems due to their health condition, requiring that environmental stimuli enable their perception through various sensory channels, should be observed in the design process, many aspects that can influence the perception of ambience and even interfere with the activities to be performed in these environments or in patient recovery.

The hospital physical environment should favor the satisfaction of its members, also making it into a therapeutic tool designed for health care, and avoid environmental stress, provide wellness feelings and meet their psychosocial needs. Considering also that well-designed spaces for clinical body of work will assist in the ease of performing the care tasks, resulting in less time spent in them and increasing their readiness for dedication to patients. (Byns ELI et al, 2006)

Among the qualifiers aspects of spaces, listed in the Handbook of *Ambiência* the Ministry of Health (BRASIL, 2004) listed below may be mentioned:

- **Light:**

Both natural light as artificial lighting are important for the qualification of hospital spaces, especially considering the length of stay and health status of patients in hospitals. Natural lighting and artificial should be combined and used to meet the regulatory aspects that establish the minimum illuminance, but also consider the qualitative aspects aimed at the welfare of patients. Biologically, the best light for the interior of the buildings is the natural light, the sunlight, which has a positive effect on mood and willingness of people. (VASCONCELOS, 2004). The author mentions the need for architectural elements provide contact with the outside environment, ensuring the visual, thermal and psychological comfort of patients and providing the perception of change in daylight, the contact with nature, relaxation and therefore to assist in

improvement in patient treatment. According Costi (2004) natural light is critical to patient recovery, and proven reduction in hospitalization time when the patient can take advantage of temporality notions and can observe the variation of light during the day and having view to the outside.

It is necessary to seek to minimize the negative effects to illuminate the environment, for the comfort of patients and staff, seeking had characterized lighting environments for the activities that there must occur within basic principles of lighting technique. We cannot forget that the field of view of a bedridden patient is the ceiling and direct light is a source of discomfort causing glare. The lighting should be indirect and the luminaire be suitable for this field of view (COSTI, 2004). With regard to health professionals when it improves illumination of the site, there is a significant improvement in production work performed by workers, since this lighting produces a feeling of comfort, safety, guidance, territoriality and performance of the visual task. The lighting of spaces contributes to the perception of mood and behavior of individuals (CAVALCANTI ET AL, 2002). Light is necessary for the activities and to compose the ambience of the place.

According Bitencourt (2007) the technical parameters used in Brazil for lighting projects in hospitals still follow the recommendations of the Brazilian Association of Technical Standards - ABNT by NBR 5413 - illuminance Interior, April 1990 determining the item 5.3. 28 - Hospitals, "The minimum illuminance in lux by type of activity (mean values in service)." However, according to the author, the new concepts of materials, equipment and lamps recommend that be done further research and specific to each activity to be performed in each environment designed, as well as their respective luminous demands, indicating how another important source of consultation US standards developed by the IESNA - Illuminating Engineering Society of north America, and approved by ANSI - American National Standards Institute, on March 27, 2006. This document entitled best Practices - RP-29-06 is significantly more current than Brazilian references, may be used as a constant parameter for the development of lighting designs in hospital environments. (BITENCOURT 2007)

- Color:

The choice of color can greatly influence the appearance of people and cause many feelings and should be considered by can also have negative aspects. The color is highly influential in the psychological and emotional state of man. It is the result of individual experiences and reacts to the brightness of the environment and can visually enlarge a space, narrow or reduce volumes increase relief, become a more intimate atmosphere and fun and minimize monotony in hospital environments (MARTINS, 2004). The colors are stimulating feelings, to relax, to work, to fun and can ensure heat or cold for people living in the environment, causing the body to compensate for their lack or excess (BRASIL, 2004). Vasconcelos (2004), states that color and light are the environmental factors that are closely linked, and may the light intensity substantially affect the outcome of color and, therefore, the choice of colors for hospital environments need to be very careful, being based in scientific studies indicate that the psychological effect of colors on the users of the space. According to the author, the colors strongly influence the psychological and human emotional and may, for example, stimulating the

sympathetic nervous system, increase brain activity, speed up the heart rate, blood pressure and respiration, as well as stimulating the parasympathetic nervous system causing tranquilizing effect.

Cunha (2004) states that the degree of reflection of the colors in the work and home field is very important, not only for the power of vision, but also for visual comfort and for that, the distribution of light density (brightness) is formed by intense contrasts, can cause great discomfort. We can also mention that, in the hospital area, the colors are also present in the organization and identifying some of the facilities, such as gas, facilitating guidance for their use and maintenance (CUNHA, 2004) and can also be used to identify sectors or specific areas.

- Sound:

Excessive noise can cause irritation, frustration, moodiness, stress and decrease the productivity of those who live daily in environments affected by it. Natural sounds such as those caused by water loss have a calming and relaxing effect, reducing the intensity of unwanted sounds (Vasconcelos, 2004). Still according to the author, excessive noise can also cause irritation and frustration, exacerbate the bad mood and reduce the pain threshold. It also affects visual perception and reduces learning ability. From the perspective of professional working in the affected environments, excessive noise decreases productivity and increases absenteeism. The improvement of acoustic environments can be provided by selection of coatings and furniture that do not reflect or amplify sound waves, irregular surfaces that assist in a dispersal of the sound and the use of materials with acoustic level, thus providing still and quiet environments.

- Morphology:

The morphology of physical space may interfere with the treatment process of the patient health-care areas, assisting in inhibiting or recovery. The sense of privacy is important and must be thought that the spatial arrangement of the wards allow, if necessary, isolating the bed, even if using devices such as curtains attached to the ceiling, to provide privacy to patients. (VASCONCELOS, 2004) In hospital settings, often there are few alternatives for different uses, as predetermining the normative and technical direct their design and organization, turning almost exclusively to provide the implementation of therapeutic practices of each sector. Even hampered by the type of activities carried out in these environments, the possibility of variability in the spaces should be considered in the design process in order to provide different options for use in environments where this variability is likely to be exercised and favoring the adjustment of environments to the needs of users.

- Air quality and biosecurity:

The air quality can have a direct and significant influence on the speed of recovery of patients and the occurrence of hospital infections. The attention to the air quality becomes even more important in health facilities that treat patients with cancer and immunosuppressive diseases, for example, since these patients usually are with highly compromised immune system and are extremely vulnerable to infections that can worsen your health.

In addition, they should be considered the environmental comfort and health feature on the presence of germs and bacteria, which are the millions in any environment. Factors which determine the temperature in buildings such as the provision of openings, the material constituting the walls and coatings and conditioning or heating air must be designed with due care to the use to be given to each environment, since temperatures high can induce laziness feelings of lethargy and decrease the productivity of people. Looking through the prism of thermal comfort, air movements accelerate the heat exchanges of people with the environment and are part of thermal control and health (Bestetti, 2014).

Zambrano (2007) identified several elements that influence the perception of individuals in health environments, and may help or not in the humanization process and the identification of ambiances for these individuals. He also noted that in addition to the growing appreciation of the influence of environmental conditions built on the mood and the health of their users, also emerged considerations about the psychological and sociocultural factors that influence the perception and construction of the user's relationship with the space that go beyond the more technical aspects and measurable environmental comfort. According to the researcher, despite the use of bioclimatic resources is a basic measure in architecture, these have not been extensively explored in the health environment architecture for a long time. Due to the general view of the hospital as "machine cure" his extremely relationship focused for a long time only for incorporation of new technologies in health and own restrictions due care and biosecurity. Restrictions on biosafety, which cannot be disregarded, are more specific in industries that require stringent air quality control in terms of purity systems, temperature, humidity, pressure and air renewal, such as operating rooms, treatment areas burned, clean rooms, etc. where artificial systems are recommended and commonly used.

Even weighing the restrictions on the safety of patients and other users should consider a range of beneficial applications of bioclimatic resources for healthcare environments, not only with respect to environmental comfort, but also with regard to Search economy and sustainability. Among the features to consider, natural ventilation is one of the important parameters of architectural design in the design process of healthcare environments in areas where there is extreme need for use of controlled ventilation. The use of natural ventilation is little considered, especially in relation to the number of renewals of air, the velocity of air between the environment and the internal displacement between an environment and each other and contiguous. Freire (2005), explains that the ventilation of a room has several functions , among which we can mention favoring thermal exchanges between people and the environment , removing excess heat from inside these environments , assist in the removal process excess water vapor contained in the air and on surfaces , to exchange stale air for fresh air and specifically for healthcare environments , the possibility of improving the quality of air smell and breathing in air circulation function and temperature control of internal thermal environmental conditions.

The conditions of the indoor air quality are greatly influenced also air conditioning, understood as the process of artificial air conditioning indoor air in public use environments, collective or intended to maintain ideal operating conditions for a particular device or process, can be used to control the air temperature, the amount of water vapor mixed with air (humidity), chemical composition and the biological particulate material dispersion and its movement, as required by the thermal comfort, or specific conditions

imposed for products, equipment or processes such as those used and performed in health buildings.

A study by Morais et al (2015) , testing the suitability of the temperature measured quality items and air quality in the physical -spatial comfort dimension in pain units located in Portugal , has identified twelve perception factors of air quality (PQA) in these environments : maintenance and care , guidance, building aesthetics and green spaces, in relation to the outer space of the hospital ; physical -spatial comfort, guidance and tranquility of the service in general ; physical space and comfort view and lighting inpatient area or waiting area of the consultation service; and social and organizational relationships , privacy and services which belong to the scale on the socio functional aspects . Among the aspects related to the temperature and air quality, important for a hospital environment quality and on the physical -spatial comfort dimension, the authors highlighted the following items:

- The temperature and air quality (temperature , air conditioning and ventilation) ;
- The adequacy of air quality level (which should be neither too wet nor too dry) ;
- The adequacy of the temperature (if it is too hot or too cold) ;
- If the air cooling system is efficient ;
- If the air is breathable.

The evaluation and the intersection of information on user satisfaction with the environments where they are and the data obtained from technical measurements are very important feature to be effected a critical analysis of the comfort conditions mentioned in various research and standards, national and International. As Ochoa & Araújo & Sattler (2012), it is normal that the body of users to adjust the conditions, to which it is subject over a period, is therefore extremely important to assess the conditions of air quality from the point of view of users in the environment under study. Perception is a brain function that gives meaning to the stimuli received from personal experiences, social relations, the needs, the culture, work capacity and interaction to the environment and can influence physical and mental health, performance and job satisfaction. The combination of all these aspects to be considered becomes distinct perception and preferences of users on each space.

Even considering all the question of the interpretation and perception of users on the conditions relating to the environments they attend and, more specifically air quality of these environments, in the case of health care environments, you cannot ignore legislation and specific norms for planning, installation and maintenance of equipment that will support and provide the correct and proper functioning of these for the establishment of indoor air quality in these buildings.

5. CONCLUSIONS

Restoring and maintaining health are paramount objectives to be considered in the targeted building projects for hospital care, since it is designed to a simple health post to those that are too high-complexity care. Goals are not only those who go in search of care, but also those who will provide this care. In addition to the care offer proposition, it is essential that health care environments also provide environments that bring well-being to all its users that provide "environments" in which all of these users, patients, caregivers and workers in

general, can understand and assimilate the "ambience" in a positive way. An ambience of comfort, safety and well-being can directly influence the recovery and maintenance of health of patients. Similarly, it can work for the workers of these sites, as prerequisites for achieving good productivity and good performance of its functions. Elements such as light, color, the smells, the form and the quality of the air, in addition to thermal comfort and biosafety, are an important part of the conditions that interfere with the perception of these ambiances for all the people who inhabit the health environments, may not only cause feelings of discomfort, the existence of an inadequate quality of indoor air can affect the health of patients and workers, causing hospital infections and decrease productivity and performance in addition to and negatively influence the perception of the services provided.

The mixture of all these actors aspects and trainers of spaces, determines the level of comfort and the perception that each user will have the ambience that surrounds it, is therefore essential in the practice of architecture and engineering for healthcare environments, consider the importance that each of them may have to provide ambiances that are pleasing to users and to provide the opportunity to assist in the recovery of patients and healthcare work processes provided. By studying the ambience of health buildings, it enjoys itself more a means to assess these areas, enabling new solutions aimed at designing environments that provide sense of security, comfort, well-being and that are suitable to the desires of individuals applied for assistance purpose of reception and treatment of their patients.

REFERENCES

- Amphoux, P. & Thibaud, JP. & Chelkoff, G. 2004. *Ambiances en Débats*. Bernin: Editions A la Croisée.
- Associação Brasileira de Normas Técnicas (ABNT). 2008. *NBR 16401-1 e NBR 16401-3*, instalações de ar condicionado. Rio de Janeiro.
- Associação Brasileira de Normas Técnicas (ABNT). 2014. *NBR 7256/2005*, Tratamento de ar em estabelecimentos assistenciais de saúde (EAS) – Requisitos para projeto e execução das instalações. Rio de Janeiro.
- Besteti, M. L. T. 2014. *Ambiência: espaço físico e comportamento*. Artigos Temáticos: Ambiência, Rev. Bras. Geriatr. Gerontol. 17(3): 601-610. Rio de Janeiro.
- Bins Ely et al, *Estudo de caso em hospital Universitário em SC*. 2006. Artigo Técnico. XI Encontro nacional de Tecnologia no Ambiente Construído – ENTAC. Florianópolis- SC – agosto de 2006.
- Bitencourt. F. Iluminação Hospitalar – A luz em ambientes hospitalares como um componente de saúde e conforto humano. Artigo. Revista eletrônica Lume Arquitetura. Edição 27. Agosto/setembro de 2007. Disponível em: <http://www.lumearquitetura.com.br/pdf/ed27/ed27-Aula-Rapida-Illuminacao-Hospitalar.pdf>.
- Brasil. 1998a. *Portaria N° 3.523*. Agência nacional de Vigilância Sanitária (ANVISA). Brasília – DF.
- Brasil. Ministério da Saúde, 1998b. *Portaria N° 3.523*. Brasília – DF.
- Brasil. 2002. *Resolução - RDC n° 50*. Agência nacional de Vigilância sanitária, ANVISA, Brasília, DF.
- Brasil. 2003. *Resolução - RE n° 9*. Orientação técnica elaborada por grupo técnico assessor sobre padrões referenciais de qualidade do ar interior em ambientes climatizados artificialmente de uso público e coletivo. Agência nacional de Vigilância sanitária. ANVISA – Brasília, DF.
- Brasil, 2004. *HumanizaSUS: Ambiência*. Secretaria-Executiva, Núcleo Técnico da Política Nacional de Humanização. Brasília: Ministério da Saúde. Brasil, Ministério da Saúde. 2013. *Ambiência*. Secretaria de Atenção à Saúde. Núcleo Técnico da Política Nacional de Humanização. 2. Ed.6 reimp. Editora do Ministério da saúde. Brasília – DF.
- Cavalcanti, Patrícia B.; Mascaró, Juan L.; Mascaró, Lúcia. *Iluminação em ambientes de internação – análise comparativa de dois hospitais de Florianópolis*. In: VII Congresso Latino-Americano de Ergonomia, XII Congresso Brasileiro de Ergonomia, I Seminário Brasileiro de Acessibilidade Integral, 2002, Recife. Anais do VII Congresso Latino-Americano de Ergonomia, XII Congresso Brasileiro de Ergonomia, I Seminário Brasileiro de Acessibilidade Integral. Recife: ABERGO, 2002. CD-ROM.

- Costi, M. Iluminação em Hospitais - Cuidados fundamentais. Artigo Revista eletrônica Lume Arquitetura. Edição 27. Junho/julho de 2004. Disponível em: http://www.lumearquitectura.com.br/pdf/ed08/ed_08_Capa.pdf.
- Cunha, L. C. R. A cor no ambiente hospitalar. Artigo técnico, Anais do I Congresso Nacional da ABDEH – IV SEMINÁRIO DE ENGENHARIA CLÍNICA – 2004, Salvador – BA. Disponível em: http://bvsm.sau.gov.br/bvs/publicacoes/cor_ambiente_hospitalar.pdf.
- Freire, S. A., 2005. *Inter-relações entre a qualidade do ar externo e interno em espaços hospitalares: O Complexo de Doenças Infecto-Contagiosas Dr. Clementino Fraga em João Pessoa – Paraíba*, Dissertação de Mestrado. Universidade Federal da Paraíba. João Pessoa – PB.
- Martins, V.P. (2004). *A humanização e o ambiente físico hospitalar*. In: IV Seminário de Engenharia Clínica. Anais do I Congresso Nacional da ABDEH.
- Medeiros, J. M. *A vivência do ambiente hospitalar pela equipe de enfermagem*. Dissertação de mestrado - Pontifícia Universidade Católica de Goiás - Mestrado em Ciências Ambientais e Saúde, Goiânia – Goiás, Agosto de 2011.
- Morais, R. & Andrade, C.C. & Bernardes, S. & Pereira, C. R., 2015. *Escalas de Medida da Percepção da Qualidade do Ambiente Hospitalar – Um Estudo em Unidades de Dor*. Psicologia: Teoria e Pesquisa. Vol. 31 n. 3, pp. 381-388, disponível em: <http://dx.doi.org/10.1590/0102-37722015031906381388>
- Ochoa, J. H. & Araújo, D. L. & Sattler, M. A., 2012. *Análise do conforto ambiental em salas de aula: comparação entre dados técnicos e a percepção do usuário*. Ambiente Construído, Porto Alegre, v. 12, n. 1, p. 91-114, disponível em: <http://www.scielo.br/pdf/ac/v12n1/v12n1a07>
- Penloup, E. 2014. *Architecture des lieux de santé et la prise en compte des besoins des usagers - Observation du Service de Soins de Suite et de Réadaptation de l'hôpital Rothschild à Paris*. École Nationale Supérieure D'Architecture de Normandie, Mémoire de M2.
- Quadros, M. E. & Lisboa, H. M. & Oliveira, V. L. 2009. *Qualidade do ar em ambientes internos hospitalares: estudo de caso e análise crítica dos padrões atuais*. Artigo técnico, Eng. Sanit Ambient | v.14 n.3 | 431-438, disponível em: http://www.scielo.br/scielo.php?pid=S1413-41522009000300017&script=sci_arttext
- Souza, E. P. N., 2015. *Qualidade e percepção do ambiente construído: influência nas características psicofisiológicas dos usuários*. Tese de Doutorado, Universidade Estadual de Campinas, Faculdade de Engenharia Civil, Arquitetura e Urbanismo. Campinas.
- Vasconcelos R. T. B. *Humanização de Ambientes Hospitalares: Características arquitetônicas responsáveis pela integração interior/exterior*. Dissertação de Mestrado - Universidade Federal de Santa Catarina – UFSC - Programa de Pós-Graduação em Arquitetura e Urbanismo, Florianópolis - SC, 2004.