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Design as a positive stimulus in a Brazilian hospital environment

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ABSTRACT

The new coronavirus pandemic has put healthcare professionals, patients, and family members under pressure and stress, causing mental health issues, especially in the healthcare community. Studies show that a positive environment plays an important role in the well-being of individuals, impacting the physical and psychological security of people. This article presents a project developed for the Hospital de Clínicas de Porto Alegre, that through graphic interventions softened the effects of combating COVID-19 for the healthcare staff and patients throughout the pandemic. The project is detailed and the discussion presents the main points considered in the process of decision making. Results show how design can play an important role in helping, not only the Covid-2019 pandemic but also in making hospitals more hospitable places.

Keywords: COVID-19, Environmental design, Evidence-based design

INTRODUCTION

The 2019 novel coronavirus is highly contagious and its incidence has increased exponentially World Health Organization (WHO). Although authorities must focus on prevention and control, the mental health of people, especially the medical community, must also be addressed (Ornell et al, 2020, Shigemura et al, 2020; Zhenyu Li et al, 2020; Li et al, 2020). A study published in 2008 about the 1995 Kikwit Ebola outbreak (Hall et al, 2008) shows that to ensure a sustained effort to provide care, staff needs to be protected physically and emotionally.

The severe situation is causing mental health issues for frontline health professionals such as anxiety, depressive symptoms, insomnia, anger, and fear (Li et al, 2020; Kang et al, 2020; Zhu et al, 2020). A study developed by Zhang et al (2020) with 1,563 medical staff members found that more than one-third of the participants suffered from insomnia symptoms during the COVID-19 outbreak, indicating that interventions among medical staff are needed.

WHO states that the measurement of health and the effects of health care must include not only an indication of changes in the frequency and severity of diseases but also an estimation of well being. On the other hand, the collapse of the Brazilian public health system was a challenge long before the pandemic (Oliveira et al, 2020), already putting medical staff under pressure and directly impacting mental health in adverse situations.

So, how could a design project help to improve the frontline health professional's quality of life during the COVID-19 pandemic? A study developed in 1998 at the Johns Hopkins University identified 1,219 articles describing investigations into the impact of environmental elements on health outcomes (Rubin et al, 1998). The report indicated that

80% of the most rigorous studies found positive links between environmental characteristics and health outcomes (Ulrich, 2000b; Rubin et al, 1998). Ulrich (2000b) also found that design approaches in architecture and signs that make wayfinding easy to promote positive well being.

The existence of positive environmental stimuli plays an important role in the well-being of individuals who work in and access the hospital. It is important that workers and patients have experiences that capture the subconscious attention, transporting them psychologically and allowing time for reflection and mental distance from stress-generating situations (Laumann, Gärling, & Stormark, 2001).

Aiming to contribute to the frontline of COVID-19, Tecnopuc, the Science and Technology Park of the Pontifical Catholic University of Rio Grande do Sul, offered the services of its laboratories for companies and the public sector. In that context, the Hospital de Clínicas de Porto Alegre (HCPA) started a partnership with Tecnopuc Crialab, the creativity laboratory of Tecnopuc, to work on interventions in the hospital environment that helps health care staff and patients throughout the COVID-19 pandemic.

This article presents how graphic interventions made in the hospital environment can soften the effects of combating COVID-19 for the health care staff and patients throughout the pandemic. The hospital's challenges that are addressed relate to the well-being, physical and psychological security of people. A pilot project that was carried out seeking to meet these challenges is described, and based on the observation of positive results from its implementation, the expansion of the design project to new areas of the hospital is described, highlighting how the design project's interventions met the hospital's challenges.

1. THE HCPA AS A REFERRAL FOR COVID-19

The HCPA is one of the main pillars of public health care service for the state of Rio Grande do Sul. The HCPA dedicates 88% of its infrastructure to the public health system and is responsible for 18.5% of the ICU beds available for the population of Porto Alegre.

The HCPA is a reference in highly complex care for patients with COVID-19 in the city of Porto Alegre, and faced with the pandemic, is under additional pressure. In response to the current situation, the hospital has expanded the number of available ICU beds, increased the number of staff, and reorganized its infrastructure and operation. The hospital has also fostered initiatives that promote the well-being and engagement of employees to maintain the excellence of the services provided. In this regard, positive environmental stimuli was acknowledged as a feasible promoter of well-being in individuals who work and pass through the hospital. It is important that health care workers and patients have experiences that capture their subconscious attention, which allow time to reflect and that transports them psychologically, allowing mental distance from stress-generating situations. In this specific regard, HCPA faced new challenges (Figure 1) that motivated this design project.

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(1) Due to access restrictions within the hospital, it was necessary to rethink and inform the public about new movement patterns throughout the hospital, thus encouraging the use of stairways to avoid crowding and the unnecessary use of elevators.

(2) Besides reducing the number of visitors and patients, it was also important to communicate new policies that make the hospital spaces safer and prevent the spread of the virus. Such policies were related to managing the use of common spaces, discouraging gatherings of groups, and indicating appropriate social distancing.

(3) The workload of health professionals has increased, so actions were taken to boost morale, such as providing break rooms for resting and recharging.

(4) Health professionals, patients, and visitors' fears and risk awareness changed the hospital's climate, which by nature is already ambivalent, to a heavier, more apprehensive environment.

Figure 1. HCPA's challenges.

Considering all that, the design project presented in this article focused on creating interventions in the hospital's physical space to address these main challenges, aiming at maintaining the well-being, physical and mental safety of the medical staff, employees, visitors, and patients.

2. THEORETICAL BACKGROUND

Healthcare is not separated from the environment in which it is delivered, as the space and organization of buildings affects the healing process (Horsburgh, 1995). Therefore, scientists argue that the hospital environment can influence not only the well-being of patients, but also the healthcare professionals. To Shumaker and Pequegnat (1989) and Ulrich et al (2010), poor design can directly and indirectly affect the delivery of healthcare, creating a stressful environment. A stressful environment can further threaten patient health, and can impair the ability of the healthcare professional to give efficacious treatment and attention to the patient (Shumaker, Pequegnat, 1989).

The first studies about the relationship between the environment and its health effects were conducted during the 1960s. During the 1980s these studies focused specifically on healthcare environments, especially hospital buildings. In 1993, healthcare and design professionals that believed design could improve patient healing through scientific knowledge founded The Center for Health Design (CHD) in California, and have made progress in evidence-based understandings. The researchers focused on healthcare design to reduce the stress of patients and healthcare professionals, improving safety and productivity (Berry, et al., 2004; Alfonsi, Capolongo, & Buffoli, 2014; Ulrich et al., 2010; Zimring, Joseph, Choudhary, 2004).

As medicine and other health sciences moved toward evidence based practices, design moved to be guided by research and user experience. As a result, the mounting scientific

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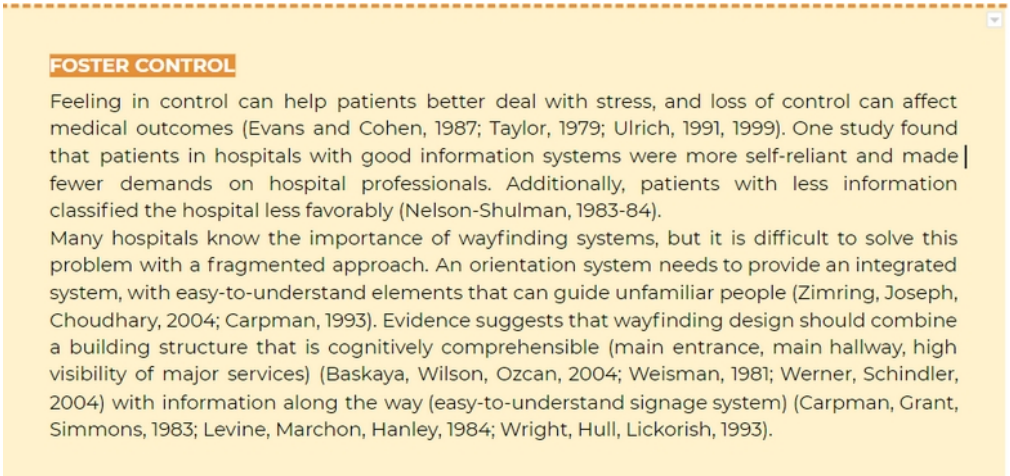
evidence brought international awareness to healthcare facility design and that certain environmental design strategies can promote improved outcomes (Ulrich, 2001), bringing a new research field called Experience Based Design (EBD) to the discussion. “EBD refers to a process for creating healthcare buildings, informed by the best available evidence, with the goal of improving outcomes'' (Zimring, Joseph, Choudhary, 2004). According to Zimring, Joseph and Choudhary (2004), EBD is not about nicer hospitals, but about designing hospitals that provide experiences of caring and safety, and still help patients get better and healthcare professionals do their jobs better.

Later, the concept of EBD was expanded to Experience Based Co-design (EBCD) to emphasise the collaboration in the process. According to Tsianakas et al. (2012), EBCD’s approach is to understand how healthcare professionals and patients interact with the healthcare service, that in major cases are hospitals. So EBCD focuses on improving healthcare services, combining co-creation and user experience to identify improvement priorities that reflect the experience of healthcare professionals, patients, and their families (Donetto, Tsianakas, Robert, 2014).

According to Ulrich (2001), healthful experiences like social support and pleasant distraction became important considerations in creating new healthcare facilities, and the reduction of infection or disease risk exposure should not be the only requirement. The emphasis on functionality and pathogenic conception of disease has often produced healthcare facilities with environments that seem factory-like, being stressful instead of creating environments that calm patients or otherwise address their psychological needs. (Ulrich, 1991, 1992, 2001; Horsburgh, 1995).

Looking at all research and findings in health design, Ulrich (1991, 1999, 2000a, 2001) brings the Theory of Supportive Design as a proposal of design directions to promote improvements on patient outcomes. The Theory of Supportive Design proposes that healthcare environments have a relationship with improved outcomes by reducing stress (Ulrich, 1991, 1999, 2000b, 2001). Ulrich (2001) proposes a guideline for designing supportive healthcare environments: (1) foster control; (2) promote social support; and (3) provide access to nature and/or positive distractions (figure 2). The importance of these strategies in hospitals is explained, as they served as theoretical foundations for the design project at HCPA.



(a)

PROMOTE SOCIAL SUPPORT

A healthcare environment should support family presence and social interactions to reduce patient stress, in order to increase satisfaction and to improve medical outcomes (Bay et al., 1988; Chatham, 1978; Happ et al., 2007; Hendrickson, 1987; Mason, 2003). Besides that, some research has indicated that social interaction and support can be increased with comfortable waiting rooms and lounges (Ulrich, 1991, 2000a, 2000b; Zimring, Joseph, Choudhary, 2004). For Ulrich et al. (2010) a healthcare organization that wants to support family presence must incorporate quiet waiting rooms with comfortable group seating to receive them.

In a study about family presence, Happ et al. (2007) realized that patients who survived critical illness reported that involving family in the process was important. Patients in this study rated social support as important for reassurance, comfort, and peace of mind.

(b)

PROVIDE POSITIVE DISTRACTIONS

According to Ulrich (1991, 1999, 2000b), positive distractions are environmental and social elements capable of improving moods and avoiding stress. Humans have a predisposition to elements that recall human faces, music, nature, or comedy and laughter (Ulrich, 1999; Ulrich et al., 1991).

To improve the environment, positive distractions can divert the attention of patients from stress and negative emotions. Positive distractions stimulate emotional well-being for patients and improve their psychology. (Ulrich, 1991; Ulrich, 2008). Studies support the use of nature elements to distract patients and reduce stress. This kind of distraction can be done through outdoor gardens, indoor plants, and window views of nature as well as indirectly through artwork and other visual displays of nature scenes (Ulrich, 1984).

(c)

Figure 2. Guidelines for healthcare environment design: (a) Foster control (b) Promote social support (c) Provide positive distractions.

3. THE PROJECT

Aiming to meet HCPA's challenges related to the well-being of its clinical staff and patients, HCPA called for a pilot project. This first initiative was titled the "Affective Wall", as graphics were developed and put on a wall within the radiotherapy unit (Figure 3). Workers and patients were involved in the creative process through electronic and printed surveys asking for words that evoke feelings of comfort, which gave rise to the contents used in the graphic and multimedia interventions that were created. With the survey and some conversations with stakeholders we defined elements, colours, and strategies to achieve the best results. Besides that, the proximity to medical staff and patients was kept to guide the project and the strategies to improve outcomes. More than turning the building nicer, the project focused on enhancing the experience of being and working in the Hospital. In addition to seeking to create a better experience, the project tried to involve patients and medical staff in a co-creation to improve the health care service and make the work in a controlled area friendly.

(a) (b)

Figure 3. Affective Wall: (a) Graphic intervention (b) Intervention applied

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According to HCPA, "Healthcare professionals and patients are going through difficult times. Understanding their esteem, belonging, and safety needs is crucial to propose more changes in their lives - even if it is about a change in the environment in which they work". The concept of affectivity was defined as a premise for the design and has influenced the decisions made throughout the creative process.

Positive responses to the "Affective Wall" prompted new areas of the hospital to request similar interventions. An extensive study looking for theoretical and visual references was carried out to guide this new phase of the project. The research focused on visual and non-visual signs in order to collect input and generate insights that supported the design process and oriented graphic designs. Thus, the research provided the basis for choosing elements that would contribute to the positive perception of the environment, and to the well-being and comfort of patients and professionals.

HCPA's budget is mostly committed to medical supplies and staff for the pandemic. As a result, a low-cost material with a simple installation process was needed. Vinyl stickers are easy and fast to apply and are easily sanitized. Through low-cost graphic interventions, moments of pause and inspiration were cultivated, spreading messages of warmth, gratitude, and emotional support, as well as reinforcing the newly-adopted organizational procedures due to the pandemic.

Colors, fonts, illustrations, and casual verbal and visual language were used in order to make each environment more pleasant. The visual concept was built based on geometric shapes, with universal and quick understanding by the observer. A set of elements were created, considering the needs of different users regarding the hospital environment and assigning different functions to each shape (Figure 4).

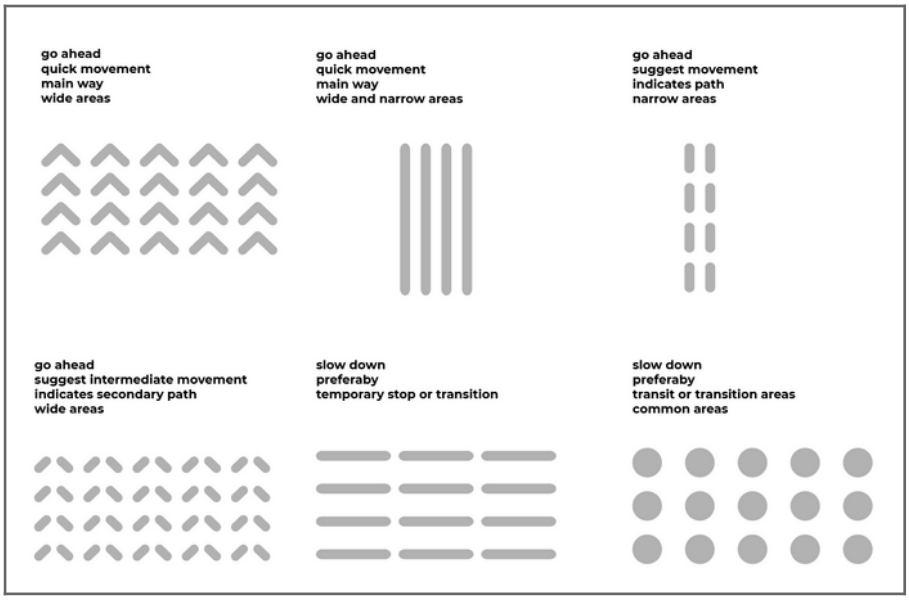

Figure 4. Set of elements / signs.

Using different colors (Figure 5) added to the creation of signs which were used on floors and walls, helping in orientating and also positively distracting people. In the graphic interventions that use words two fonts were selected: a sans serif and a handwritten one (Figure 5). The first font intends to highlight the precision of the work done by health care professionals, and the handwritten font represents their human and dedicated service.

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Figure 5. Colors palette and fonts.

The first challenge was related to moving around hospitals, as they are notoriously busy places that receive heavy traffic on a daily basis with no sequential logic of services. Lack of information can make the experience confusing and disorienting for a person. A properly executed orientation ensures that visitors always know exactly where they need to go and how to get there, helping them to stay calm, and feel safer.

Besides the basic orientation problem, proposing new ways of moving while encouraging people to use the stairs was needed. To meet that, a signaling system was developed (Figure 6). The shapes and elements created were organized in a way to help people move within the spaces in an intuitive and safe way. The new visual language was created to work with the current signs that already exist at the hospital, without mischaracterizing or compromising the essential information available.

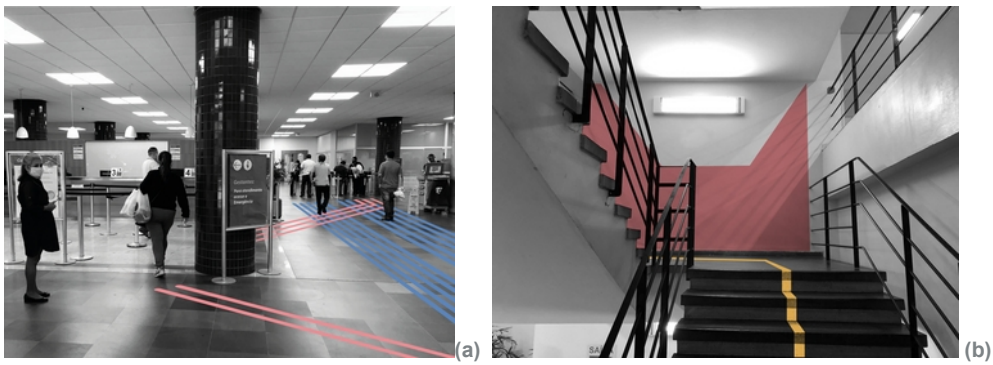


Figure 6. Signaling system: (a) Floor (b) Stairs interventions.

The second challenge was related to the need to make people and spaces safer in order to prevent the spread of the virus. To meet this challenge, new ways of using common spaces, discouraging the formation of groups, and helping people to respect the mandatory physical distance were thought of. Casual and playful graphical approaches highlighted specific spaces for meetings, incorporating proper social distancing (Figure 7). Also, in waiting areas such as elevators, specific spaces were defined.

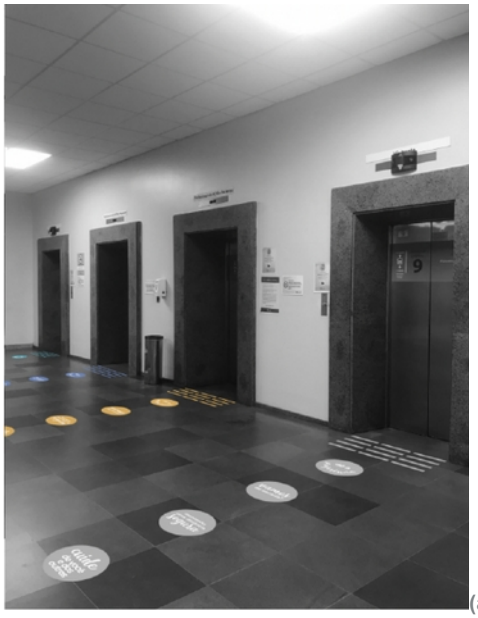
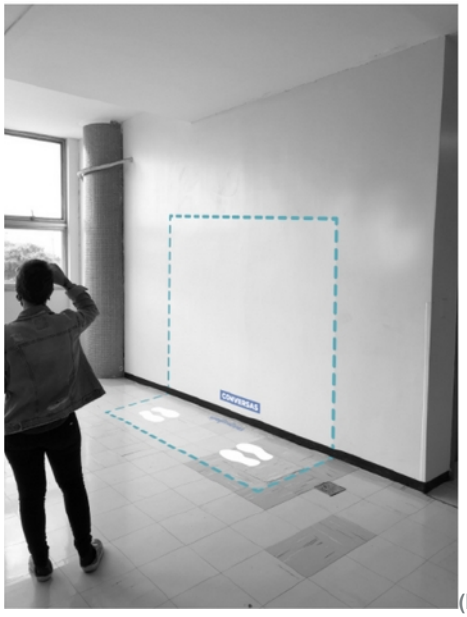

(a)

(b)

Figure 07. Floor signs. (a) Meeting areas (b).

For the third challenge, the use of the common areas of the hospital were modified because of new procedures against COVID-19. As the workload of health professionals has expanded, providing a source of motivation and gratitude became imperative. To meet this demand, interventions were proposed for the available resting spaces to calm, welcome, and inspire people. These resting spaces were little used before the pandemic, but because of the hard working shifts they were revitalized with applications of colors and shapes making them more pleasant to use (Figure 8).

Figure 8. Revitalized spaces.

Finally, the last challenge is directly related to the hospital climate. Hospitals, by their very nature, engender a disconcerting atmosphere. The pandemic exacerbates this situation due to its uncertainty and risk which affects physical and mental health. Using design to meet this challenge was one of the most difficult points of the project. At a time when all efforts are focused on healing, finding an alternative way to bring comfort to people was the main goal.

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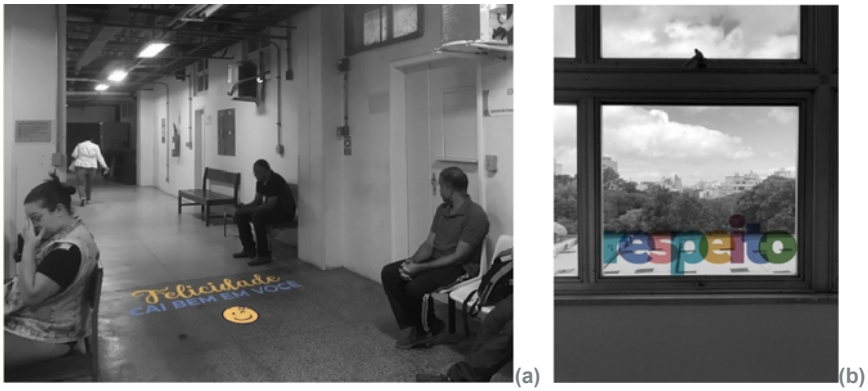
Words of affection were inserted in the circulation windows of patients and family members (Figure 9). In the areas of the common use of employees, positive messages were inserted (Figure 9) and at the hospital entrances and exits, welcome messages were applied (Figure 10). In addition, in the Radiotherapy Unit, the sector that originated the development of the project, a new "Affective Wall" was created, this time in the waiting room, focusing on messages for patients (Figure 11). Finally, also in the waiting room, a children's area was created bringing more interactive elements (Figure 12).



(a) (b)

Figure 9. Supportive words on the floor and windows: (a) "happiness looks good on you" (b) "respect".

(a) (b)

Figure 10. Welcome and farewell messages: (a) "have a nice work" and "you are unique" and (b) "have a good rest".

Figure 11. Affective Wall at the waiting room.

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Figure 12. Children's area.

For the printing and application of the stickers, we found partner companies that donated the needed material. In this paper we have presented simulations of this project in order to protect the privacy of the people and spaces of the hospital during this difficult time. Due to the high rate of occupancy and human circulation, it wasn't possible to photograph the spaces.

4. DISCUSSION

The challenges of developing a design project for a referral public hospital for the treatment of patients affected by COVID-19 are countless. Projects like this involving two institutions (Tecnopuc Crialab + HCPA) tend to be time-consuming and very bureaucratic. The imminence of the pandemic and the urgence of minimizing the effects in society helped make the project much more agile and a priority for both institutions. Also, the Hospital has a budget that is mainly committed to medical supplies and staff, so the project must be low-cost and simple. We also tried to minimize the need for physical interactions in the Hospital, so just a part of our team has done a technical visit to know the building and make notes. Besides it, the COVID-19 impacted the idea we have about social support. We needed to look at the new procedures of care in the pandemic, and make the social interaction happen without physical contact or agglomeration. Therefore, one of the requirements of the project was to think beyond the present, and make a project that will be useful in a future after the pandemic for the Hospital.

Ulrich (1984, 1991, 1992, 1999, 2000a, 2000b, 2001, 2008) is perhaps the main reference regarding discussions about the hospital environment and its impact on people. The three strategies proposed by the author were the basis for the development of this project and helped in the decision-making process with the many stakeholders involved.

For Ulrich (1991, 1999, 2000b) fostering control is related to the feeling of being in control. In addition to the studies that indicate the importance for medical staff to feel in control due to the nature of the work (Teikari, 1995; Shumaker and Pequegnat, 1989), in times of pandemic, this point gains even more importance. Considering the intense workload that overloads health professionals, thinking about the design project as a way to give autonomy

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for people to move around in the hospital, without depending on others, is already a positive result of the project. Thus, seeking to address the issue of fostering control, the signage for the stairs were created, as well as indications of social distancing in the elevators and floors, both for general circulation in the hospital and those focused on the medical staff.

Ulrich's second point (1991, 2000a, 2000b) relates to the role of design to promote social support. This point was addressed differently for patients and employees. While the medical staff is highly informed on how to act in adverse situations of the pandemic by training and protocols, patients and visitors often do not know how to act. With this in mind, specific areas for doctors, family members, and patients to talk were graphically represented, encouraging the expected behavior in an unconscious way, making the issue of necessary social distance lighter and more playful. For the medical staff, decompression areas were created, with a series of interventions presented in the results of this article. Lastly, the pilot project, the Affective Wall, also applied in other areas of the hospital, offers messages of support and welcome, promoting social support.

Finally, positive distraction, the third point recommended by the author (Ulrich, 1984, 1991, 1999, 2000b, 2008), was achieved in the interventions at the entrance and exit of the hospital, on the walls of units and in the various messages and directions within the areas of decompression. These areas of decompression were designed to be places for rest and relaxation for the medical staff.

In the face of a global pandemic, with uncertainty and an unclear perspective of what the future holds, the need to remain calm and the attempt to feel some control become more important. Considering that, all initiatives related to improving the well-being and mental health of people on the front lines of fighting the pandemic are fundamental.

Studies (Zimring, Joseph, Choudhary, 2004) relate the physical environment to results in four areas: reduce staff stress and fatigue, and increase effectiveness in delivering care; improve patient safety; reduce stress and improve outcomes; and improve overall healthcare quality. The wayfinding project and the interventions developed at HCPA sought, through design, to meet these four areas, with initiatives developed in different areas and sectors of the hospital.

A stressful environment can, over time, make individuals emotionally and physically ill. In addition, a high turnover of healthcare professionals has been attributed in part to stress, which reduces the quality of care for patients (Pardes, 1982). In this regard, the improvement of the work environment is related to the physical and mental health of patients, medical staff, and family members.

Also, patients are more vulnerable considering that they are ill or in need of care, whereas the nurses' role is to care for others and to manage crises. Patients and nurses spend different amounts of time in hospitals, and have different abilities to leave. Patients can't leave the hospital, but usually stay for short periods of time, while nurses can leave after their shift, but obviously stay working at hospitals for years (Shumaker, Pequegnat, 1989). This was an important aspect to be considered in the project as it influenced the use of colors and elements that would not make the space tiring or too distracting or fatiguing, either for patients who spend a lot of time in the same place, or for health professionals who are in the hospital for long periods of time.

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The positive impacts of the design project on the different hospital ambient will be perceived even after the end of the pandemic, reinforcing the role of design as a promoter of psychosocial support for healthcare professionals and patients (Figure 13).

Figure 13. Staff testimonies.

5. FINAL CONSIDERATIONS

The project developed for HCPA has potential for expanding to more areas and sectors of the hospital, and even other health institutions. The use of vinyl adhesives allows for both the creation of the product and the artwork to be developed within Tecnopuc Crialab, without the need for other professionals. Because it is a cheap material and simple to apply, the involvement of suppliers for the installation of the project is also reduced, bringing agility and cost reduction to the process.

The novel coronavirus pandemic was the first stimulus for the project, but the end result goes far beyond meeting the immediate needs of the pandemic at the hospital. All the interventions and pieces created are timeless, and at the end of this most critical period, they can remain in the hospital and continue to play a fundamental role in the daily lives of patients, family members, and employees.

Often the hospital's medical team is unaware of the potential of design as a transforming tool of the work environment, thus project opportunities are lost. Because of the pilot project we could see the potential of the role of design as a positive stimulus in the HCPA hospital environment. In this sense, design can play an important role in helping, not only the Covid-2019 pandemic, but also in making hospitals more hospitable places for those who have to and chose to be there.

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