Human Sensorial Exploration in Designing a Comfortable Patient Room

Golriz Farzamfar

A Thesis
in
The Department
of
Design and Computation Arts

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Design at
Concordia University
Montréal, Québec, Canada

June 2023

CONCORDIA UNIVERSITY
School of Graduate Studies

This is to certify that the thesis prepared

By: Golriz Farzamfar

Entitled: Human Sensorial Exploration in Designing a Comfortable Patient Room

and submitted in partial fulfillment of the requirements for the degree of

Master of Design

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final Examining Committee:

_____ Examiner
Dr. Martin Racine

_____ Examiner
Dr. Alice Jarry

_____ Supervisor
Dr. Carmela Cucuzzella

Approved by _____

Dr. Martin Racine, Graduate Program Director

_____

Dr. Annie Gérin, Dean, Faculty of Fine Arts

Date: 20 June 2023

ABSTRACT

Human Sensorial Exploration in Designing a Comfortable Patient Room

Golriz Farzamfar

Some researchers have addressed what home means in architectural terms to human beings, and some others have investigated comfort and homeyness in relation to patients. Also, many studies, and on top of them Pallasmaa's theory about the architecture of senses, have shown the importance of considering all human five senses in the design of a built environment and its positive effect on people's sense of well-being. However, there has been no scientific evidence supporting the relationship between human senses and designing homely healthcare spaces which can result in the development of healing environments. So, this research investigates the comfort and homely design factors for patient rooms and their relationship to the five human senses in order to create multisensorial experiences. Also, this project aims to raise awareness among healthcare designers, caregivers, and patients in terms of the importance and role of considering all human senses in order to create comfortable and homely atmospheres in hospital rooms.

The current study is analytical and theoretical using qualitative research. Discourse analysis is conducted to find and evaluate the design recommendations based on sensorial qualities. Through the research-creation process, the current images of a cancer ward room in Montreal are analyzed. The final creation of this project is a webpage to reveal sensorial design recommendations as an information mechanism. The research-creation project has a didactic approach and tries to teach different design recommendations for a patient room and their sensorial aspects by interacting with the analyzed hospital room images using a website.

Keywords: comfort, homey environment, human senses, patient room

ACKNOWLEDGEMENTS

I would like to extend my heartfelt thanks to the following people who have contributed significantly to the completion of this thesis.

First and foremost, I would like to express my sincere gratitude and appreciation to my supervisor, Dr. Carmela Cucuzzella, for her dedicated and invaluable support and guidance throughout this research journey. Her expertise, encouragement, and unwavering commitment to my academic growth have been instrumental in shaping this research and enhancing my understanding of the subject matter. Her guidance and insightful feedback have pushed me to explore new avenues of knowledge. I am immensely grateful for her mentorship, as well as for the privilege of being a member of the talented IDEAS-BE team. Moreover, I appreciate the opportunity she has afforded me to collaborate with the sensory lab. I also would like to thank Dr. Howes for his guidance and expertise.

I would like to extend my gratitude to all the professors at the Master of Design program as well as my classmates and friends for their valuable insights and thoughtful contributions which have greatly enriched the quality of this research.

I am deeply grateful to my parents for their love and unconditional support throughout my academic pursuits. I would like to express my sincere appreciation to my sister, Nina, for her constant motivation and assistance, belief in my abilities, willingness to listen to my ideas, and insightful discussions. I would also like to extend my heartfelt thanks to my husband, Arash, for his encouragement and support during this challenging and demanding period of my life.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

It is widely accepted that both patients and healthcare workers benefit from an environment that fosters healing (Sakallaris et al. 2015). Nonetheless, Foucault (1995) and Goffman (1968) have analyzed the existing structure and function of hospitals as institutions, identifying them as an "examining apparatus" that excludes external factors such as the patient's home environment, social network, and daily routine. The distinguishing features of hospitals are the division between those who provide care (the staff) and those who receive it (the patients), limited interaction with the outside world, and minimal communication between these two groups. (Gilmour 2006).

Recent studies have indicated that fostering a sense of home through various means, such as sensory, material, and social aspects that promote feelings of familiarity, comfort, and safety, can contribute to a healing environment in healthcare institutions (Duque et al. 2019). The primary focus in creating a sense of homeliness has typically been on visual elements. For instance, during the 20th century, healthcare institutions were advised to use furniture found in homes, as well as to incorporate diverse colors and wooden beds and armchairs, rather than metal ones. However, in some cases, this approach resulted in hospital rooms that resembled those of a hotel or an exclusive club (Willis, Goad, and Logan 2018). But, what about the other senses? hospital food is notoriously unappetizing, and the odors are frequently musty or antiseptic. The acoustic environment is often noisy with staff chatter, trolleys, the white noise of the ventilation system, and various electronic sounds from monitors (Bates 2021; Howes and Classen 2013). Patients usually receive little physical contact, except for what is necessary during physical therapy, and the clothing provided by hospitals is often plain and shapeless (Howes and Classen 2013). Thus, the influence and significance of the other human senses in the healing process and the development of a pleasant and comfortable atmosphere for patients have been disregarded.

In her work, "Sensing Space and Making Place", Victoria Bates argues that there is no single therapeutic environment that can automatically make people feel better or impose power relations on them, nor do individuals lack the agency to resist these impositions. Bates highlights the crucial role of embodied practices in shaping therapeutic environments and the importance of considering feelings in design practice. Patients' bodies are subject to various multi-sensory experiences, including comfort and noise, which can affect their sense of place. Patients, in turn, have agency in shaping these sensory environments. Shifting the focus away from visual aesthetics allows us to better comprehend how the body is an integral part of the environment, rather than an external observer (Bates 2019).

In summary, some researchers have explored the meaning of "home" in architectural terms and some others have investigated the impact of comfort and homeyness on patients. Also, Pallasmaa's theory about the architecture of senses besides other numerous studies highlights the significance of incorporating all five senses in the design of a built environment to enhance well-being. However, there is a lack of scientific evidence regarding the relationship between human senses and designing homely healthcare spaces which can result in the development of healing environments. Hence, this research seeks to examine the factors contributing to comfort and homeliness in patient rooms and their correlation with the five senses to develop multisensory experiences.

The main objective of this research is to investigate how to create patient facilities that promote healing more effectively. Past research has revealed that current healing environments primarily focus on visual elements and do not take into account all five human senses (Willis, Goad, and Logan 2018, Duque et al. 2019, Howes and Classen 2013, Bates 2019). Therefore, this study aims to address this gap by exploring the role of the human senses in achieving comfort and a homely atmosphere. In other words, it tries to question the correlation between designing a comfortable and homely environment for hospital patients and multisensory design. In addition, the research-creation project aims to raise awareness among healthcare designers, caregivers, and patients about the importance of considering all human senses when designing comfortable hospital rooms. This objective also highlights the crucial role of each audience in creating homely atmospheres within patient facilities. There are three main audiences for this research since they are all directly involved with patient rooms in hospitals. The healthcare designers have the initial concept for the design and construction of the space. The patients are the main end-users of the hospitals, especially the patient rooms. Finally, the caregivers such as nurses and physicians live alongside patients and have daily contact with them in a hospital setting.

The focus of this study will be on patient rooms in hospitals since these spaces are where patients spend the majority of their time. These rooms serve various purposes, acting as nursing rooms, bedrooms, dining rooms, living rooms, and bathrooms for patients (Persson, Anderberg, and Kristensson Ekwall 2015; Leydecker 2017). Therefore, hospital patient rooms are of utmost importance in the field of healing environments, and there is a need for additional research to transform them into more comfortable, homely, and healing spaces. This research is particularly relevant for patients requiring long-term care, such as those with cancer. The impact of environmental factors is even more 1 in the case of cancer patients, causing them to experience frequent mood changes and/or depression following a cancer diagnosis (Mystakidou et al. 2006; Bottomley 1998). Cancer patients have weakened immune systems, undergo painful and lengthy therapies, and often have less hope for a living (Dl et al. 2003; Bottomley 1998). Hence, it is essential to give careful consideration to the design of cancer departments to provide comfort and improve their overall well-being.

The research addresses these questions:

- What can we learn from experimenting with some of the senses in the design of patient rooms to enable a more homely environment?

- What recommendations can help caregivers, patients, and designers to design comfortable rooms for patients and how do the five senses play a role in these recommendations?

- How can we educate caregivers, patients, and designers about their role in creating a comfortable patient environment using the human senses?

This thesis is comprised of four main sections. The first section includes the state of knowledge about the concept of healing environments. This will be followed by different theories about designing better spaces that improve the wellbeing of human beings through human senses and comfort in built environments. Then, with the aid of these theoretical developments, the problem will be articulated. The second section of my thesis is about the methodology which addresses the problem. It looks at the methods in different steps including the categorization and analysis of the findings. The third section discusses the results of the analysis and research-creation projects. The

last section discusses the conclusion and provides reflective insights into theories and projects. Additionally, it suggests potential areas of focus for future research.

CHAPTER 2: THEORETICAL FRAMEWORK

The literature review is conducted in five main parts. First, definitions of health and healing are discussed. Second, studies about the healing built environments are described. The third part includes one of the main theories in terms of "built environment and senses" and the fourth part presents the literature on the subject of "familiarity and homeliness". Afterward, the homeliness and senses within the context of a hospital are presented. The final section of the chapter discusses the importance of a patient room within the hospital setting.

Health and Healing

The term "health" is challenging to define as it encompasses various levels that include functions, processes, bodily structure, and psychological states. It involves physical, state-of-soul, and fulfillment dimensions, which all influence one another. According to the World Health Organization, health is not merely the absence of disease but a state of complete physical, mental, and social well-being. Health can also be described as a condition of renewal, balance, and growth. The earth's version of this state involves cyclical renewal, fertility development, and balance of elemental forces such as water, air, solid, and warmth. For humans, this entails life vitality, stability of emotions, and the development of spirituality (Day 2002).

In his book, "Spirit and Place: healing environment", Christopher Day states that the causes of illness are not limited to physical factors, as humans also experience a psychological dimension. The study of the interplay between psychological state, susceptibility to illness, and its development and outcomes is called psychoneuroimmunology. This has implications for designing human environments as buildings that can negatively impact health and it is called sick building syndrome. While it is important to understand how physical factors can make us ill, the environment can also have positive effects. There are places that can renew our energy, create a sense of calm, and inspire us, and thus be health-promoting. Therefore, avoiding sick-building syndrome is not enough to support health (Day 2002).

According to Day, the state of being healthy relies on being complete and balanced, and even minor sickness can have multiple causes. To properly heal, we need to address each of these causes, rather than just treating the symptoms. Medical treatment alone is insufficient for long-term healing; spiritual motivation, emotional wellbeing, forgiveness, freedom from resentment, a nutritious diet, exercise, and a healthy environment are all necessary. Healing involves re-establishing healthy processes and is more than simply nourishing. A healing environment is not only necessary for those who are sick, but also for those who are healthy, in order to optimize their life experiences. Everyone benefits from a healing environment, whether at home, work, or in healthcare facilities (Day 2002).

Built Environment and Healing

Christopher Day states that the impact of the environment on health can be measured and is undeniable. He also highlights that institutions tend to inhibit individuality, innovation, and imagination, promoting reliance on others. Institutional structures are known to be de-energizing, as evidenced by hospitals and even homes that are designed similarly. Spaces that provide choices and a peaceful atmosphere are more inviting than those that are forceful and designed solely to store objects (Day 2002). Moreover, hospitalization itself creates a significant amount of stress, which is mainly due to the loss of physical abilities, painful medical treatments, anxiety, and uncertainty. The stressful situation is intensified by the hospital environment, which is typically noisy, disorienting, and invasive of personal privacy, with limited emotional assistance (Beatley, Jones, and Rainey 2018).

At the start of the 20th century, it was widely accepted that the design of healthcare facilities directly affects the satisfaction levels of both patients and caregivers. The term "healing environment" was initially proposed by Florence Nightingale, who suggested that the design of a sickroom should take into account various factors, such as lighting, sound levels, air quality, and temperature, to create a therapeutic effect (Olausson et al. 2019). The concept of the healing environment places the patient at the center of the design of patient rooms (Leydecker 2017). Ulrich's (1991) theory of supportive design is one of the approaches that addressed the healing of patients in healthcare environments. This theory considers the impact of the physical and social environment of healthcare on the well-being of patients, particularly in reducing their stress levels. Ulrich suggests that healthcare environments can contribute positively to patients' well-being by promoting a sense of control over their physical and social surroundings, social support, and access to positive distractions (Ulrich 2001; Andrade and Devlin 2015).

At present, everyone agrees that creating a healing environment is beneficial for both patients and healthcare providers. The concept of an Optimal Healing Environment (OHE) was introduced by the Samueli Institute in 2004. It refers to a healthcare system that aims to promote and enhance the natural healing ability of patients, their families, and healthcare providers. The OHE framework consists of four different environments and eight constructs, as illustrated in Figure 1 (Sakallaris et al. 2015).

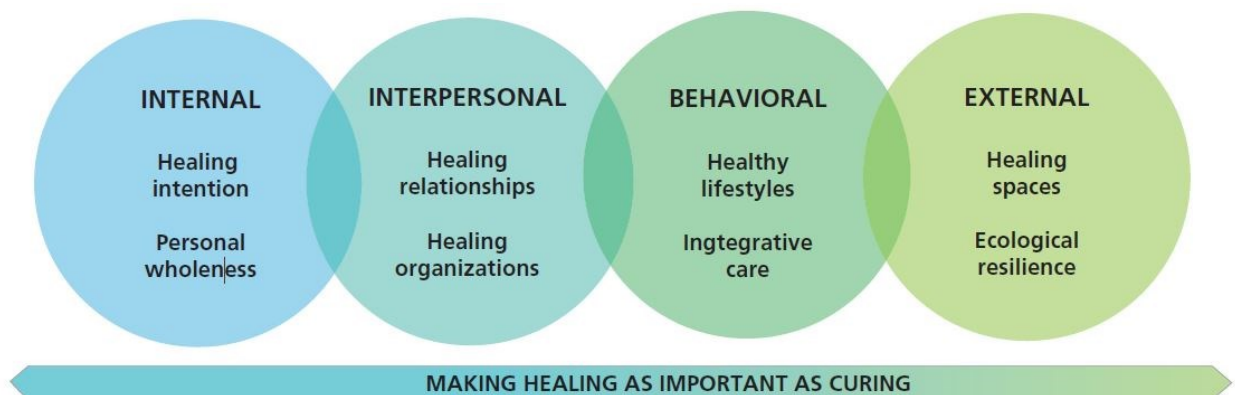| INTERNAL	INTERPERSONAL	BEHAVIORAL	EXTERNAL
Healing intention	Healing relationships	Healthy lifestyles	Healing spaces
Personal wholeness	Healing organizations	Ingtegrative care	Ecological resilience

MAKING HEALING AS IMPORTANT AS CURING

Figure 1: Optimal Healing Environments framework (Sakallaris et al. 2015, 40)

According to Sakallaris et al., one of the four environments that contribute to promoting healing intention and relationships is known as the "healing space". The objective of this environment is to establish a favorable physical setting that harmoniously facilitates the mind, body, and spirit to find relaxation, renewal, and vitality. Healing spaces aim to promote healing intention, and cultivate healing relationships (Sakallaris et al. 2015).

Around the year 2000, the concept of "evidence-based design"(EBD) emerged, sparked by a study titled "A View Through a Window May Influence Recovery from Surgery" by Roger Ulrich. This study shows how the physical environment can affect well-being and potentially facilitate the healing process (Olausson et al. 2019). Indeed, Ulrich started to use the term "evidence-based design" instead of "healing design" or "healing environments" ((Theodore 2016). According to researchers in evidence-based design, good design can have various positive effects, such as lowering blood pressure, reducing anxiety, decreasing the need for pain medication, improving surgical recovery, and shortening hospital stays (Olausson et al. 2019). The fields of Evidence-Based Design and Salutogenic Design are now broadly acknowledged for offering a scientific foundation to measure and illustrate how design can provide positive effects on patients, beyond its aesthetic appeal (Leydecker 2017). The aim of Salutogenic Design in patient rooms is to design environments that reduce stress triggers and assist patients in managing the stress levels connected with their illness and hospital stay (Leydecker 2017). However, According to Adams, Pang, and Lee, EBD's current emphasis on quantifiable outcomes may not adequately address the complex nature of patient experiences (Pang, Adams, and Lee 2018). David Theodore also believes that in discussions regarding evidence-based design, a crucial aspect is noticeably absent. Many concepts linked to evidence-based design are not new developments, but rather old ideas with a longstanding history in the field of hospital design. Consequently, it could be argued that evidence-based design is more of a rebranding or repackaging effort rather than a ground-breaking approach. So, it is important to update the evidence-based design principles and consider the current and future needs such as cultural factors besides the medical considerations (Theodore 2016).

In essence, it is widely understood that the physical surroundings of healthcare facilities play a vital role in promoting health and wellness. Several physical factors, including proper ventilation, windows, and features that help with orientation and distraction, a view of nature, either real or simulated, and comfortable furniture, can all have a positive impact on one's health (Nilsson et al. 2020; Karlin and Zeiss 2006; Schweitzer, Gilpin, and Frampton 2004). But the first step towards designing a healing environment would be humanizing the spaces (Bates 2018) and identifying the interaction requirements of its end-users as human beings. One of the important theories in this regard belongs to Juhani Pallasma about the relationship between built environments and human senses.

Built Environment and Human Senses (Pallasmaa's Fragile Phenomenology)

Pallasmaa's fragile phenomenology aims to consider context and multiple senses, prioritizing experiential interaction and sensual adaptation. It emphasizes a gradual and sensory-based understanding, moving beyond a focus solely on vision, and enhancing bodily presence while attending to lived experiences. Fragile phenomenology seeks to replace one-dimensional perception with a more holistic, multisensory approach. Pallasmaa endorses the concept of 'weak ontology' and 'fragile thought' put forward by Gianni Vattimo. He proposes an architecture that is delicate and fragile, specifically an architecture that embraces the 'fragile image', which contrasts with the prevailing strong images in architecture. This type of architecture is multisensory, contextual, and reactive, emphasizing experiential interaction and sensual adaptation (Shirazi 2014).

The Architecture of the Senses

Pallasmaa asserts that architects should design buildings based on the images and fundamental emotions of their inhabitants. The role of phenomenology is to examine these basic emotions. In other words, phenomenology is concerned with the common feelings and images of people. With Husserl's concept in mind, phenomenology involves "purely observing" the phenomenon or examining its essence. Pallasmaa interprets the phenomenology of architecture as observing architecture from within the consciousness that experiences it, rather than focusing on the formal features, characteristics, and style of buildings. He believes that the phenomenology of architecture seeks to uncover the inner language of the building (Pallasmaa 1996). Thus, in contrast to the visual emphasis in architecture and urban planning, Pallasmaa suggests that experiencing architecture involves multiple senses, such as hearing, smelling, touching, and tasting, and that the qualities of materials, space, and scale should be experienced through all senses (Shirazi 2014).

According to Pallasma, while the eye is responsible for distinguishing separation and distance, touch allows us to sense proximity, intimacy, and affection. Even though the eye reaches out to distant objects, touch is able to perceive what is close. Pallasmaa points out the skin as an intermediary for the sense of touch, enabling us to feel and understand the texture, density, weight, and temperature of things. It is capable of feeling, such as detecting the warmth of a surface. Unlike the eye, the skin can perceive and observe things that are beyond the reach of vision. Additionally, experiencing a building or space entails not only the visual aspect, but also the acoustics. Each building has its own distinct visual and acoustic qualities, which can influence our physical responses when we visit it. In addition, Pallasmaa states that the scent of the space is often the most enduring memory: "Every dwelling has its smell of home" (Pallasmaa 2012, 58). Although the visual appearance of the space may fade from our memory, our sense of smell aids our recollection. According to him, the olfactory sense has a better capacity for remembering than the visual sense. However, Pallasmaa does not place much emphasis on the sense of taste in relation to architectural perception, as it is not extensively discussed in his text. He does mention, though, that a polished stone surface with delicate color can be subconsciously perceived by the tongue, and that the most primal origin of architectural space is in the mouth cavity (Shirazi 2014).

In her book, "the sensual home", Ilse Crawford also notes that humans possess five advanced senses, namely vision, hearing, taste, touch, and smell, yet modern culture has prompted us to minimize the use of the latter three. Neglecting our senses deprives us of an opportunity to connect

with our physical bodies and emotions. Our vision isolates us from the environment, rendering us mere observers rather than active participants. On the other hand, our other bodily senses are what integrate us into daily life, heightening our awareness of the present moment, enabling us to experience and feel it, and become an integral part of it (Crawford 1998).

Besides the senses, Pallasmaa discusses that the experience of architecture is not solely based on visual images, but rather on interactions and collaborations. This potential for action within a space sets architecture apart from other forms of art. For example, we experience home through a variety of activities such as eating, cooking, socializing, reading, and so on. We experience the environment by moving through different areas and feeling it through our entire body. In fact, Pallasmaa states that "Architecture directs and frames behavior and movement." This theory highlights the necessity of experiencing architecture through bodily engagement, movement, and interaction within a three-dimensional space (Shirazi 2014, 72). Besides multisensorial experiences, the next focus of this research is home and comfort feeling. So, the next section explores the theories related to home and similar themes.

Home, Homeliness, Familiarity, and Comfort

Home

For many years, anthropologists have been interested in understanding the nature of homes and the emotions associated with them. This has been explored in various ways, such as Miller's (1988) analysis of how residents of council estates in the UK developed a sense of belonging in their homes despite feeling disconnected from their landlord (the State) (Duque et al. 2019). According to Kontos (1998), home is a place that fosters self-identity and fulfills basic requirements for shelter, privacy, and security. Additionally, the home is a unique personal space that holds meaningful memories and experiences (Gilmour 2006). Marsden views the home as both a physical space and a cognitive idea that encompasses various aspects such as social, psychological, cultural, behavioral, and physical characteristics, resulting in an intangible, emotional, and metaphysical connection between an individual and their housing (Marsden 2001). Moreover, Porteous and Smith (2001) have asserted that individuals have different interpretations of the term "home," but a fundamental belief is that it is a source of emotional well-being, comfort, and happiness (Gilmour 2006). Olakivi and Niksa have similarly acknowledged that home can mean various things, such as a private space, a location of emotional connection, and a spot for relaxing (Olakivi and Niska 2016).

In more recent years, there has been a shift towards examining the ways in which home is experienced and enacted through phenomenological and design anthropological approaches. For example, Bille (2019) has explored the role of lighting design in creating a sense of home, while Pink et al. (2017) have investigated how the temporalities, environments, activities, and movements within homes shape people's experiences. According to Pink, "home does not necessarily refer to home as a house or a fixed dwelling place that is inhabited by a family or other social unit household" (Pink et al. 2017, 12). Indeed, the term "home" is encouraging us to concentrate on the procedure of experiencing a sense of feeling at home, comfort, and belonging, rather than emphasizing it as a fixed state (Duque et al. 2019).

In addition, Pallasmaa makes a distinction between two concepts, "house" and "home." He argues that a home is more than just a physical representation of architecture; it is also a psychological, psychoanalytical, and social occurrence. A house, on the other hand, serves as a structure and a shield for the home, which is the complex atmosphere and domain of the inhabitants' existential living space. The idea of home reflects the personality and family and their distinctive ways of life (Pallasmaa 1995). Pallasmaa believes that a home is not just a simple building or an object, but rather a complex entity that combines memories, desires, fears, and both the past and present. It serves as the setting for personal rituals, routines, and rhythms of life, and deals with memory, identity, consciousness, and the unconscious, as well as biological and culturally conditioned responses and values. The word "home" evokes the memory of warmth, protection, and love, for people. It is centered around a few key areas and objects that have distinct functions and symbolic meanings, such as the entryway, front yard, façade, windows, hearth, stove, table, cupboard, bathroom, bookcase, television, furniture, family treasures, and memorabilia (Shirazi 2014). The following section will cover this topic of discussion in healthcare settings.

Homeliness

The article by Duque et al. on homeliness in healthcare discusses that studies in nursing have discovered a direct link between feeling at home and an individual's physical and emotional wellness. The article proposes that the physical surroundings can have a significant impact on emotional stability and security, especially for the elderly population. Therefore, "homeliness is an ongoingly emergent feeling of home, which is related to material, technological and sensory affordances as well as social relations with wellbeing implications" (Duque et al. 2019, 215). Olakivi and Niksa also mention that it is possible to introduce the concept of "home-likeness" in institutional settings, which would blur the clear differentiation between homes and institutions (Olakivi and Niska 2016).

The importance of environmental design in creating a feeling of homeliness in healthcare environments has been emphasized as a significant factor in promoting wellbeing. This is achieved through features such as patient-friendly and comfortable spaces, the ability to balance clinical and homely environments in psychiatric care, and aiding the transition of individuals from their homes to long-term residential care facilities. Anthropological literature emphasizes both the physical and sensory aspects of the home, and this is reflected in studies of homes and care for the elderly. Van Steenwinkel et al. highlight the importance of sensory qualities in the creation of meaning in residential care settings, while van Hoof et al. underline the significance of personal possessions (Duque et al. 2019).

Although homeliness is a crucial aspect of clinical care environments, it can be challenging to balance safety, hygiene, and other regulations that especially govern the care of vulnerable psychiatric patients. To address this challenge, providing personal possessions and some home comforts that are typical in other residential care settings can be beneficial. Additionally, creating a sense of home involves more than just using appropriate materials and technology; it also requires considering social connections and atmosphere, and allowing patients to make their own choices (Duque et al. 2019). Annmarie Adams's research also confirms the beneficial effects of providing space for personal belongings of the patients from their own homes (such as memory boxes) as

well as defined gathering spaces for patients and their families in long-term care facilities (Adams and Chivers 2016; Adams 2016).

Following the recent desire among hospital designers to create homely atmospheres, some researchers highlight that the concept of "home" can differ based on an individual's history, cultural background, and social class. According to Annmarie Adams, not everyone likes cozy or finds a group of paintings attractive or significant. More importantly, autonomy in long-term residential care (LTRC) is distinct from the autonomy enjoyed by individuals living in their own homes. She believes that "there is no place like home" and long-term care residents cannot simply be transported back to the familiar aspects of their previous domestic environments through any magical means. Adams' research indicates that architectural legacies besides the concept of home could hold the greatest promise for innovative LTRC design (Adams and Chivers 2016). Beatley, Jones, and Rainey suggest that to achieve a healthy environment, the design should consider the intention behind the desire for a homely atmosphere. In healthcare settings, people seek comfort from design elements that are personally significant to them. Similarly, individuals want to feel that the "we care" slogan is not merely a management phrase, just as they would in a home environment (Beatley, Jones, and Rainey 2018).

In parallel, the patient is gradually shifted into a customer, particularly in lucrative sectors and for wealthy clients. As customers, patients have their own desires, expectations, and viewpoints that must be considered. Consequently, the design of modern, high-end patient rooms frequently aims to replicate the atmosphere and visual features of a hotel (Leydecker 2017). The healthcare industry's shift towards treating patients as customers has led healthcare providers to look towards the hospitality industry for inspiration and partnership. The infusion of hospitality into healthcare is primarily initiated through the design of hospital facilities and the provision of hotel-like services, which is not a new concept and has been in practice since the 1980s. According to some researchers, providing high-end hotel-like services and rooms to patients in hospitals reduces stress and provides them with greater comfort and rest, ultimately enhancing the healing process (Suess and Mody 2017).

Some other studies hold the belief that patients in hospitals would rather receive care in a home-like environment instead of being in a vast "hotel-like curing factory" (Leydecker 2017). Thus, a hotel-like healthcare setting can be utilized just to establish a feeling of "familiarity" with the hospital environment, evoking emotions of "comfort, convenience, safety, security, privacy, support, and feeling "at home" (Suess and Mody 2017). As mentioned above, most studies have used the terms "familiarity" and "comfort" to describe the sensation of feeling at home for patients in hospitals. Thus, the following sections will briefly discuss the theories that define these terms.

Familiarity

At its core, familiarity refers to becoming accustomed to a specific stimulus or setting through repeated exposure. Zajonc's mere-exposure effect theory suggests that repeated exposure to an object can lead to a preference for it. This form of familiarity can be referred to as "objective familiarity" or "actual familiarity," which is essentially a measure of the frequency of a person's encounters with a particular object or scene (Craig, Conniff, and Galan-Diaz 2012).

Contrary to the early studies of environmental aesthetics that primarily used simple stimuli, environments are usually experienced repeatedly and habitually. Regarding familiarity with environments, there are two categories: "acquaintance familiarity" where there is repeated exposure to a place without any specific purpose, and "functional familiarity" where a place is encountered to accomplish some activity. Another form of familiarity is what can be described as "perceived familiarity," which is the feeling that comes with exposure to a specific stimulus that is perceived as familiar. This is similar to the "glow of warmth" described by Titchener or the opposite of Berlyne's term "novelty" (Craig, Conniff, and Galan-Diaz 2012). In general, individuals tend to find comfort in a space they are familiar with that offers them sustenance, validation, and opportunities for recreation (Davis 2019).

Comfort

In the past, nursing primarily focused on providing comfort to patients by addressing their physiological needs and illness symptoms, rather than their emotional and psychological needs. Later, the concept of comfort evolved to encompass a state of overall well-being that extends beyond just physical and mental awareness. Presently, healthcare professionals have found that patients experience discomfort mainly due to anxiety, pain, and feelings of restraint. Certain environmental factors like lack of privacy, nighttime noise, and light were also identified as sources of discomfort (Olausson et al. 2019).

Torkildsby introduces the term "existential design" to describe a design process suitable for institutional and enclosed environments that fail to accommodate a sick and vulnerable individual's "normal" state of being. From an existential perspective, comfort is a crucial aspect of being human and encompasses physical and psychological ease, which is indeed wellbeing. When faced with critical illness, patients may experience existential homelessness, which is essentially a sense of existing in a state of absence. According to Torkildsby, existing in absence means that the patient is physically present but has no choice but to rely on others for care, rendering them powerless and unable to take control (Olausson et al. 2019).

Kolcaba proposes a theory that prioritizes the concept of comfort in nursing care, where comfort is defined as "the immediate experience of being strengthened by having needs for relief, ease, and transcendence met in four various contexts. These contexts are physical, psychospiritual, social, and environmental" (Olausson et al. 2019, 330). Moreover, Yousefi et al. investigated the definitions of comfort among patients in Iranian hospitals. The research acknowledges comfort as a fundamental human requirement that comprises four primary elements: family, belief and faith, staff, and a comforting environment, which encompasses a homely and tranquil space (Yousefi et al. 2009).

Homeliness and Senses in Hospitals

Foucault and Goffman have analyzed the role and objective of hospitals as institutions, referring to them as "examining apparatus". Hospitals exclude external factors such as home environment, social circle, and regular activities, and instead focus on power dynamics and control. Goffman's perspective on hospitals as total institutions emphasized the divide between the managed (patients) and the managers (staff), limited interaction with the outside world, and minimal communication between the two groups (Gilmour 2006).

The act of institutionalizing care involves moving people from their homes to hospitals or nursing homes where they are exposed to new and unfamiliar environments with different languages, practices, and values. As a result, patients may feel disconnected in various ways. They may miss the familiarity of the physical environment, have difficulty comprehending their illness, struggle to understand changes in their body, or have difficulty finding personal meaning in their experiences. The illness and the care they receive can cause them to feel estranged from their life, body, and surroundings which they do not recognize or feel comfortable in (Tyreman 2011).

Recent research indicates that creating an environment that evokes a sense of home or homeliness through the use of sensory, material, or social elements that create a feeling of comfort, familiarity, and safety can have a positive impact on the overall well-being of patients in healthcare settings (Duque et al. 2019).

Homeliness is a concept that relates to the patient's psychological well-being, aimed at comforting them by providing a sense of assurance that they are not being institutionalized but instead, they are receiving care and attention as they would at home. It is important for hospitals to resemble a house rather than a clinic to evoke the feeling of appreciation in patients for doctors, nurses, and even architects for considering their needs as human beings (Willis, Goad, and Logan 2018).

A study examining the experiences of elderly individuals in long-term residential care identified four key elements that made them feel at home in an institutional setting. These included interpersonal warmth, which involved the expression of love and friendship, physical comfort, which involved personalizing the environment, the chance to contribute., and the freedom to make choices. Similar findings were observed in a study conducted by Sixsmith (1990) where individuals living in their own homes defined home with concepts such as comfort, family, and autonomy. Liaschenko (1994) asserts that nursing aims to help patients live a fulfilling life. For patients requiring long-term care within a hospital, it is necessary to recreate the sense of home through the creation of a supportive environment that facilitates the development of self-identity and emotional well-being (Gilmour 2006).

The current anthropological literature has highlighted both the material and sensory aspects of the home environment, including personal belongings and sensory qualities that contribute to the meaning-making process (Duque et al. 2019, 217; Pink et al. 2017). Incorporating elements such as contact with nature and thoughtful use of color, form, light, texture, acoustics, and haptic qualities can provide patients with multi-sensory experiences that engage multiple senses simultaneously. However, the design of modern interiors often neglects the multi-sensory effect that environments can have, focusing mainly on visual aesthetics (Leydecker 2017).

Among all the spaces in hospitals, patient rooms are intricate structures that encompass multiple factors and provide multi-sensory experiences. It is unclear how the perception of healthy

individuals differs from the sick ones in a room, but it can be assumed that a sick person, depending on their condition, will have an impaired or altered sense of perception. For instance, they may be more sensitive to sound or temporarily lose one or more senses. Indeed, conscious and subconscious perception varies among people, regardless of their health status (Leydecker 2017).

Patient Room

The patient's room can be a very different experience for the patients who occupy it. They only leave the room for medical procedures, tests, or treatments, and often find themselves there feeling anxious. During the periods when they are alone, they have plenty of time to pay close attention to the room's details while lying in bed, such as the color of the walls, the brightness of the room, and the pictures and decorations. They spend more time observing these details than the hospital staff. All these factors can significantly impact the patients' well-being and their overall impression of the hospital (Leydecker 2017).

The patient room is a crucial component for patients, as it is where they spend the majority of their time. The quality of their experience is dependent on whether the room simply serves as a place for them to stay, or if it creates an environment that provides feelings of safety, trust, and well-being, helping the recovery process. A well-designed patient room provides a comfortable and caring environment where patients can recover in a stress-free setting. It is a space that not only promotes physical healing but also mental reassurance, safety, and security. Maintaining hygiene in these rooms is crucial, but it must be balanced with creating a comfortable atmosphere that is conducive to recovery. Using sterile, washable rubber cells may be hygienic but will not contribute to the patients' recovery. Instead, creating a good-feeling atmosphere that complements hygiene affects the well-being of the patient (Leydecker 2017).

Consequently, a patient room is not just a functional space; it is much more than that. To design it effectively, three sets of eyes are needed: those of the architect, the hospital staff, and most significantly, the patient. The successful alignment of these different perspectives is what creates a good "healing space" (Leydecker 2017).

CHAPTER 3: METHODOLOGY AND METHODS

This thesis follows the methodological approach of research-creation. SSHRC defines this methodology as "an approach to research that combines creative and academic research practices and supports the development of knowledge and innovation through artistic expression, scholarly investigation, and experimentation". This process is embedded within the research activity and leads to the production of critically informed work across a range of artistic media (Social Sciences and Humanities Research Council 2019).

Experiments

To answer my research question, I conducted three research-creation explorations with the human senses and the concept of home. The first experiment explored the sense of auditory in the urban environment. The Urban Soundscape project seeks to reintroduce city life into hospitals by connecting them and offering patients the opportunity to have new experiences, as well as sending them a positive message that the outside urban life is inviting them. Patients that have been isolated from city life for a while can listen to the sounds of different activities from everyday life in the city and they can imagine the image of those spaces in their mind.

In the first step, the list of potential urban spaces was determined through informal interviews with family and friends. Next, accessible locations in Montreal were identified from this list. Then, the appropriate recording equipment (H 6 Zoom Recorder) was reserved from the Fine Arts equipment
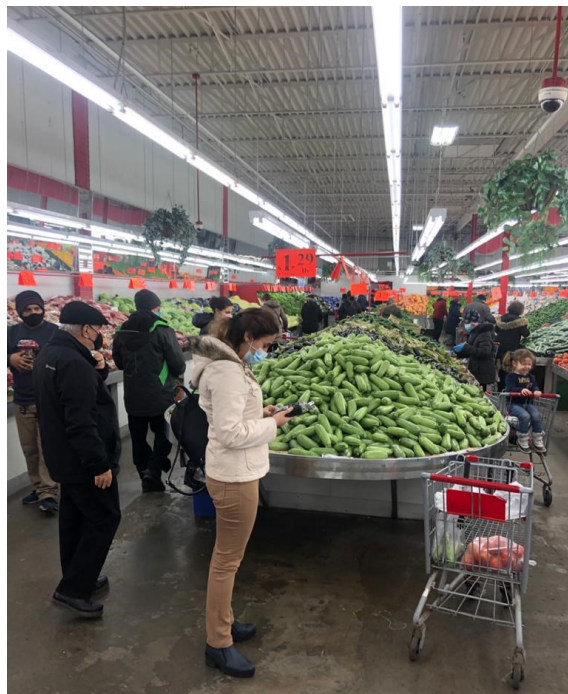

Figure 2: Sound recording in the grocery store

depot of the CDA department of Concordia University (Figure 3). The method for collecting data was a combination of interviews, on-site observations, and field trips. The next step involved walking through various areas of the city to capture sounds by means of recording. The potential urban spaces included streets, traffic lights, sidewalks with fall leaves, grocery stores (Figure 2), urban plazas, parks, and small waterfalls. Subsequently, the recorded audio files were edited through the software of Audacity. Finally, they were uploaded on a social media platform (YouTube) in order to get feedback from the audience.

The second experiment was focused on residential soundscapes and shared a similar objective and process with the urban soundscape experiment. The purpose was to collect the various sounds of daily activities at home that patients in the hospital may miss. Following interviews with friends and classmates, a list of the most common sounds in everyday life was created and then recorded (Figure 3). The selected activities included making the bed, taking a bath, brushing teeth, using the boiler, the coffee maker, the heater, opening and closing drawers and the wardrobe, walking with sleepers, cooking, watering plants, dusting, vacuuming, and watching TV. The final sounds were composed of thirteen individual sounds, each presenting one specific activity, and one sound of multiple activities. The recorded files were edited and analyzed. At last, they were uploaded on Sync and presented to the classmates to get their comments.

Figure 3: Recording equipment (H6ZoomRecorder)

The third experiment's focus was on the haptic sense. The project aimed to study and experiment with the side rail of a patient bed in a hospital room. The side rail is a crucial component of the bed that patients regularly touch, but the cold and slippery metal and plastic surfaces can create an unpleasant feeling. Studies have shown that people find touching soft and warm materials more pleasant and it creates a more comfortable and relaxing experience for them (Essick et al. 2010).

So, this project focused on soft and warm fabrics that look more familiar to people. These are the materials that most people use in their homes and daily lives and the fabrics are accessible and inexpensive. Moreover, for addressing the ease of sanitation, fabrics that are washable in high degrees (Tano and Melhus 2014) were selected for the creation work.

According to studies, velvet, and cotton provide more pleasant haptic experiences (Hartzell 2009; Essick et al. 2010). Also, most people feel good touching faux fur and fleece (Delong, Wu, and Park 2012). However, not only there is no unanimous formula to note one concrete soft material that all people would like, but also, according to one study in 2012, people even can shift their touch preferences in different circumstances (Delong, Wu, and Park 2012). Therefore, this project places great importance on having a range of options and considering "flexibility" in addressing diverse preferences, among the warm and soft fabrics. The list of materials for the creation part of this research was determined through the literature review and interviews with family members. The final materials were velvet, cotton with a dense or low pile, faux fur, dimple fleece, and terry silicon (Figure 4). Finally, the handrail covers were created using the selected fabrics and were documented and presented through photography.
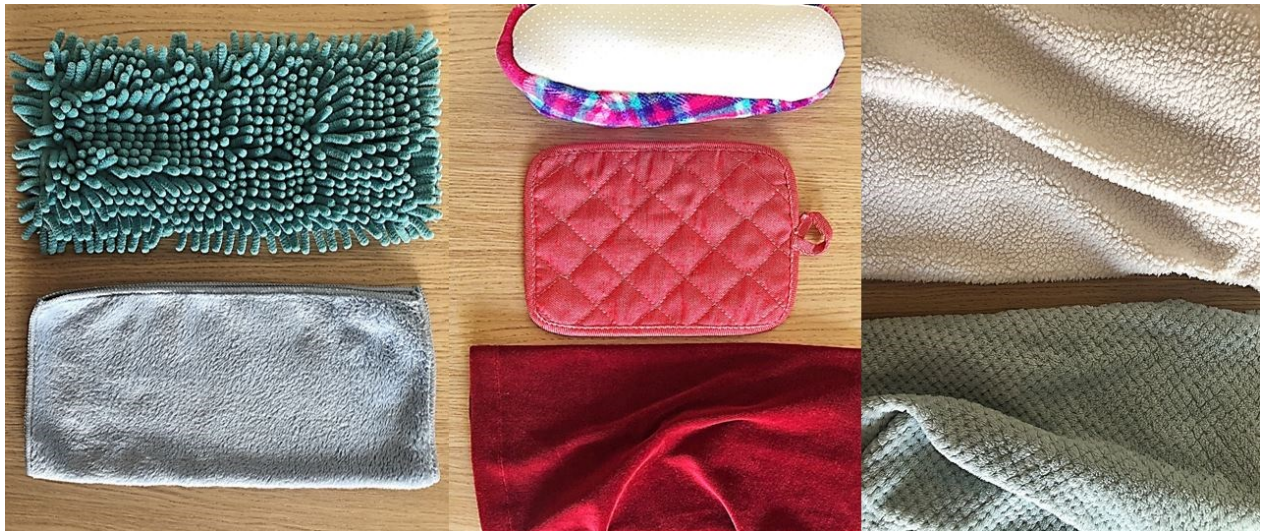

Figure 4: Selected soft and popular fabrics for the experiment

In summary, the three experiments were conducted to highlight the significance of sensory factors in understanding familiarity and comfort. Following the sensory experiences, a hypothesis emerged, leading us to prioritize the exploration of these sensorial aspects due to their apparent crucial role in establishing environments of comfort. These projects served as foundational components for the subsequent phase of the research, which helped to clarify the potential connections between the primary themes and their impacts on users. The current research addresses three main themes; patient room design, sense of homeliness, and human senses. It also seeks to explore their relationship with each other as well as with the three groups involved: patients, caregivers, and designers. Due to the project's complexity and the multitude of subjects involved, a qualitative methodology was needed to extract relevant information.

The Research-Creation Project

The study is both analytical and theoretical and employs a variety of methods. The initial phase includes conducting a literature review and categorizing and analyzing the design recommendations derived from the literature. The second phase involves carrying out several creative processes.

The key method in phase one is a discourse analysis of the main research findings that have been done related to the concepts of comfort and homeliness in the hospital ward. The critical discourse analysis (CDA) approach can inform academic literature (Wall, Stahl, and Salam 2015). The first objective of CDA is to systematically examine how discursive practices, texts, and events relate to social and cultural structures, relations, and processes. CDA discloses the discursive sources of dominance, power, bias, and inequality through studying and analyzing written texts (McGregor 2003). So, the analysis of the literature in this study has explored two innovative viewpoints. The first one focuses on identifying the actors influenced, while the second one examines the human senses that have been considered.

This research adopts two kinds of data collection and data analysis. At the first step of data collection, various principles, guidelines, themes, and recommendations for designing medical wards with a focus on comfort and homeyness are extracted from past studies. To maintain consistency throughout this thesis, these extracted elements are referred to as "design recommendations". The books and articles were located using Google Scholar and the Sofia discovery tool of Concordia University for any year up to 2020, though most studies were published in the past twenty years. For this purpose, searches were performed iteratively. Searching started with core concepts such as homey design, comfortable, familiar, sensual design, patient room, hospital, and medical environment. The citations of papers were also considered to locate additional articles in that way. Then, the literature is further investigated with various combinations and spellings of search terms related to the main concepts. The focus was finding English studies with guides for designing homely spaces in hospital patient rooms. Although numerous resources are available for hospital design, there is a scarcity of research exploring the creation of cozy and home-like spaces in medical settings. Moreover, due to the time constraints of being a master's student, I was only able to review eight sources related to the design of comfortable and homely medical environments.

During the next stage, the collected data is divided into three levels of categorization. Firstly, the data is classified into different areas of design potentials addressing the main subjects such as nature, material, object, furniture, music, aroma, meal, and nurse-patient relationship. These are the key concepts of each extracted recommendation that are labeled as "sub-categories" in the final table. Secondly, based on the types of all sub-categories in the design domain, they are grouped into three primary categories: physical interventions, experiential interventions, and social interventions. All three categories share the term "intervention", which addresses the design improvement action. Physical interventions refer to elements that can be used or avoided in the design of the physical space. Experiential interventions relate to the sub-categories that enhance the quality of sensorial experiences. The social relationships and interactions between patients and caregivers or family members have been classified under the category of social interventions. Thirdly, the three main categories and their subsets are distributed among three target audiences: patients, caregivers, and designers. According to the references and considering the nature of each design recommendation, its sub-category, and its main category are assigned to one of the three

groups of patients, caregivers, or designers to perform the task (Tables 1, 2, 3). However, a few recommendations address more than one audience group. The subsequent stage involves analyzing the relationship between the design recommendations and the five human senses, and identifying how each recommendation affects the different sensory aspects. Initially, the human sense(s) addressed by each recommendation is investigated. Next, the quantitative analysis is conducted using various chart types to reveal the correlations among the audience, principal categories, and human senses.

In the second step of data collection, in order to find how the recommendations relate to real-world situations, qualitative observations in the hospital room of a cancer unit were conducted through photography documentation. The case study was at the cancer wards of the McGill University Health Centre (MUHC) in Montreal, Quebec. The MUHC is one of two major healthcare networks in Montreal. Among different hospitals of MUHC, the Royal Victoria Hospital's cancer ward (in the Glen site) was selected as the case study. It is one of the recent and modern buildings of MUHC which was established in 2015 as a result of the funding support of Quebec taxpayers (Dougherty 2012). The inpatient[1] cancer unit of this hospital (located on block D, level 10) consists of the Oncology Inpatient ward, Hematology Inpatient ward, and Stem Cell Transplant ward (MUHC 2023). The cancer department of this hospital was chosen because the physical and spiritual needs of cancer inpatients are distinct from those of other patients, and they require specialized care. Cancer can threaten their sense of meaning in life (Visser, Garssen, and Vingerhoets 2010). Patients who receive a cancer diagnosis are often more susceptible to stress and trauma, and they may require additional support from their environment (Skalla and McCoy 2006). Due to the pandemic situation, just one inpatient room from the Oncology and Hematology wards of the Royal Victoria Hospital was permitted to be observed, while visitors were not allowed in the Stem Cell Transplant ward.

Following the observation and photography documentation, the second data analysis involves examining the hospital room images to determine how many of the design recommendations have been considered and how they have addressed the five human senses. In other words, the analytical framework from the previous stage is used to analyze the photos of a hospital room for each target group, and the sensorial aspects of the design recommendations are demonstrated on the images. Moreover, sketches of some design recommendations have been drawn to depict the expected outcome of them.

Finally, the research findings including a table of design recommendations, analytical charts, analyzed hospital room images and sketches need to be shared with people to reveal the sensorial design recommendations as an information mechanism and get the ideas. Media is an important communication tool being used to deliver information. There are many types of media including print media, broadcasting media, the internet, etc. (Paletz, Owen, and Cook 2021).

For the current project, the website platform from the internet category is chosen because the format and the content can be designed and created by an individual person, and it can be improved in further steps due to the research requirements. While there are numerous websites, such as Archdaily and Dezeen, that provide the latest architectural information and news, none of them have focused on the sensory aspects of hospitals. This research-creation project has a didactic approach and tries to teach different design recommendations for a patient room and their sensorial

---

[1] Inpatient term refers to someone admitted to the hospital to stay overnight, whether briefly or for an extended period of time (cskopecce 2021).

aspects by interacting with the analyzed hospital room images on a website. In addition, this platform will provide opportunities for the contribution of the target groups in expanding the research scope, and results, and adding more case studies by obtaining users' suggestions and comments. The two following chapters present the findings and conclusions of the study.

CHAPTER 4: THE RESEARCH RESULTS

The Research-Creation Experiments

The experiments that I conducted on human senses provided me with a better understanding of the importance of considering each sense during the design process. In my first experiment with auditory sense, I received feedback from individuals who listened to urban soundscapes (Figures 5, 6) on YouTube (Figure 7). The feedback indicated that the impact of sounds varied among people. Comments suggested that factors such as individuals' backgrounds and childhood memories played a crucial role in how they responded to the soundscapes. In general, most of the users found the soundscapes of social spaces with the presence of people (such as the urban plaza) to be more enjoyable.
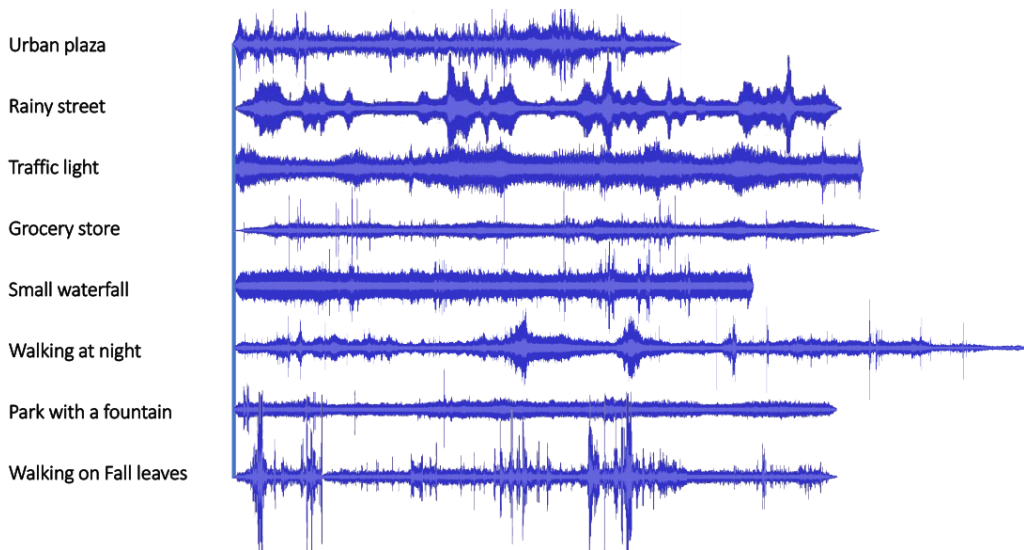

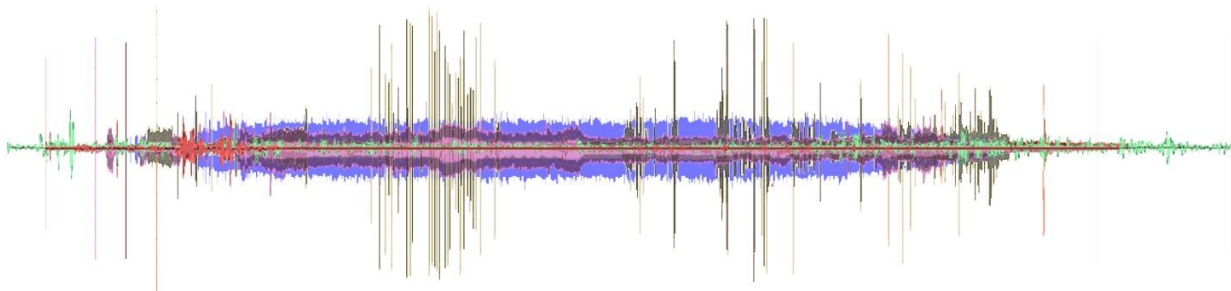Figure 6: Audio waveforms of eight urban environments

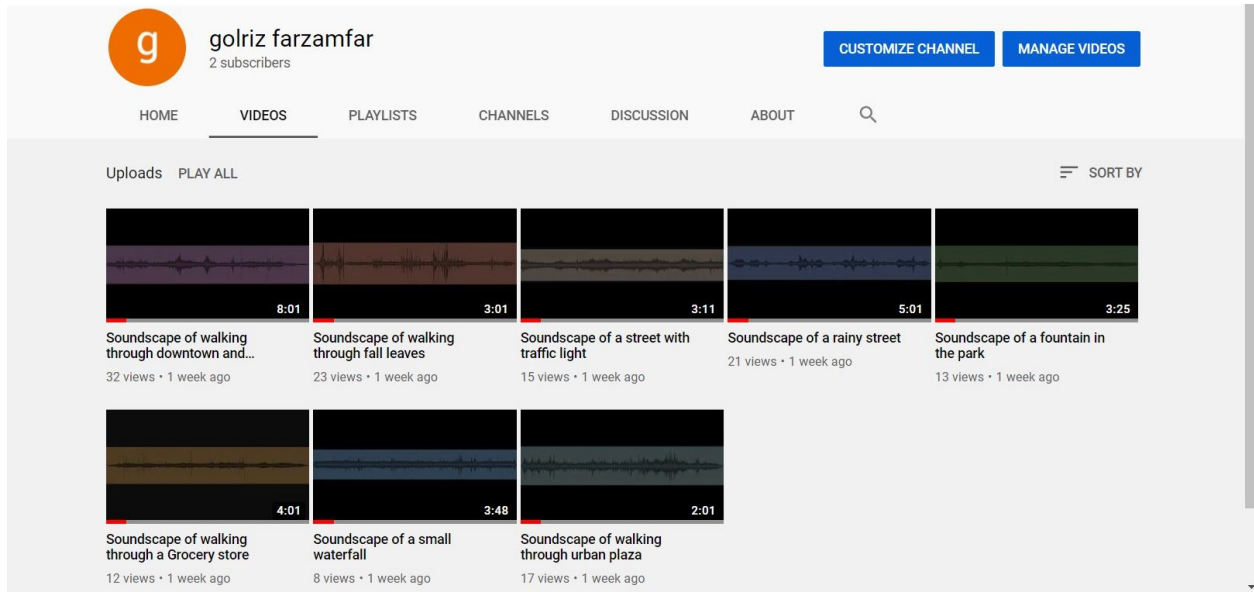Figure 5: Combination of eight audio waveforms

Figure 7: Uploaded audio files on my YouTube channel

In the second project, two methods were used to capture the sounds of various everyday activities at home. The first method involved recording individual soundscapes for each activity, while the second method was a seven-minute recording of multiple activities occurring in a sequence (Figures 8, 9). The modified audio files were shared with the MDes program students, and they were also presented in the class. According to their comments, most of the students enjoyed listening to the sound of running water during a bath and the sizzling and boiling sounds of cooking.

1. Making the bed
2. Taking bath
3. Brushing teeth
4. The boiler
5. The coffee maker
6. Drawers and wardrobe
7. Walking with sleepers
8. Cooking
9. Sparing on the plant
10. Dusting
11. Vacuuming
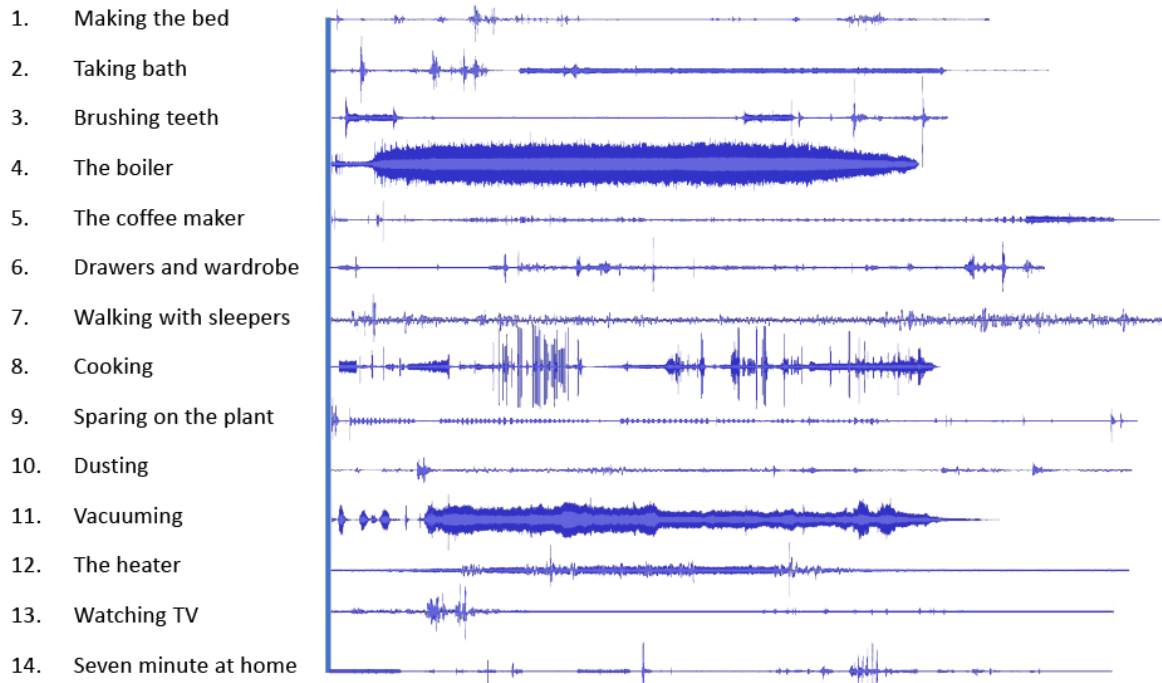12. The heater
13. Watching TV
14. Seven minute at home

Figure 8: Audio waveform of domestic sounds for the second experiment

Considering all the suggestions and feedback, the future study can expand the scope to cover more soundscapes, improve the sound quality, implement more professional methods of testing the soundscapes on users, and define various categories. For instance, the soundscapes could be sorted based on their duration (short or long), whether they are separate or mixed (superimposed), still or in motion, and individual or group-oriented. Creating a sound library and sharing it on a platform (such as YouTube or SoundCloud) could have the benefits of being highly accessible to hospital patients and adaptable to different tastes. In this case, patients or their psychologists could select the appropriate sounds based on their needs at the moment. Indeed, a portable media player could be installed on the patient's bed, providing an opportunity for all patients, doctors, and nurses to adjust the program and play desired healing soundscapes.
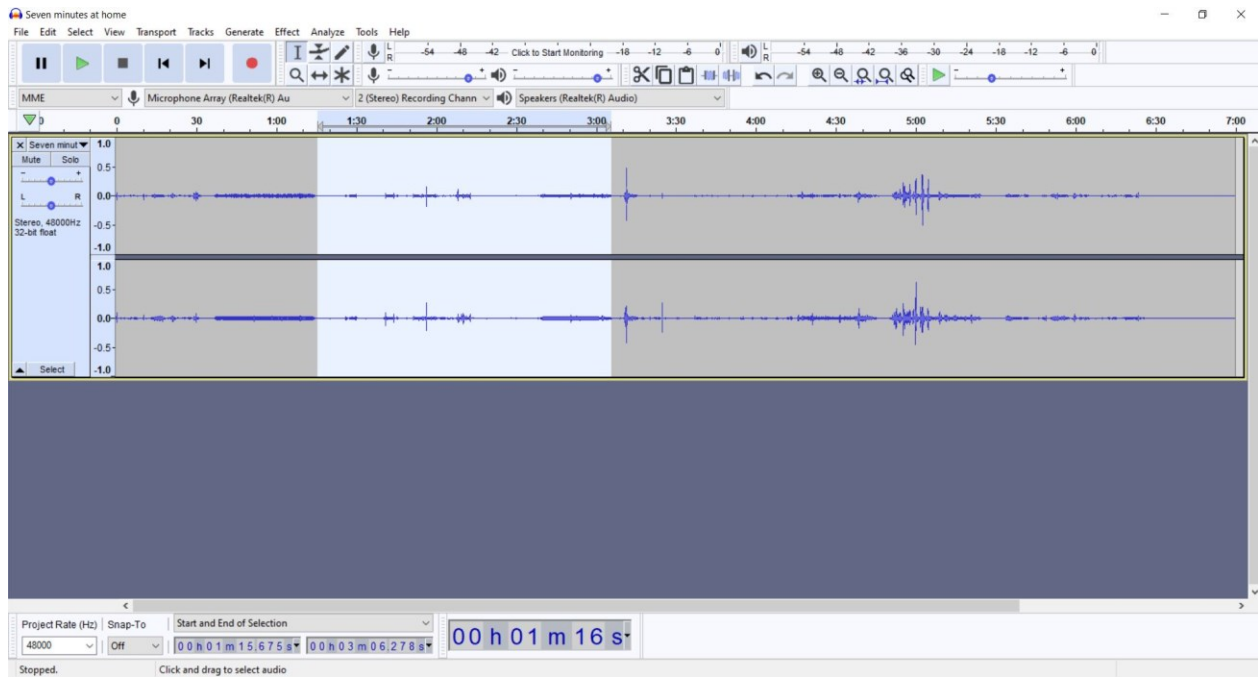

Figure 9: The software of Audacity for editing the recorded audio files

The third experiment explored the haptic sense with the side rail of the patient bed in the hospital room. After determining the proper materials due to past studies and interviews with my family members, some homey fabric covers were prepared. The selected fabrics were cut and sewn to cover the rails accurately and the Velcro tape was applied for the ease of attaching and detaching to the side rail (Figure 10). So, daily changing of the cover would be facilitated by all groups of patients, staff, or family members. Also, the spongy form was created by placing foam inside some fabrics or sewing multiple layers together. This attitude would persuade the users to be able to squeeze and distract themselves from stress or pain. The approach mimics the use of a stress ball, which has been shown to reduce anxiety and pain levels in patients (Kasar, Erzincanli, and Akbas 2020). As a result, instead of touching cold, rigid, and slippery steel, hospital patients can have a soothing haptic experience while moving their fingers through the texture of the fabrics (Figure 11). This project brings about three advantages; the covers could be produced easily at home or by

companies, there would be a diversity of choices for different preferences regarding warm and soft covers, and the covers could be changed and sanitized every day.

Figure 10: Covers from selected fabrics for the side rail of the patient bed

Figure 11: Photography documentation of haptic experiment with the designed fabric covers for the handrail of a patient bed

The limitations imposed by the COVID-19 pandemic and associated restrictions for accessing some places affected my research in various ways. Regarding the first two experiments, the initial objective was to list, record and test the urban soundscapes with the end users (patients) in hospitals. However, due to the pandemic situation, it became impossible and ordinary people replaced the patients as the users. This situation also influenced my list of potential spaces and resulted in removing some of them from the list such as restaurants, coffee shops, malls, markets, and other spaces full of people. Despite this limitation, it allowed me to realize that not only the patients in the hospitals but also many other people can benefit from the soothing or energetic sounds of urban spaces. The third experiment also aimed to obtain patients' opinions on comfortable fabrics to touch. However, due to the lockdown and pandemic restrictions, I had to interview my family members instead.

In consequence, the majority of users (including my family and students) expressed their enjoyment in listening to the audio and touching the fabrics in all three projects. Furthermore, in the comments, they noted that it was their first exposure to the concept of considering human senses in hospitals.

The Results of the Literature Review and Data Analysis

After the experiments with senses, a more precise literature review was conducted to identify the studies for homely design recommendations applicable to hospital wards. The recommendations are sourced from books and articles that have conducted research on actual hospital cases across various global medical institutions including psychiatric and hematology wards in Australia, ICUs in Sweden, as well as medical facilities across the USA and Germany. These recommendations are not purely theoretical; rather, they are founded upon rigorous practical testing and thorough analyses within real patient care settings.

The result is a table with 151 design recommendations derived from eight references which are sorted into two main categories. The first category is the audience groups consisting of patients, caregivers, and designers. Within the 151 recommendations, only eight can be applied by patients to make their hospital rooms more comfortable and home-like (Table 3). 48 recommendations aim to assist caregivers in enhancing the patient experience (Table 2), while the remaining 95 are primarily intended for consideration by designers and architects during the hospital design phase (Table 1).

Audience	Main Categories	Sub-categories	Recommendations	Sight	Hearing	Smell	Taste	Touch
Patients	Physical Interventions	Nature	Bring in elements of nature to create comfort (Olausson et al. 2019, 336)	■		■		■
		Furniture	Having favorite objects near such as a pillow, blankets, and objects brought from home (Olausson et al. 2019, 331)	■		■		■
			Time and one's past: for example objects and materials that people linked to their happy childhood or grandparents' home (Olausson et al. 2019, 337)	■	■	■	■	■
	Experiencial Interventions	Creativity	"Bring back the creativity into your life, even if only by writing letters with pen and ink or taking time to arrange fruit on a plate" (Crawford 1998, 98)	■	■	■		■
		Music	Cool environment: the sound of running water makes us feel cooler (Crawford 1998, 58) Listening to the music and the sound of running water (Crawford 1998, 23) The sound of the sea, for example, appears to be almost universally liked and it is relaxing (Crawford 1998, 44) the sound of rain		■			
			Auditory distractions: listening to music, and particularly music that was soft, non-lyrical, and comprised mostly of strings and low tones (Clinton-McHarg et al. 2021, 2)		■			
			Discreet music from the "good old days" like wise creates a sense of familiarity and well-being (Leydecker 2017, 70)		■			
		Aroma	Cool smells: "clean plant-based waters and colognes and sheets. Try using rose waster, lavender, or rosemary (Crawford 1998, 58)	■		■		

Table 1: Design recommendations for patients

Audience	Main Categories	Sub-categories	Recommendations	Sight	Hearing	Smell	Taste	Touch
Caregivers	Physical Interventions	Nature	Bring in elements of nature to create comfort (Olausson et al. 2019, 336)	●				●
			Try to keep fresh air on the move. Open windows, especially in bedrooms and bathrooms, to remove moist air, ensure a cross-flow, and revitalize the air (Crawford 1998, 28)		●	●		●
			Positive distraction: indoor plants (Clinton-McHarg et al. 2021, 2) plants for cancer patients (Suess and Mody 2018, 9)	●				●
		Material	Tactile towels Choose towels that are absorbent, such as linen, Egyptian cotton, or those that massage your skin (Crawford 1998, 26)	●				●
			For the bed sheets "cotton and linen absorb moisture and are a better choice than synthetics for a good night's sleep (Crawford 1998, 42)	●				●
			Good-quality bed linen, a small-format pillow and a decorative blanket or throw immediately evoke associations with a hotel and should be favoured over cheap mass-produced wares (Leydecker 2017, 29)	●		●		●
	Experiential Interventions	Music	Cool environment: the sound of running water makes us feel cooler (Crawford 1998, 58) Listening to the music and the sound of running water (Crawford 1998, 23) The sound of the sea, for example, appears to be almost universally liked and it is relaxing (Crawford 1998, 44) the sound of rain	●	●			●
			Auditory distractions: listening to music, and particularly music that was soft, non-lyrical, and comprised mostly of strings and low tones (Clinton-McHarg et al. 2021, 2)		●			
			Discreet music from the "good old days" like wise creates a sense of familiarity and well-being (Leydecker 2017, 70)		●			
		Aroma	Cool smells: "clean plant-based waters and colognes and sheets. Try using rose waster, lavender, or rosemary (Crawford 1998, 58)	●		●		
			The smell of food can be used to encourage people to eat regularly (Leydecker 2017, 51)			●		
			Warm smells: "aside from the smell of supper cooking, there are scents that evoke warm feelings, such as amber, vanilla, musk, and frankincense (Crawford 1998, 57)			●		
			Fragrant blossoms and blends of incense and flowers can help speed recovery (Leydecker 2017, 55) Positive distraction:Aroma/fragrance (Suess and Mody 2018, 11)	●		●		
			Artificial room fragrances should be used with care as they are often unnecessary and can cause allergic reactions among some patients (Leydecker 2017, 55)			●		
			The indoor air quality of patient rooms can be improved through ventilation, air conditioning, the choice of materials and cleaning (Leydecker 2017, 55)			●		
			Fresh air is desirable in the patient rooms (Leydecker 2017, 55)			●		
	Social Interventions	Window	Windows became surfaces (through positive messages and decoration): (Duque et al. 2019, 223)	●				●
			Commercial glueless stickers to decorate the windows such as flowers in the common areas (Duque et al. 2019, 223)	●				●
			Draw patients' names on the glass window with a smiley face to help them find their room (Duque et al. 2019, 224)	●				●
			Hand-made stickers to create a "discharge tree" (Duque et al. 2019, 223)	●				●
			Erasable colored markers to write positive messages (Duque et al. 2019, 223)	●				
			Origami birds (Duque et al. 2019, 223)	●				
		Wall (the role of health care staff as everyday experts)	Discharge trees painted on the walls (Duque et al. 2019, 222)	●				
			Large stickers that comprised murals of relaxing beach or forest scenes (Duque et al. 2019, 222)	●				
			Patient artworks (Duque et al. 2019, 222)	●				
			Small "fiddle boards" for patients with dementia to interact with (Duque et al. 2019, 222)	●				●
			Information about staff interests and backgrounds (Duque et al. 2019, 222)	●				
			Positive messages (Duque et al. 2019, 223)	●				
			Having a creative whiteboard on one wall for the use of patients and staff (Crawford 1998, 98)	●				●
		Meal (the role of health care staff as everyday experts): Familiarity of routines	Catering service whereby meals were pre-ordered: Catering staff introduce a practice of sitting with each patient into their everyday routines, taking them through the menu options and recording their preferences on a tablet coordinated with the hospital kitchen (Duque et al. 2019, 226)	●	●			
			Have a toaster installed in the OPU kitchen: First, it ensured the bread was fresh, making it's gustatory and tactile qualities easier for frail patients' to bite and chew. Second, toast preparation was a form of care, whereby staff would make toast to patients' individual tastes, with butter and vegemite or marmalade" and develop stronger connections with them (Duque et al. 2019, 226)	●	●	●	●	
			Keeping different jams and cereals in the kitchen (Duque et al. 2019, 227)	●		●	●	
			Paying attention to wiping plates	●			●	
			The materiality of food presentation and delivery: Taking great care in plating and presenting meals in an attractive and appetizing fashion; like the placement of the vegetables and meat (specially for the meals that could be visually unappealing) (Duque et al. 2019, 226)	●				
			The material and size of plates are designed to ensure the safety and maintenance (Duque et al. 2019, 227)	●				●
			The color of plates (Duque et al. 2019, 227)	●				
			Socializing and provide patients with some daily certainty during mealtime periods that can be very uncertain and disorienting (Duque et al. 2019, 227)Food can indeed affect mood. Nearly every important family or social event takes place around the table (Crawford 1998, 126) eating meals around a table or bed with family members or at least one hospital staff	●	●	●	●	●
			Tastes of meals (Duque et al. 2019, 228)	●		●	●	
			Giving patients the ability to eat what and when they want to eat: On-demand room service, kitchenette (coffemaker and refrigirator) (Suess and Mody 2017, 11)	●				●
			Having coffee, an afternoon cup of tea, and relaxing with family and friends (Olausson et al. 2019, 337)		●	●	●	●
			The possibility of parents/carers' staying the night in the patient room (Leydecker 2017, 65)					●
		Nurse-patient relationship (with the organizational support at a management level)	Caring for the patient as if he were a brother, father or grandfather. The patient becomes 'part of your life' (Gilmour 2006, 18)	●	●			
			Flexible social boundaries: staff regularly eat with the patients (Gilmour 2006, 18)	●		●	●	●
			Access to social support: hospitality-certified healthcare staff: hospital employees' ability to listen to patients, treat them with respect, and effectively communicate with them (Suess and Mody 2017, 10) (Suess and Mody 2018, 11) Personal relationships (Gilmour 2006, 18)	●	●			●
			Entering the room with getting permission from patient (when they are awake). For example by knocking the door (Leydecker 2017, 35) permission to enter a private area. In normal cases, patient rooms can be entered immediately (Leydecker 2017, 60)	●	●			
			Everyday clothing for both nurses and patients (Gilmour 2006, 18)	●		●		●
			Freedom of movement of patients in and outside of the unit and in all areas of the ward (Gilmour 2006, 18)	●				●
			No specific designated space for the nurses and all nursing documentation are completed at the bedside.... But with personal private spaces for both patients and staff (Gilmour 2006, 18)	●				●

Table 2: Design recommendations for caregivers

Audience	Main Categories	Sub-categories	Recommendations	Sight	Hearing	Smell	Taste	Touch
Designers	Physical Interventions	Nature	Cool smells: "clean plant-based waters and colognes and sheets. Try using rose waster, lavender, or rosemary (Crawford 1998, 58)	X	X	X		
			Nature samples in the presented material such as a piece of wood (Olausson et al. 2019, 336)	X				X
			Plant flowers (such as roses, jasmine, violets, carnations and honeysuckle) in boxes behind the window or in the garden in front of the window to attract birds and butterflies and to release scents in the evening (Crawford 1998, 30)	X		X		
			Positive distraction: indoor plants (Clinton-McHarg et al. 2021, 2) plants for cancer patients (Suess and Mody 2018, 9)	X		X		X
			Proximity to water (Leydecker 2017, 94)		X			
		Window	View from the window to the outside (Olausson et al. 2019, 338)	X				
			The large windows and impressive views: by offering safe access to fresh air, natural light, and views to the outside world (Duque et al. 2019, 223) Being able to view the outdoors through large windows (Clinton-McHarg et al. 2021, 2)	X	X	X		
			Curtains, and textiles in general, contribute a homely atmosphere to patient rooms... Lightweight semi-transparent curtains are usually sufficient to provide a measure of privacy, but to darken a room, a suitably opaque material is required (Leydecker 2017, 33)	X				X
			Blinds and shades can be regulated electrically from the patient's bed (Leydecker 2017, 33) Patients should be able to comfortably control the incidence of natural light from their bed (Leydecker 2017, 60)	X				
			Cool objects: Install shutters, blinds, or shades to allow air in yet keep sunlight out (Crawford 1998, 58) Sunshades can be used to buffer high and low temperature extremes, keeping the room at a pleasant temperature (Leydecker 2017, 53)	X				X
		Light	You can bring light to life with glass. "Glass and mirrors reflect, multiply, and energize light (Crawford 1998, 118)	X				
			Natural light: Rely as little as possible on artificial light and make the most of natural Light... Keep windows completely clear or use minimal covering to maximize the light. Use half-curtains in fabric such as lightweight linen or cotton, or a shade on the lower half only to diffuse the light. Also, try sand-blasted glass, or even tracing paper or photographic gels on the lower panes to let in light but keep prying eyes out (Crawford 1998, 115) Natural light is essential for patient well-being (Leydecker 2017, 60)	X				
			Natural illumination, for example from adjoining courtyards, is ideal (Leydecker 2017, 36)	X				
			So-called circadian lighting is sometimes used in hospitals to artificially simulate the natural rhythm of the day (Leydecker 2017, 60)	X				
			The more individual the sources of lighting, the richer the mood... low-level warm lights for a relaxed feeling create intimate areas of light. Paper lamps, standard lamps or even candles are best (Crawford 1998, 122)	X				
			Yellow light stimulates the intellect, orange enhances creativity; turquoise is refreshing and soothing; green induces calm and balance (Crawford 1998, 125)	X				
			Lighting that shines onto side walls creates a more harmonious atmosphere and avoids dazzling patients when transported lying in bed (Leydecker 2017, 36)	X				
			LEDs are now widely used as an efficient form of lighting (Leydecker 2017, 60)	X				
			A separately adjustable reading lamp for patients is practical (Leydecker 2017, 60)	X				
			The indoor air quality of patient rooms can be improved through ventilation, air conditioning, the choice of materials and cleaning (Leydecker 2017, 55)			X		
			Fresh air is desirable in the patient rooms (Leydecker 2017, 55)			X		
		Furniture	Having retractable screens that patients can close for privacy and open when they desire broader interactions (Suess and Mody 2018, 9) Frosted glass prevents people outside from looking in. A similar situation arises where separate blocks or wings of a hospital overlook one another. Here curtains or blinds are commonly used to ensure privacy (Leydecker 2017, 60)	X				X
			A bedside cabinet provides storage directly next to the bed, allowing patients to stow personal belongings within easy reach. Wardrobes, by contrast, can be further away and don't necessarily have to be in sight (Leydecker 2017, 29)	X				X
			Coffee/tea-maker and refrigerator (Suess and Mody 2018, 11) refrigerator or minibar, either in the cupboard, in a separate item of furniture or within comfortable reach in the bedside cabinet (Leydecker 2017, 29)	X	X	X		
			Comfortable chairs, armchairs and sofas (Leydecker 2017, 29)	X				X
			A dining table for up to two people, an armchair with reading lamp (Leydecker 2017, 30)	X				X
			A chair to sit at and read (Olausson et al. 2019, 337)	X				X
			A coach with soft cushions (Olausson et al. 2019, 337)	X				X
			A working desk and lights (Olausson et al. 2019, 337)	X				X
			Furniture is best when it is big multi-purpose and flexible; tables large enough to work and on, sofas to stretch out on (Crawford 1998, 51) Positive distraction: Designer-inspired furniture (Suess and Mody 2018, 11)	X				X
			Freestanding items of furniture and built-in fittings must be incorporated so that they do not obstruct work patterns within the room and provide sufficient space to move around. Fold-down tables are a typical example (Leydecker 2017, 27)	X				X
			Beds should be placed so that they can be reached from three sides, so staff have direct access, especially in the case of an emergency (Leydecker 2017, 27)	X				
			From the patient's perspective, the placement of the bed should permit them to look outside onto greenery, to see people entering via the door, to watch over their belongings in the bedside cabinet and cupboard, and to watch TV (Leydecker 2017, 27)	X				
			A calendar and a clock in the room: providing patients with a temporal reference to the day and time (Duque et al. 2019, 228)	X	X			
		Material	Use materials that contribute to feelings of being anchored including heavy and robust elements (soil and iron) because they contrast the artificial and high-tech atmosphere (Olausson et al. 2019, 340)	X		X		X
			Building materials such as concrete, bricks, and plastic fabrics as a "junk pile" (Olausson et al. 2019, 337)	X				X
			Soft materials associated with intimacy and warmth (Olausson et al. 2019, 337) Materials associated with coziness (Olausson et al. 2019, 337)	X		X		X
			Long-lasting materials (Olausson et al. 2019, 338)	X				X
			Suitable for medical standpoint and aesthetically appealing materials and finishes (Suess and Mody 2017, 10)	X				X
			Synthetic surfaces might seem the obvious hygienic choice, but natural materials such as wood (especially fragrant ones-camphor or cedar), soft textured stone or unpolished marble are perfectly serviceable, and irregularity is far more sensual than hard edges (Crawford 1998, 26)	X				X
			Sensuous fabrics (the most sensuous fabrics delight the skin. Cashmere, wool, and mohair velvet, among others, are tried and tested pleasure materials. They are at their most comforting in natural stone and earth colors such as honey, slate, gray, sand, and brown. Wool is one of nature's cleverest fabrics. Warm in winter, cool in summer, it is also naturally flame-resistant) (Crawford 1998, 51)	X				X

27

Category	Statement					
	Warm surfaces: tactile fabrics make a room feel warm but used in excess they can also be claustrophobic. Worn wood, old leather, soft stone, and paneling also make a space feel intimate and human, and thus naturally warm (Crawford 1998, 57)	green				purple
	Cool surfaces: "soft-textured stone, marble, terrazzo, and concrete are the best surfaces for the heat. On beds and sofas use fabrics that are cool in summer, such as linen, wool and leather and choose naturals rather than synthetics which don't breathe (Crawford 1998, 58)	green				purple
	Synthetic materials are an inescapable part of modern life, and have a certain vibrancy, especially in contrast: plastic against worn wood, or rough ceramic on Formica (Crawford 1998, 62)	green				purple
	Using the materials such as gentle wood by paneling on one wall to give a sense of depth and richness, old wooden floors, aged and unpolished stone and marble to give a sense of solidity to a space, unfinished plaster or concrete to reflect the light softly, quality paints which are high in pigment such as chalky natural paints to reflect and absorb the light in a soft and gentle way (Crawford 1998, 62)	green				purple
	Good-quality wood surfaces are pleasant to touch and hold and contribute to creating a warm atmosphere (Leydecker 2017, 36)					purple
	Textured stone and marble feel solid and secure, wood warm, sisal friendly and stimulating, and nylon carpet feels unpleasant (Crawford 1998, 62)	green				purple
	Positive distraction:Hi-end material finishes (Suess and Mody 2018, 11) Using the walls to display materials: (Duque et al. 2019, 222) High-quality materials and lighting systems create a more homely patient room (Leydecker 2017, 21)					purple
	The artificial material (such as imitation wood surface and imitation leather upholstery) addresses the wish for a classier, hotel-like, warmer and homely atmosphere while fulfilling hygiene requirements and being easy to clean (Leydecker 2017, 48)					purple
	Incorporate natural material (Olausson et al. 2019, 340)	green		yellow		
	Plastic is warmer to the touch than steel or glass, which can be unpleasantly cool. For this reason, wooden handrails are always preferred over steel, as are aluminium door fittings, as both materials are warmer and more pleasant to touch than steel (Leydecker 2017, 53)					purple
	Smart materials such as latent heat accumulators/PCMs (Phase Change Materials) can be used to buffer high and low temperature extremes, keeping the room at a pleasant temperature (Leydecker 2017, 53)					purple
	Linoleum is regarded as a very natural floor covering, as is natural rubber, provided it has a European EPD (Environmental Product Declaration). Vinyl flooring is available in phthalate-free varieties mixed with natural materials such as cork to reduce the PVC content (Leydecker 2017, 55)					purple
	Acoustic materials can be used to counteract the effects of excess noise" such as Acoustic ceilings in foyers, acoustic plasters and panels on walls, Sound-insulated doors (Leydecker 2017, 59)			yellow		
	The material concept should harmonise with the colour concept and be augmented by the lighting concept. For example, Naturally-lit spaces with wooden floors and white, not too smooth walls result in pleasant, bright and light interiors that are calm and unfussy, and contrast pleasingly with the world outside (Leydecker 2017, 47)	green				
Wall	Painted glass fibre or non-woven wallpaper, or high-quality wall coverings such as patterned or textured wallpapers (Leydecker 2017, 36)					purple
	Wall-mounted handrails (Leydecker 2017, 36)					purple
	The warm surfaces of the wood panelling, a cutout for the bed, and concealed supply lines and technology help create an atmosphere of comfort and trust far removed from typical sterile hospital interiors (Leydecker 2017, 15)	green				
	The importance of details in the design. "No home ever feels truly harmonious unless the design and function of details (such as a doorknob, light switches, window frames and bathtub faucets) are right (Crawford 1998, 82)	green				
	Using curves at the layout design of the home; "we feel at ease with curves. A world designed along straight lines would be unnatural- an icy place" (Crawford 1998, 78)	green				
Image and artwork	Positive distraction: Art work on the walls: such as soothing, not exciting, artwork for psychiatric hospital design, or idiosyncratic collections of art that provide sources of entertainment and engagement for a pediatric setting (Suess and Mody 2017, 11) (Suess and Mody 2018, 5, 11) selected works of art or photographs (Leydecker 2017, 36, 65)	green				
	Positive distraction: images portraying realistic nature scene (Clinton-McHarg et al. 2021, 2) nature images (Suess and Mody 2018, 9)	green				
	The frequent use of images of woods, meadows and flowers can be used in hospitals to trigger positive associations (Leydecker 2017, 51)	green				
Floor	Having carpet or a rug can not only help for sound-absorption but also for emotional warmth (Crawford 1998, 42) Flooring material that make spaces more comfortable such as carpet (Leydecker 2017, 29) the sound of soft steps on carpets or loud steps on ceramic tiles (Leydecker 2017, 59)	green	blue			purple
	Carpets certified for use in healthcare environments are often used in corridors due to their hotel-like qualities and acoustic damping. However, to clean them, vacuum cleaners are necessary, which introduces a new source of considerable noise (Leydecker 2017, 36)	green	blue			
	Floor surfaces must therefore be designed with appropriate anti-slip qualities to prevent people from stumbling (Leydecker 2017, 52)					purple
	The design of the floor covering (The wavy floor pattern) can definethe different parts of this single-bed patient room (Leydecker 2017, 19)	green				
	Soothing soundproofing: Wood or tiled floors are great, but they do tend to make spaces echo and give noise is a harder edge. Rugs are great sound absorbers- the shaggier the better. Rubber and linoleum are also good and are natural alternatives to vinyl (Crawford 1998, 41) Draperies also help to deaden noise (Crawford 1998, 42)	green	blue			purple
Color	Colorful items and environment (Olausson et al. 2019, 337)	green				
	Positive distraction: colorful walls (Suess and Mody 2018, 11)	green				
	Warm colors: When you choose colors for rooms that you want to feel warm, make sure there are some red tones- although even grays and creams can be warm (Crawford 1998, 57)	green				
	Cool colors: "blue actually lowers the blood pressure. Neutrals are good, as they reflect light and shade, although bright white can be fiercely reflective in strong light (Crawford 1998, 58)	green				
	Color changes perception. Wrap-around pale colors on floors, walls and ceiling make small spaces bigger (Crawford 1998, 72)	green				
	An innate response to color; nearly all cultures have associated red, orange, and yellow with sun colors, and thus with warmth, pleasure, and energy; blue, indigo, and violet are identified with the moon, and so are cool, calm, and soothing. Science also confirms our common belief that certain colors make us behave differently... green rests the eyes and induces a feeling of calm, while the exposure to red raises the metabolic rate (Crawford 1998, 109)	green				
	The colours in the hospital environment should not be be dull and dreary (Suess and Mody 2018, 9)	green				
	Bright, warm, friendly, invigorating, inviting, and restful are just some of the typical attributes that a good room design should have such as yellow and apricot with a hint of terracotta or dark red as accent colours (Leydecker 2017, 47)	green				

			Recommendation					
			As a rule, stronger, striking colours are better used as accents, for example a single dark red wall surface. It is better to avoid using such colours on very durable surfaces such as floor coverings (Leydecker 2017, 47)	green				
			The choice of a neutral, timeless colour affords greater flexibility in future (Leydecker 2017, 47)	green				
			Colours are associated with smells, as in the case of violet or yellow (Leydecker 2017, 48)	green				
			Yellow tones, accentuated with terracotta and apricot, create warm, comforting interiors; how ever, their use in patient rooms for older people has become somewhat ubiquitous. A balanced mix of pleasant sand and beige tones in combination with an off-white can be more effective (Leydecker 2017, 48)	green				
			Floors in earthy colours communicate a sense of reassuring solidity" for older people (Leydecker 2017, 48)	green				
			The consistent use of white communicates a sense of cleanliness (Leydecker 2017, 15)	green				
			White is almost always perceived as being too "sterile" and has predominantly negative connotations (Leydecker 2017, 15)	green				
			Hospital colour concepts also go through trends: white and surgical green gave way to petrol and pastel yellow, then to "feel-good" colours such as apricot, yellow and terracotta, then to trendy colours such as apple green, which remains a firm favourite among marketing departments (Leydecker 2017, 47)	green				
			Bright green foliage as a backdrop for the patients is calming and relaxing (Leydecker 2017, 51)	green				
		Technology	High-end flat-screen TV (Suess and Mody 2017, 10)	green	blue			
			Smart-room technology: Such technology, which allows patients to regulate temperature and lighting, access entertainment (TV, music, video games, internet), monitor their health activity, and speak directly with a nurse when needed (Suess and Mody 2017, 10)	green	blue			purple
			Microsystems with sensors and digital controllers for various functions herald the arrival of the smart patient room. These controllers will make it possible for patients to adjust room temperature, open and close doors, raise and lower blinds, change room lighting and also to operate the entertainment centre – whether on the wall or at the bedside – with TV, VOD (Video on Demand), music, games and Internet (Leydecker 2017, 61)	green		yellow		purple
			Connect to WiFi (Access to social support) (Clinton-McHarg et al. 2021, 2)	green	blue			
			Catering service whereby meals were pre-ordered: Catering staff introduce a practice of sitting with each patient into their everyday routines, taking them through the menu options and recording their preferences on a tablet coordinated with the hospital kitchen (Duque et al. 2019, 226)	green	blue			
			Control over light, adjustable window blinds, the temperature of the infusion chair, and access to food, personal healthcare information (Suess and Mody 2018, 4)	green				purple
			A hotel-like environment: controllable technology (music, television and entertainment), on-demand room service, patient self-service kitchenette, controllable lighting (adjustable, with color changes), on-demand in-room spa and salon services, and on-demand family assistance and concierge services (Suess and Mody 2018, 4)	green	blue	yellow	orange	purple
		Bathroom	Bathroom fittings include a large mirror, good lighting, sufficient storage space, a hairdryer, shaving mirror, presentable towels and toiletries, and a heated towel rail (Leydecker 2017, 33)	green				purple
			Large-format tiles (with anti-slip floor surfaces) are advisable, not only because of the quality they convey but also because they have fewer joints, which is more hygienic (Leydecker 2017, 33)	green				
			Floor-flush shower trays or tiled floors, wheelchair-accessible wash basins, handles and buttons that are easy to use and mirrors that can be seen from different heights (Leydecker 2017, 33)	green				purple

Table 3: Design recommendations for designers

The second category pertains to the nature of the recommendations and activities that improve the spatial experience of patients. It is divided into three domains: physical, experiential, and social interventions. Each of the three interventions consists of sub-categories. The physical intervention focuses on the visible and tangible aspects of the environment including nature, objects, furniture, images and artworks, materials, lights, colors, windows, walls, floors, technology, and bathrooms. The experiential intervention covers the clusters of aroma and music which address the patient's direct sensory experience, excluding vision. The third intervention relates to the recommendations that promote better social relationships with patients. Nurse-patient relationships, meal, wall, and window surfaces are subdivisions of this category.

The following step involves analyzing all five human senses for each recommendation. To ensure consistency throughout the project, including the table, charts, images, and website, a specific color is assigned to represent each sense. This enables the audience to easily follow the various analyses and information about the senses presented in the study and on the website. The color green is used to represent vision, blue is selected for an audition, yellow refers to olfaction, orange speaks for gustation, and purple corresponds to the tactile sense.

The results from the above table were presented in multiple graphs that illustrate quantitative relationships between variables of the audiences, categories, and human senses. According to the extracted analytical bar chart (Figure 12), the sense of vision is the most commonly considered sense among the total of 151 recommendations, accounting for 86.8%. The tactile sense is the second most frequently addressed sense, with 51.7% of the recommendations taking it into account more than the other three senses. In contrast, gustation has received the least attention in the studies. Therefore, the order of the senses by their frequency in the design recommendations is sight, touch, smell, hearing, and taste. In addition, more than half of the recommendations focus on one or two senses, while only 5% of them involve four or five senses. In conclusion, the majority of the existing research has prioritized the sense of sight, and the other senses (especially taste, smell, and hearing) have been undervalued. Also, most of the recommendations address only one or two senses and a small number of them consider four or five human senses in designing a comfortable patient room (Figure 13).

The chart in Figure 14 shows the distribution of design recommendations for each audience and their categories. Designers have more than half of the recommendations (95 out of 151), while the least number of recommendations belong to patients. Also, the physical intervention category has the largest proportion of recommendations, whereas the experiential intervention category that addresses the senses directly has the smallest proportion. It is worth noting that designers only consider the physical intervention category and the recommendations under the social intervention category are only relevant to caregivers. In summary, most of the resources have primarily focused on designers and fewer studies have investigated the role of patients or caregivers in creating

comfortable hospital environments. Furthermore, the focus of the studies has been more on the physical factors than the social or sensual features.
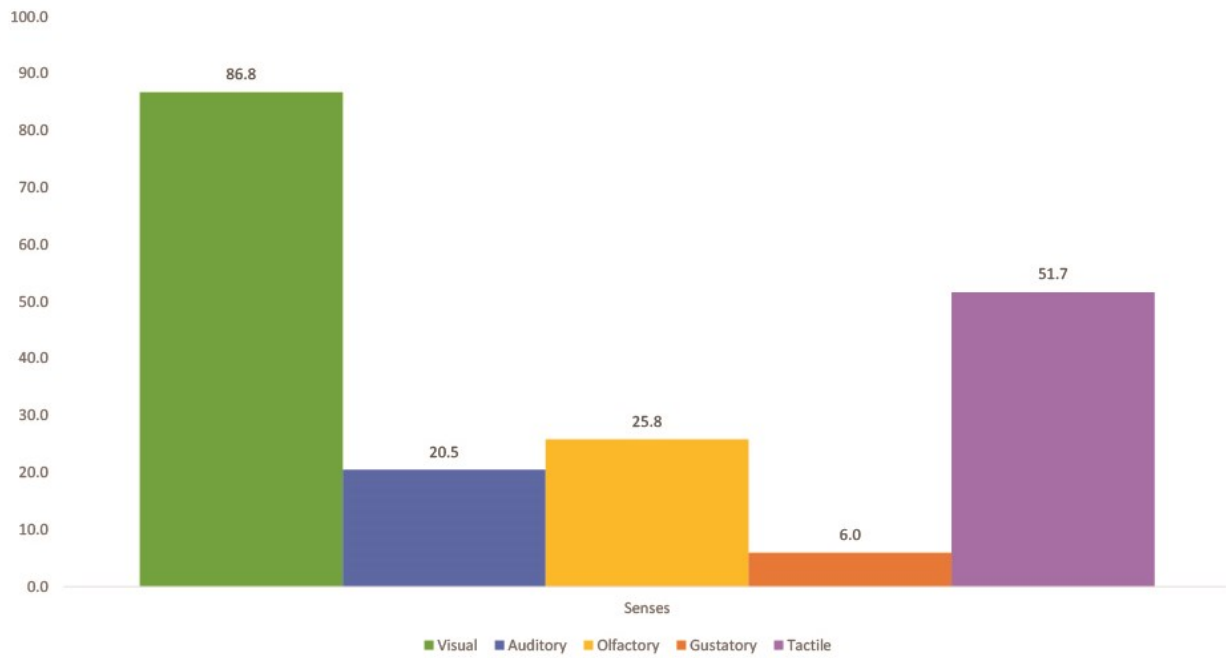
Figure 12: Distribution of senses for all design recommendations
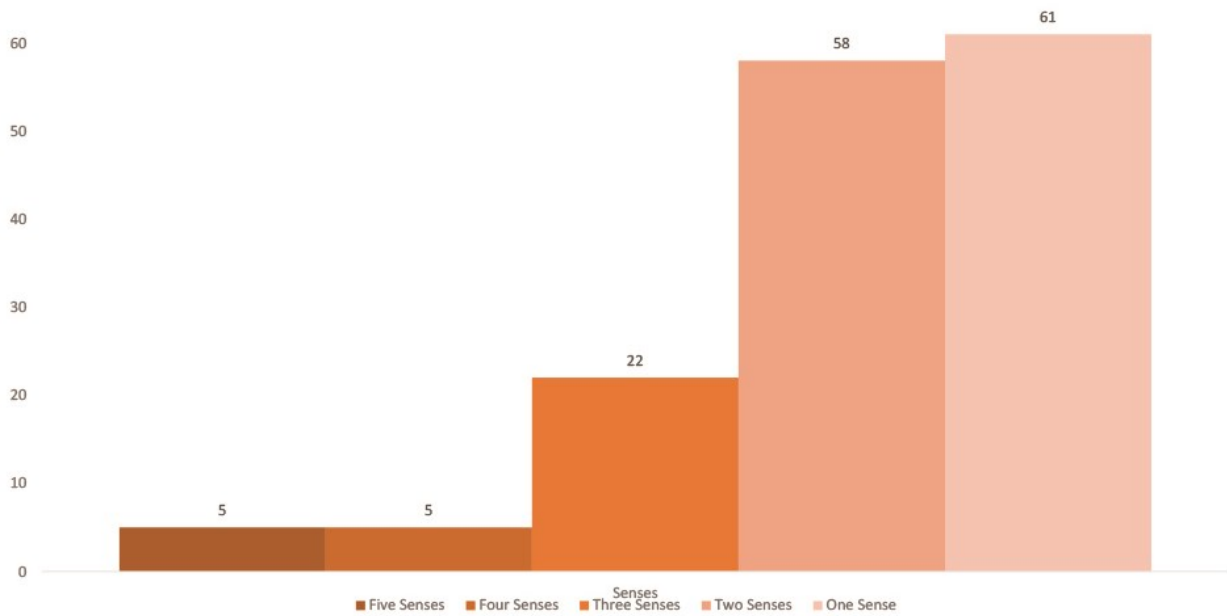
Figure 13: Distribution of multiple senses among all design recommendations
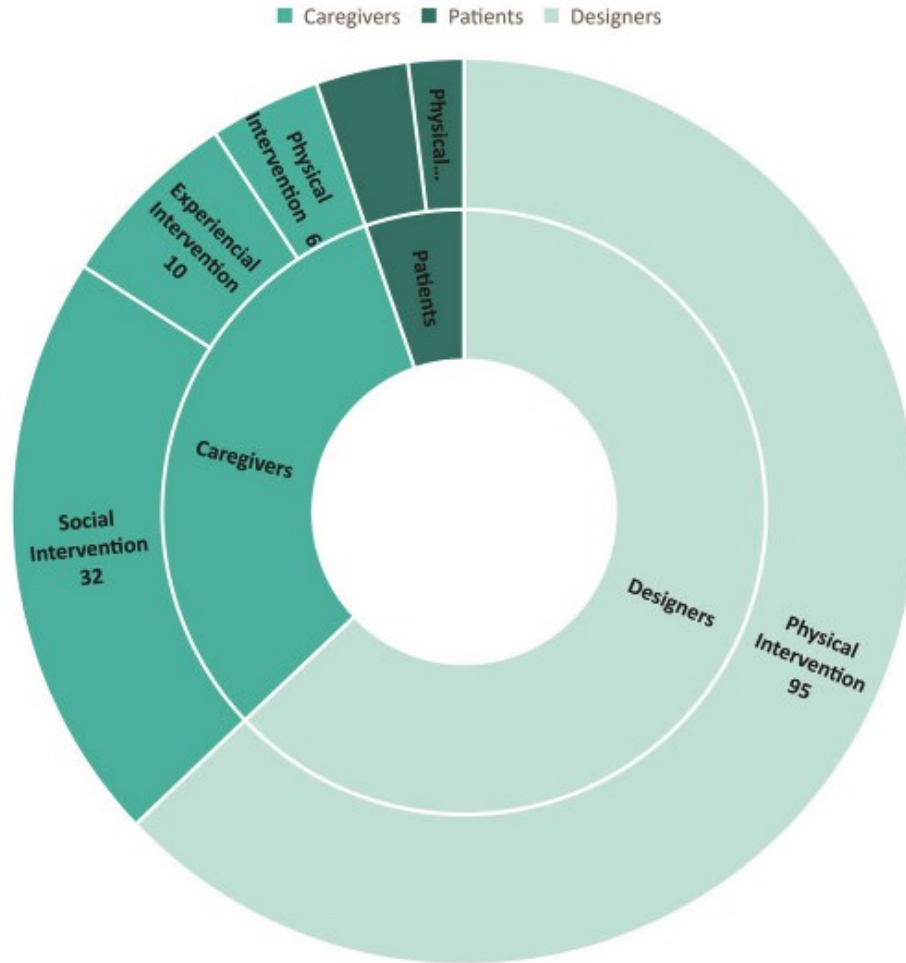
Figure 14: Distribution of design recommendations among the audiences

The relative proportion of the five human senses for the different audience groups is depicted in the pie chart in Figure 15. At first glance, it is evident that all five senses are included in the total recommendations for every group. For designers and caregivers, the order of the senses, from most to least, is sight, touch, smell, hearing, and taste. For patients, the percentage is the same for sight, touch, and hearing, with the least proportion for taste. The opposite of this chart is the graph in Figure 16 which indicates the proportion of each audience group for each human sense. The order of sensory proportions for designers and caregivers is also the same here, respectively including sight, touch, smell, hearing, and taste. The final chart in Figure 17 reveals the distribution of senses among the main categories. As shown in this chart, the physical and social interventions have similar proportions for the five senses, with sight as the greatest and taste as the least. However, in experiential intervention, the sequence of senses based on their quantity is olfaction, audition, vision, and touch while taste is not included. Thus, the direct sensual recommendations have been studied less than others, and the sense of taste has received the least attention in existing research.
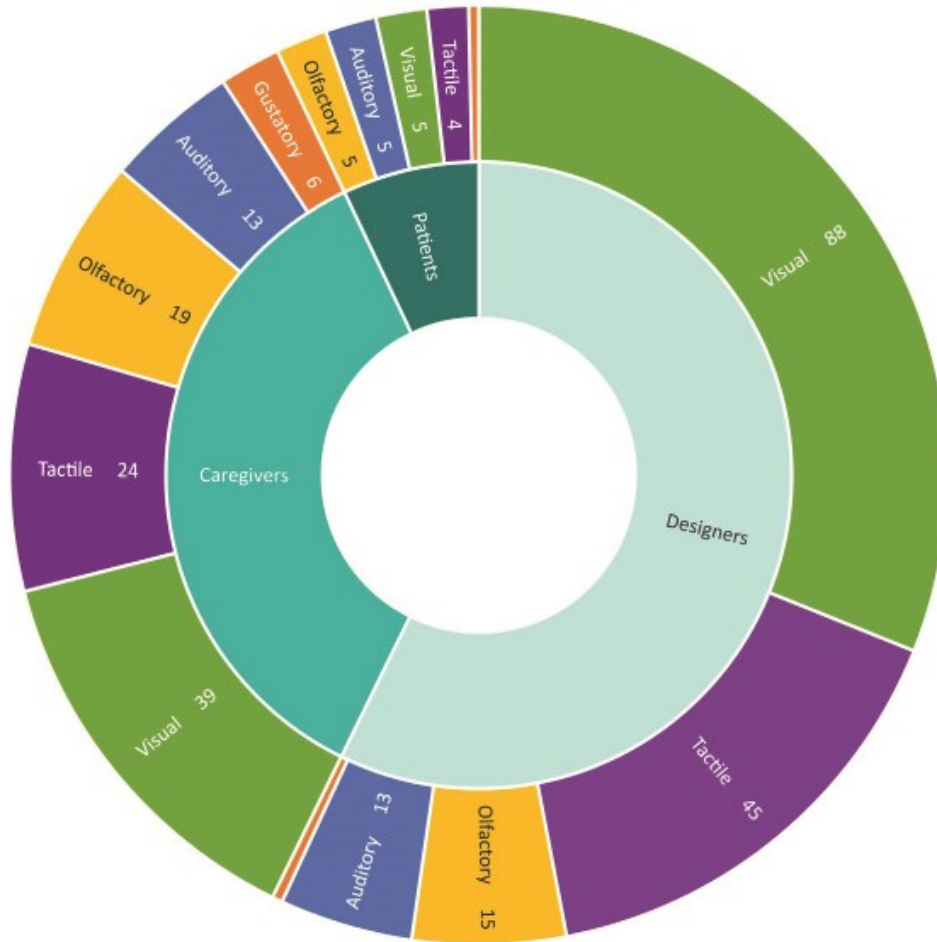
Figure 15: Distribution of senses among the design recommendations of audiences

The findings from the table and the analytical graphs reveal that very few studies have directly addressed the role of senses in design recommendations. Nevertheless, the sense of sight has been indirectly considered in most of the resources for designing a comfortable patient room, while other senses have been overlooked. It can be seen from the charts that there is a vast scope for exploring numerous design recommendations in the future. In addition, further research is needed for unfolding the ways that caregivers and patients can integrate with the comfortable and sensual design of their environment. Furthermore, additional research can investigate the social and sensual aspects of creating comfort in hospitals instead of just focusing on the physical features.

Figure 16: Distribution of audiences for five human senses in terms of design recommendations

The next step of the research-creation project was analyzing the photos of the patient room at Royal Victoria Hospital. The photos captured different angles of the patient room, including the bathroom (Figure 18). Each photo was analyzed separately for designers, caregivers, and patients. The analysis was based on the recommendations from the tables (Tables 1, 2, 3). There were two types of analysis conducted for each group: "current strengths," which identified the design recommendations that were already present in the room, and "further improvements," which suggested additional design recommendations that could provide more comfort for patients. Each recommendation was labeled and placed next to the relevant spot in the photo (for example, the text related to the window can be found next to it in the images). To make the images more explicit, the opacity of all elements not related to the recommendations in the tables was reduced.

Figure 17: Distribution of senses among the main recommendation categories

Moreover, the design recommendations in the images were also analyzed in terms of their connection to the senses. Pictograms were used to illustrate the senses associated with each recommendation on the images. So, both the "Current Strength" and "Further improvement" classifications include images of the patient room with all the relevant recommendations and their associated senses. Figures 19 and 20 represent a composite mosaic of the comprehensive analyses conducted. For detailed reference, each of these images can be found in Appendices A and B.

Additionally, to better understand the role of each sense in the patient room, the images were sorted based on the senses. So, five categories of images were created, each containing only the recommendations connected to one sense. To maintain consistency with the previous stage, the color code for each pictogram corresponds to the same sense in the analytical table and charts.

Figure 18: Photography documentation of a patient room in the cancer ward of Royal Victoria Hospital

Figure 19: Image analysis 1-Current strengths

Figure 20: Image analysis 2- Further improvements

The Results of the Creative Process

To provide a more complete view of the suggested design recommendations for improving the patient room, iterative sketches were created for some of the recommendations that were not fully represented in the images (Figure 21). Some sketches depict a recommendation once, while others show multiple concepts for a single recommendation (Figure 22). These sketches can aid both the researchers and the audience in visualizing how a recommendation can lead to improvements in the space. The same process was followed for creating iterative drawings of the symbols representing the five human senses (eye, ear, nose, mouth, and hand) (Figure 23). The final versions of these sensual sketches were used in the analysis of the hospital images.

Figure 21: The sketches depicting some of the design recommendations
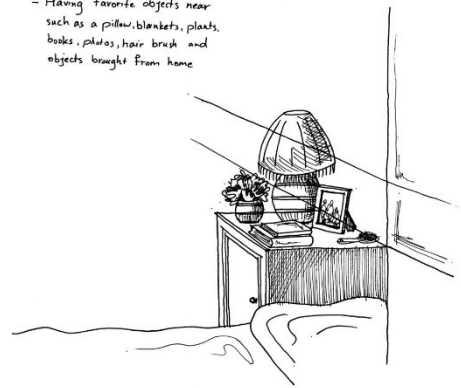
Figure 22: Iterative sketches for some of the design recommendations

Figure 23: Iterative drawings of the pictograms for five human senses

The final stage was creating a platform to present all the research findings including the analysis, images, and sketches. The goal was to inform the people of what has been done and what can be their role in designing a comfortable patient room by considering the senses. For this purpose, a website was created using the Wix platform ("About Us | Wix.Com" 2006). The main objective of this website was to provide information related to each audience group separately which is explained in the "About" section (Figure 25). So, the homepage of the website starts with a question asking users to select their group from patients, caregivers, and designers (Figure 24). Users can further switch between groups using the audience group icon on the header. Once a group is selected (Figure 26), the webpage appears with six sections: table of design recommendations, analysis of design recommendations, images of the patient room, image analysis one (current strengths), image analysis two (further improvements), and sketches (Figure 27). The layout of this webpage is identical for all audiences. Users can download the files of the design recommendation table and analytical charts by clicking on the related buttons. They also have access to all images of the case study through the section "Images of the patient room" (Figures 28, 29).
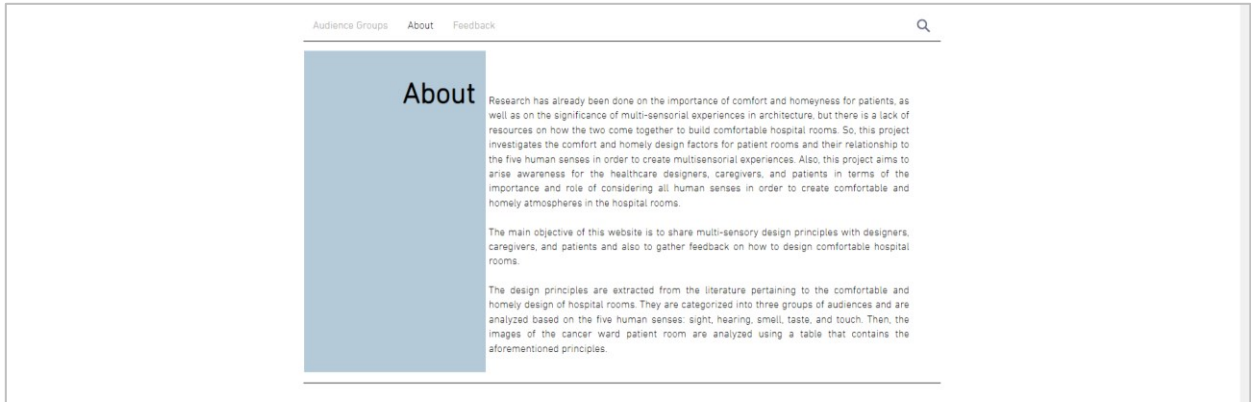
Figure 25: The "About" page of the website
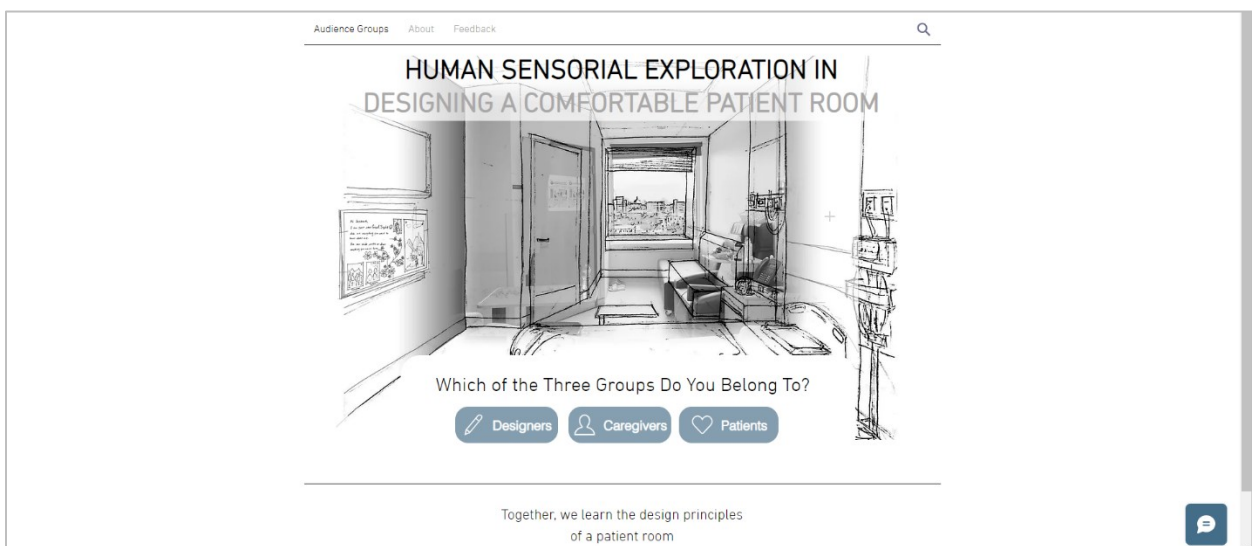
Figure 24: The homepage of the website
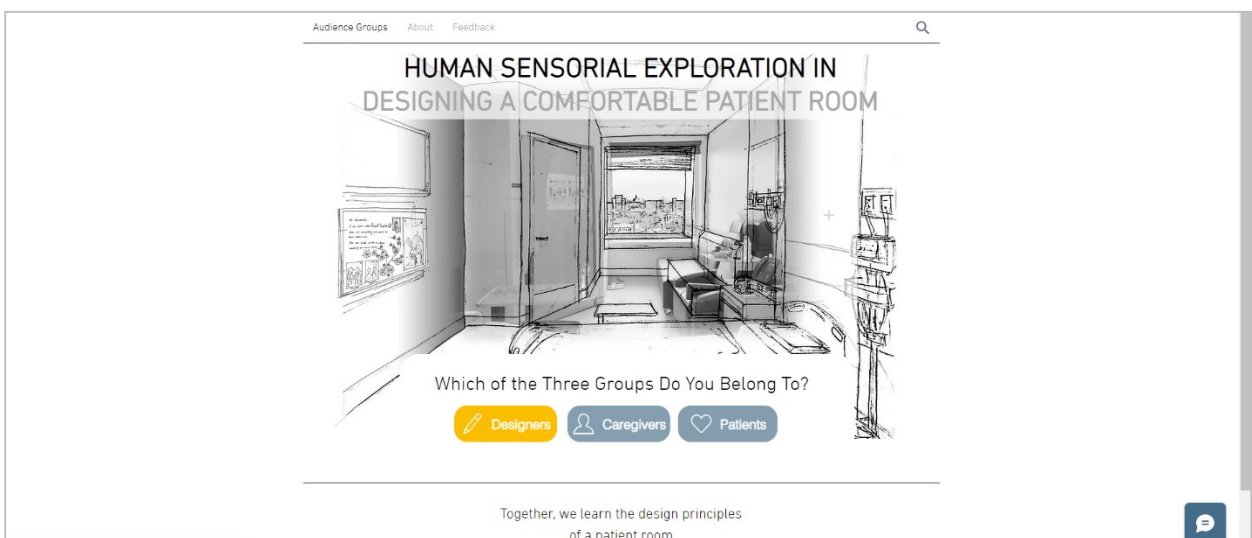
Figure 26: The users need to select one of the three audience groups
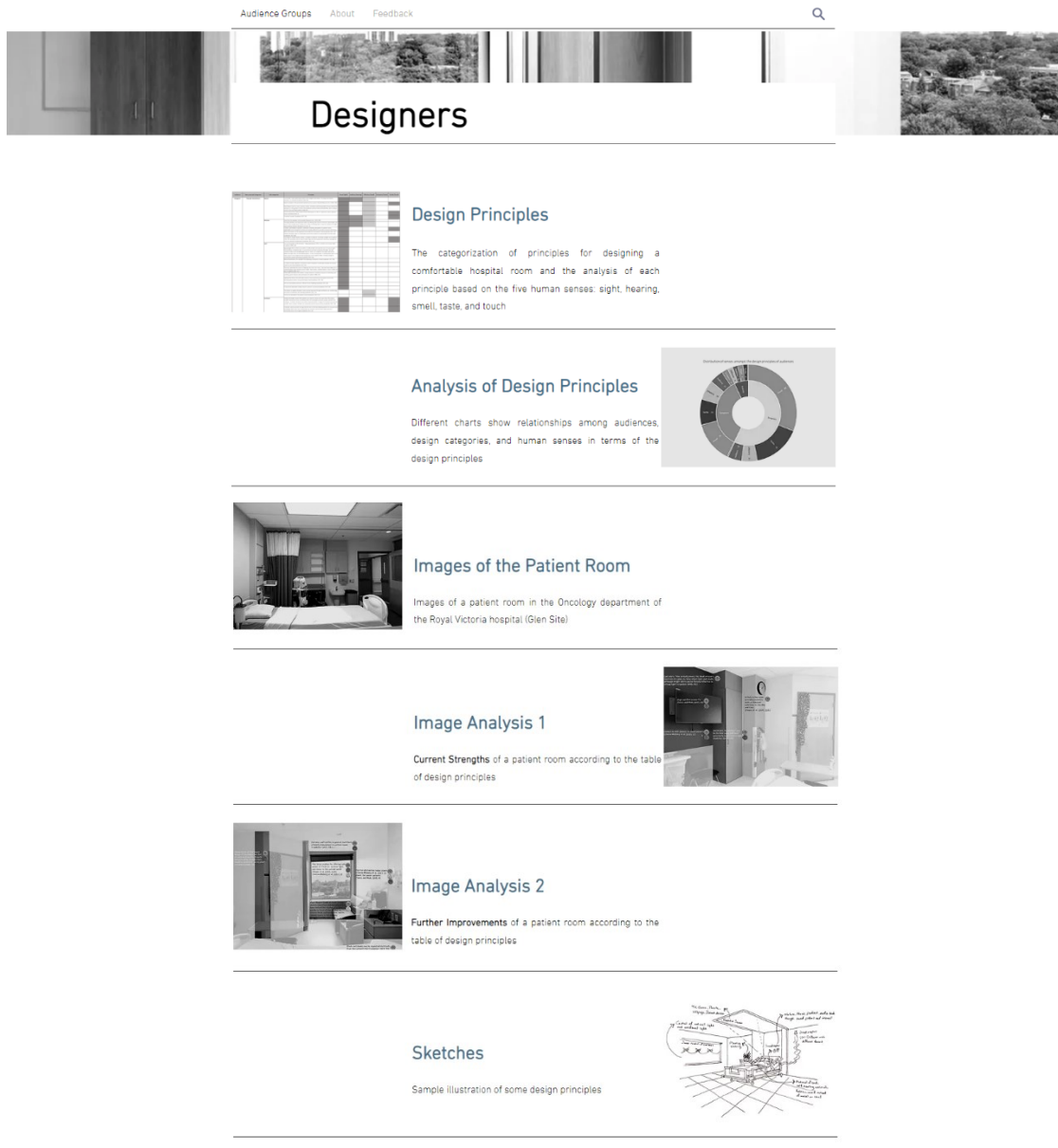
Figure 27: Once an audience group is selected, the webpage appears with six sections.
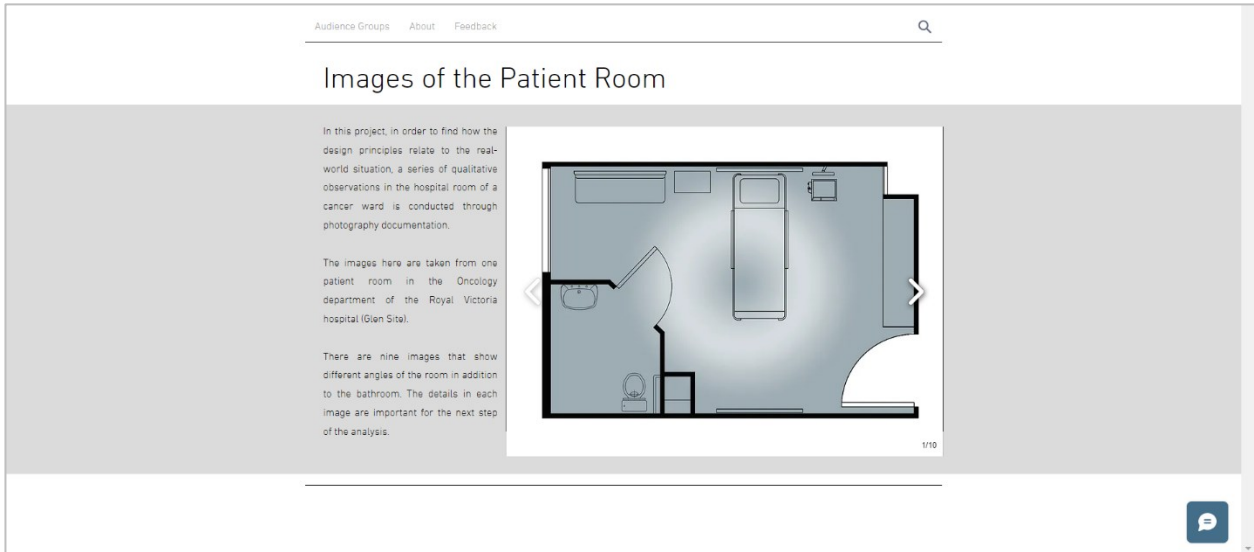
Figure 28: The section of "Images of the patient room": Layout of the room
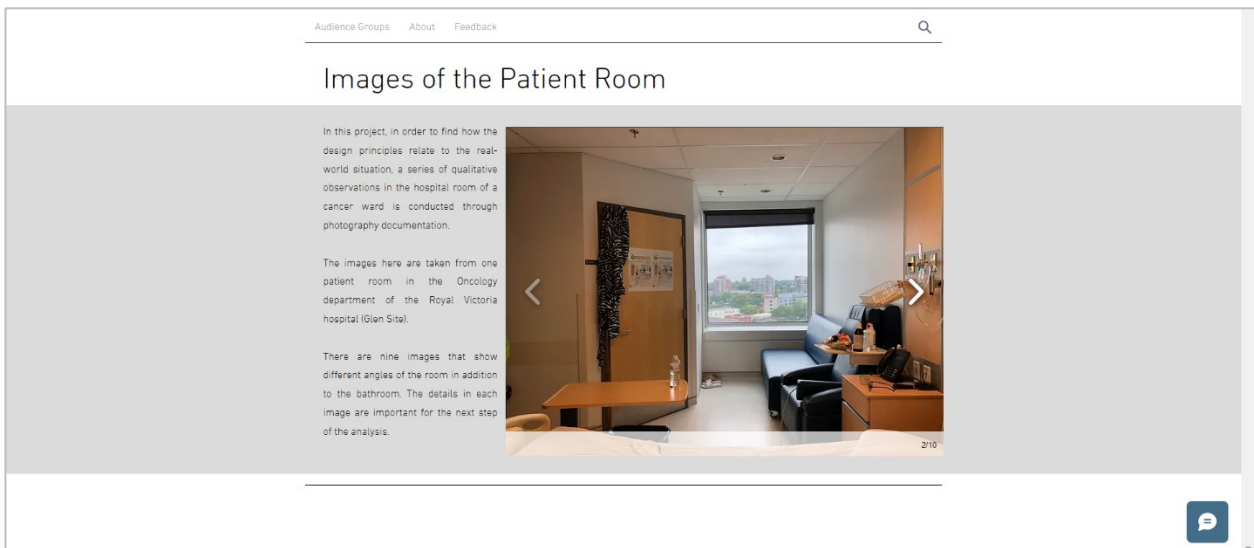
Figure 29: The images of the case study from different angels

By choosing the image analysis sections, a new page appears asking the users to select the sense/senses that they wish to explore (Figures 30, 31). There are six options for answering this question: sight, hearing, smell, taste, touch, and multiple senses. They can choose to see the results of image analysis for one of the human senses or all five senses. The last section on this page is "Sketches" which contains the iterative sketches for design recommendations of related audiences (Figure 32).

Figure 30: The "Image Analysis 1" section

Figure 31: The "Image Analysis 2" section
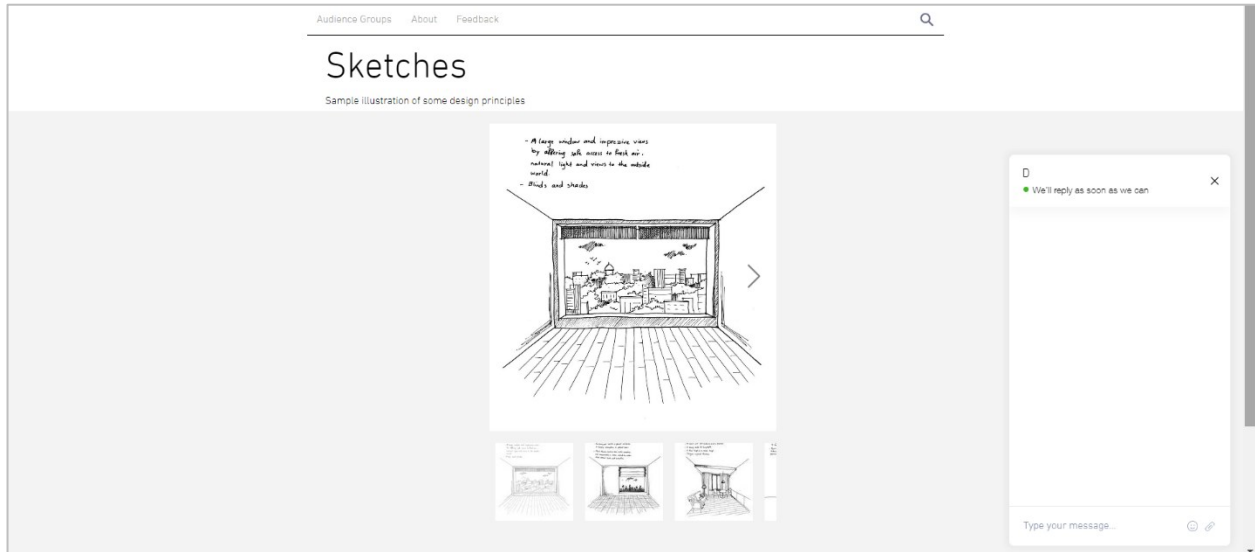
Figure 32: The "Sketches" section

There are three ways to get people's opinions about the website. Users can write comments and put ratings for the image analysis or sketch pages. The comment boxes also enable them to engage in discussions with other users or the website owner. Additionally, users can submit their thoughts on the website's structure and content through the feedback section (Figure 33). Finally, they can directly contact the owner of the website via email or the chat box at the bottom of each page and offer suggestions, which allows them to share their personal experiences in hospital patient rooms with others. As a result, in the further steps, the website will be improved based on the users' responses and more images and analysis will be added. Therefore, the website is considered a work in progress that will evolve gradually.
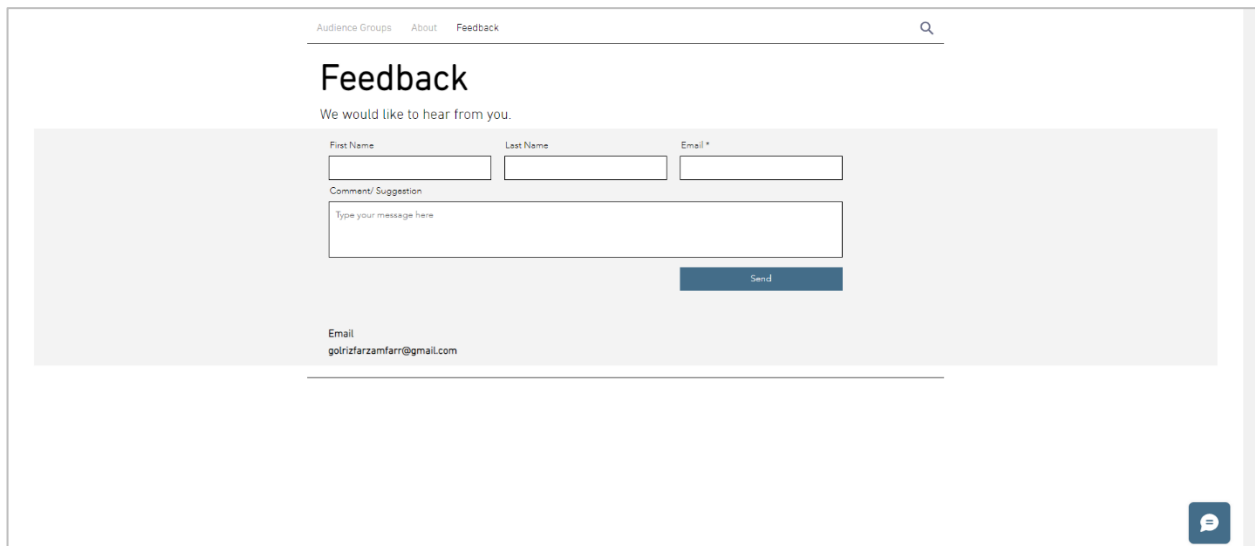
Figure 33: The "Feedback" page

The Exhibition Design Strategy

According to the MDes program's critical path at Concordia University, an exposition at the end of the second year is organized by students for oral presentation of the final research-creation projects. The design of my exhibition space was also an experiment with comfort and senses, reflecting my thesis topic and research outcomes. My research investigated the comfortable design recommendations for patient rooms and their correlation with the five human senses. It brings patients, caregivers, and designers together to share ideas through a website. So, the primary concept for the design of my section at the year-end show was to create a cozy and homely space for visitors to explore my website while engaging with some of the senses (Figures 34, 35).

a panel with sketches

a panel with window and plant

a panel with sketches

semi-transparent
bloc fillers with
some stickers and
pens or markers

a table with a tablecloth,
an imac, a keyboard, a
mouse, two scented candels,
a plant

a coach and a cushion
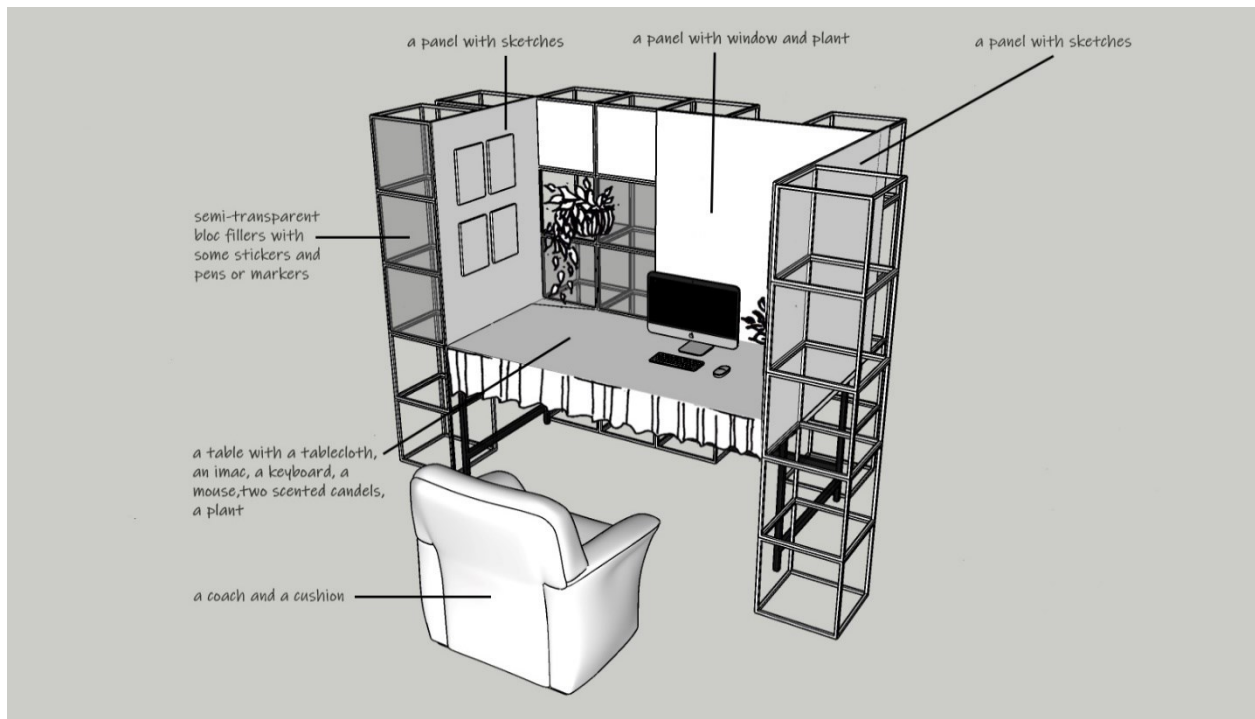
Figure 34: The sketch of the exhibition space design concept

The selection of each element in the exhibition space had two objectives: to showcase one recommendation for designing a comfortable patient room and to engage different human senses to create a multisensory experience (Figure 36). My exhibition space mainly consisted of three walls and a table. The walls surrounding the rectangular table were made up of white cardboard attached to cubes that created the illusion of a two-cornered room. For creating a window on the front surface, two columns of cubes were covered with semi-transparent block fillers instead of cardboard. Also, one cube was considered without filler to simulate an open window with a plant inside it. A wall displayed sketches of design recommendations, showing the importance of paintings in patient rooms. Another wall featured a design recommendation table and analytical charts framed by cardboard, highlighting the significance of incorporating images into patient rooms. A tablecloth was placed on the table as a sign of comfort and home that addressed the tactile sense. Another plant, a candle, and a table lamp at the corner of the table were referring to the

senses of sight and olfactory. Additionally, a large monitor, a keyboard, and a mouse on the table invited the visitors to explore the website with ease. At last, stickers were provided on the semi-transparent surface of cubes on the left side for people to write positive messages for the patients (Figure 37).

Figure 35: The sketch of the exhibition space design concept

Figure 36: The actual exhibition space

Based on the feedback from the visitors and the messages that they wrote on the stickers (Figure 37), it was evident that most of the audiences had found the exhibition space comfortable and homey. They were encouraged to engage with the senses such as touching the fabric of the tablecloth or feeling the warmth and scent of the candle. Also, they were excited to discover the window and the plant inside it. Finally, the participation of visitors in writing positive messages for patients was remarkable. That section appealed to most of them to take their time, think, write, sketch, and express their hope and love to the patients.
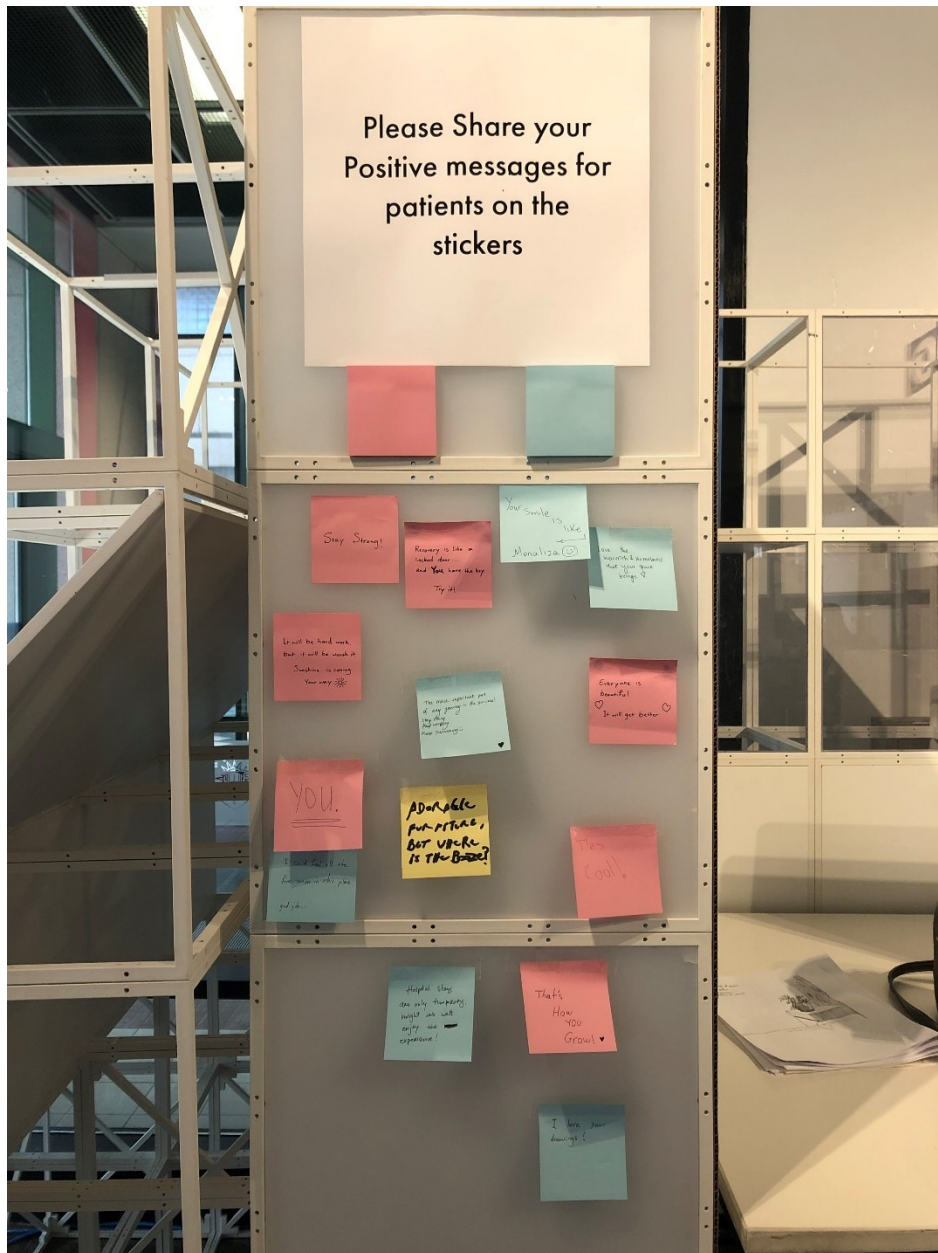
Figure 37: Visitors' engagement by writing positive messages for patients

CHAPTER 5: CONCLUSION, REFLECTIONS, AND WAYS FORWARD

The initial concept in my thesis was achieving design recommendations and designing a comfortable and multisensorial patient room based on insights gained from interviews with patients who are the end users of the hospital rooms. However, there were two limitations to accomplishing this objective. Firstly, due to the COVID pandemic situation, access to hospitals was restricted to patients and their immediate family members. As a result, I was not allowed either to enter hospital in-patient departments to take photos or have personal or virtual contact with the patients of that department. Nevertheless, after contacting some hospitals in Montreal, I could get permission to photograph a patient room in the cancer ward of the Royal Victoria Hospital. Secondly, the ethical approval process of Concordia University for interviewing patients could take more time in comparison with ordinary people as a target group. And, as a master's student, I have had limited time scope to complete my program. Consequently, these limitations led to a different creation process which each step of the thesis project brought about the next step.

During the current thesis project, both research and creation have taken place simultaneously. The primary study about homey healing environments in hospitals and multisensorial design led to the three experiments with senses during the first year of the program. The significant theories regarding healing environments include Christopher Day's healing environment and Roger Ulrich's theory of supportive healthcare design (Day 2002; Ulrich 2001). Sara Pink, Melisa Duque, and Sepideh Olausson explored theories of home and comfort concerning healthcare spaces (Pink et al. 2017; Duque et al. 2019; Olausson et al. 2019). The most important theory about sensory experiences is Juhani Pallasmaa's fragile phenomenology which highlights the importance of multisensory perception in architecture (Pallasmaa 1996; 2012). So, I attempted to reflect on the theories in the experiments and examine the senses and their impact on healing and well-being concerning home and urban environments. Two of the projects focused on urban and domestic sounds and the third one investigated the tactile sense through fabrics on the handrail of a patient bed. Despite the constraints of accessing the spaces and people (especially patients) due to the COVID pandemic, the three projects revealed that most of the users (my family members and/or students) had pleasant sensorial experiences with audio and fabrics. Moreover, it was apparent that considering human senses in hospitals was a novel concept for them since this was their first time thinking about it. Conducting interviews with family and friends, some had in-patient hospital experience, and some had not, helped me to recognize that the benefits of sounds of urban environments and touching soft and warm fabrics are not limited to hospital patients, but could be extended to a wider range of individuals.

Afterward, a further examination of the literature regarding homey and cozy healthcare settings resulted in the classification of design recommendations. In this stage, I came across some studies that emphasized the roles of caregivers and patients in the design process of hospital spaces, also known as "everyday design". As a designer, this gave me the insight that the concrete design of healthcare spaces should not solely rely on the decisions made by designers. The participatory design here can involve the engagement of caregivers and patients not only as an approach to evidence-based design, before or during the design but also after the construction of the spaces. So, this will enhance healthcare providers' understanding of how the environment influences illness, ultimately strengthening their connections with patients (Pang, Adams, and Lee 2018). Thus, I

added the categorization of the three audiences to the design recommendation table to highlight their potential contributions. The findings of this section demonstrate that most studies about healthcare design recommendations addressed designers while few researchers investigated the roles of patients and caregivers in creating a homey environment. In this context, ordinary people including healthcare staff, family, and patients can act as "everyday designers" to create a comfortable and healing space with flexibility that can personalize spaces to fulfill changing needs (Duque et al. 2019).

Regarding the senses, the design recommendation table and analytical graphs demonstrate that only a limited number of studies examined the role of the senses in design recommendations. However, the sense of vision is indirectly taken into account in the majority of resources for creating a comfortable patient room, while other senses have not been given enough attention. Hence, conducting a comprehensive study on multisensory design recommendations and the role of each sense will be a big asset to achieve a healing environment for patients.

The results of my research, which included various categorizations, qualitative and quantitative analysis, the potential roles of people in creating comfort, and a lack of resources on the topic of human senses in hospital design, made me realize the necessity of informing different groups of people to learn and think about these subjects. To accomplish this, I decided to design a website that will introduce and raise awareness about the comfortable design recommendations of a patient room and highlight the role of human senses in this regard. Therefore, in the initial phase of designing the website, all the information is academic and research-based, and the engagement of audiences is limited to giving comments or sending feedback. For the future phase of this project, options can be added to the website that provides a more participatory analysis of patient rooms. For instance, the users can be able to share images of their own patient rooms and analyze the design elements and related human senses. All the images can also be analyzed by multiple people simultaneously in this online platform by adding design factors and senses to the images. This will allow users to explore, learn, and teach each other. The results of this participatory analysis can be used for future research to suggest novel design potentials for creating a multisensory and comfortable environment in hospitals.

In conclusion, this research-creation project provided me with a deeper comprehension of the multidisciplinary nature of designing a patient room with six eyes: those of the architect, the hospital staff, and the patient. In addition, it is important to consider not only the visual aesthetics but all sensory aspects when creating patient rooms. Multi-sensory perception is critical in helping patients and residents from diverse backgrounds to escape the hospital environment and create a sense of comfort and relaxation for them.

This study can not be conclusive about the results because the main objective has been pulling together the multiplicity of the existing research and creating a website as a resource with a pragmatic and didactic approach. There were only a few studies that investigated the concept of a homely environment in medical settings. As a master's student with limited time for conducting a literature review, I was able to examine eight references related to designing comfortable and home-like medical spaces. I explored the existing literature around the world, and I did not focus on any specific country such as Canada. Although my sole case study is situated in the Quebec province of Canada, the exploration of Quebec and Canada's healthcare system and successful case studies in Canada was out of the scope of the current thesis. Nonetheless, investigating the healthcare systems of Quebec and Canada and evaluating the feasibility of using various design

recommendations will be a valuable area of research for the future. It could disclose the potential for implementing design recommendations in the political, economic, and cultural contexts of each region. Also, despite choosing the cancer department of the hospital for the case study, this thesis did not focus on the use of homely design recommendations for cancer patients. However, upcoming research can explore these recommendations in dept for each department of the hospital or specific patients. In the future, I also plan to extend this study by delving into more resources, particularly those within Canada, and examining them from various perspectives. This approach will result in more definitive outcomes that could be discussed and criticized. Moreover, the issue of subjectivity and design potentials for different cultures and personalities has not been addressed in this thesis. This is a broad topic that demands attention and exploration from multiple fields, including psychology, sociology, and design.

There is a vast opportunity to be capitalized on in the future. In particular, the potential for new studies, experiments, and research in the field of design recommendations is immense. The current thesis reveals that there is a vast scope for further study of homey design recommendations by exploring more resources. This could lead to a better understanding of existing design recommendations and even pave the way for new ones. In addition, there is a need for further research to unfold the ways that caregivers and patients can integrate with the comfortable and sensual design of their environment. Also, additional research can focus on the social and sensual aspects of creating comfort in hospitals rather than the physical features. Finally, future research can potentially open up new avenues of exploration and innovation in the field of universal design. The concept of "design for all" has a fundamental role in providing flexibility and usability for everyone including diverse tastes which could address the multi-culture nature of modern society as well (Leydecker 2017).

REFERENCES

"About Us | Wix.Com." 2006. About Us | Wix.Com. 2006. https://www.wix.com/about/us.

Adams, Annmarie. 2016. "HOME AND/OR HOSPITAL: The Architectures of End-of-Life Care." *Change Over Time* 6 (2): 248-263,265.

Adams, Annmarie, and Sally Chivers. 2016. "There's No Place like Home: Designing for Long-Term Residential Care in Canada." *Journal of Canadian Studies* 50 (2): 273–98.

Andrade, Cláudia Campos, and Ann Sloan Devlin. 2015. "Stress Reduction in the Hospital Room: Applying Ulrich's Theory of Supportive Design." *Journal of Environmental Psychology* 41 (March): 125–34. https://doi.org/10.1016/j.jenvp.2014.12.001.

Bates, Victoria. 2018. "'Humanizing' Healthcare Environments: Architecture, Art and Design in Modern Hospitals." *Design for Health* 2 (1): 5–19. https://doi.org/10.1080/24735132.2018.1436304.

———. 2019. "Sensing Space and Making Place: The Hospital and Therapeutic Landscapes in Two Cancer Narratives." *Medical Humanities* 45 (1): 10–20. https://doi.org/10.1136/medhum-2017-011347.

———. 2021. *Making Noise in the Modern Hospital*. 1st ed. Cambridge University Press. https://doi.org/10.1017/9781108885010.

Beatley, Timothy, Carla L. Jones, and Reuben Rainey. 2018. *Healthy Environments, Healing Spaces: Practices and Directions in Health, Planning, and Design*. University of Virginia Press.

Bottomley, A. 1998. "Depression in Cancer Patients: A Literature Review." *European Journal of Cancer Care* 7: 181–91. https://doi.org/10.1046/j.1365-2354.1998.00100.x.

Craig, Tony, Anna Conniff, and Carlos Galan-Diaz. 2012. "The Influences of Actual and Perceived Familiarity on Environmental Preferences for the Design of a Proposed Urban Square." Research Article. Urban Studies Research. Hindawi. October 22, 2012. https://doi.org/10.1155/2012/767049.

Crawford, Ilse. 1998. *The Sensual Home: Liberate Your Senses and Change Your Life*. Rizzoli International.

cskopecce. 2021. "Inpatient vs. Outpatient: Comparing Two Types of Patient Care." *Medical Blog, St. George's University* (blog). May 13, 2021. https://www.sgu.edu/blog/medical/inpatient-versus-outpatient/.

Davis, Jennifer. 2019. "Space." *Religious Studies and Theology* 38 (1/2): 117–24. http://dx.doi.org/10.1558/rsth.38323.

Day, Christopher. 2002. *Spirit & Place: Healing Our Environment, Healing Environment*. Routledge.

Delong, Marilyn, Juanjuan Wu, and Juyeon Park. 2012. "Tactile Response and Shifting Touch Preference." *TEXTILE* 10 (1): 44–59. https://doi.org/10.2752/175183512X13267336595278.

Dl, Patrick, Ferketich Sl, Frame Ps, Harris Jj, Hendricks Cb, Levin B, Link Mp, et al. 2003. "National Institutes of Health State-of-the-Science Conference Statement: Symptom Management in Cancer: Pain, Depression, and Fatigue, July 15-17, 2002." *Journal of the National Cancer Institute* 95 (15): 1110–17. https://doi.org/10.1093/jnci/djg014.

Dougherty, Kevin. 2012. "Quebec Infrastructure Case Study: The McGill University Health Centre." November 19, 2012. https://web.archive.org/web/20121119092918/http://www.montrealgazette.com/news/Quebec+infrastructure+case+study+McGill+University+Health+Centre/7562318/story.html.

Duque, Melisa, Sarah Pink, Shanti Sumartojo, and Laurene Vaughan. 2019. "Homeliness in Health Care: The Role of Everyday Designing." *Home Cultures* 16 (3): 213–32. https://doi.org/10.1080/17406315.2020.1757381.

Essick, Greg K., Francis McGlone, Chris Dancer, David Fabricant, Yancy Ragin, Nicola Phillips, Therese Jones, and Steve Guest. 2010. "Quantitative Assessment of Pleasant Touch." *Neuroscience & Biobehavioral Reviews*, Touch, Temperature, Pain/Itch and Pleasure, 34 (2): 192–203. https://doi.org/10.1016/j.neubiorev.2009.02.003.

Gilmour, Jean A. 2006. "Hybrid Space: Constituting the Hospital as a Home Space for Patients." *Nursing Inquiry* 13 (1): 16–22. https://doi.org/10.1111/j.1440-1800.2006.00276.x.

Hartzell, Freyja. 2009. "The Velvet Touch: Fashion, Furniture, and the Fabric of the Interior." *Fashion Theory* 13 (1): 51–81. https://doi.org/10.2752/175174109X381328.

Howes, David, and Constance Classen. 2013. *Ways of Sensing: Understanding the Senses In Society*. Routledge.

Karlin, Bradley E., and Robert A. Zeiss. 2006. "Best Practices: Environmental and Therapeutic Issues in Psychiatric Hospital Design: Toward Best Practices." *Psychiatric Services* 57 (10): 1376–78. https://doi.org/10.1176/ps.2006.57.10.1376.

Kasar, Kadriye Sayin, Saadet Erzincanli, and Nesat Tolga Akbas. 2020. "The Effect of a Stress Ball on Stress, Vital Signs and Patient Comfort in Hemodialysis Patients: A Randomized Controlled Trial." *Complementary Therapies in Clinical Practice* 41 (November): 101243. https://doi.org/10.1016/j.ctcp.2020.101243.

Leydecker, Sylvia. 2017. *Designing the Patient Room: A New Approach to Healthcare Interiors*. Birkhäuser. https://books.google.ca/books?id=SIxsDwAAQBAJ&printsec=copyright&redir_esc=y#v=onepage&q&f=false.

Marsden, John P. 2001. "Chapter 6 A Framework for Understanding Homelike Character in the Context of Assisted Living Housing." *Journal of Housing For the Elderly* 15 (1–2): 79–96. https://doi.org/10.1300/J081v15n01_07.

McGregor, Sue L. T. 2003. "Critical Discourse Analysis: A Primer." *Kappa Omicron Nu FORUM* 15 (1). https://publications.kon.org/archives/forum/15-1/mcgregorcda.html.

MUHC. 2023. "Finding Your Way around the Glen Site." McGill University Health Centre. 2023. https://muhc.ca/getting-to-the-hospitals/glen/hospital-map.

Mystakidou, Kyriaki, Eleni Tsilika, Efi Parpa, Emmanuela Katsouda, Antonis Galanos, and Lambros Vlahos. 2006. "Psychological Distress of Patients With Advanced Cancer: Influence and Contribution of Pain Severity and Pain Interference." *Cancer Nursing* 29 (5): 400.

Nilsson, Christina, Helle Wijk, Lina Höglund, Helen Sjöblom, Eva Hessman, and Marie Berg. 2020. "Effects of Birthing Room Design on Maternal and Neonate Outcomes: A Systematic Review." *HERD: Health Environments Research & Design Journal* 13 (3): 198–214. https://doi.org/10.1177/1937586720903689.

Olakivi, Antero, and Miira Niska. 2016. "Constructing Home-Likeness: Migrant Caregivers and the Politics of 'Activation' in Public Care Provision in Finland," 22.

Olausson, Sepideh, Isabell Fridh, Berit Lindahl, and Anne-Britt Torkildsby. 2019. "The Meaning of Comfort in the Intensive Care Unit." *Critical Care Nursing Quarterly* 42 (3): 329–41. https://doi.org/10.1097/CNQ.0000000000000268.

Paletz, David, Diana Owen, and Timothy Cook. 2021. *American Government and Politics in the Information Age Version 5.0*. FlatWorld.

Pallasmaa, Juhani. 1995. "Identity, Intimacy and Domicile - Notes on the Phenomenology of Home." *The Home; Words, Interpretations, Meanings and Environments*, 131–47.

———. 1996. "The Geometry of Feeling: A Look at the Phenomenology of Architecture." *Theorizing a New Agenda for Architecture, An Anthology of Architectural Theory*, 447–53.

———. 2012. *The Eyes of the Skin: Architecture and the Senses*. John Wiley & Sons.

Pang, Steph, Annmarie Adams, and Virginia Lee. 2018. "Architecture's Creative Contributions to Healing: Oncology Patients in the Cedars Cancer Centre." *International Journal of Whole Person Care* 5 (January). https://doi.org/10.26443/ijwpc.v5i1.137.

Persson, Eva, Patrice Anderberg, and Anna Kristensson Ekwall. 2015. "A Room of One's Own - Being Cared for in a Hospital with a Single-Bed Room Design." *Scandinavian Journal of Caring Sciences* 29 (2): 340–46. https://doi.org/10.1111/scs.12168.

Pink, Sarah, Kerstin Leder Mackley, Roxana Morosanu, Val Mitchell, Tracy Bhamra, Rosie Cox, and Victor Buchli. 2017. *Making Homes: Anthropology and Design*. 1st edition. London ; New York: Bloomsbury Academic.

Sakallaris, Bonnie R., Lorissa Macallister, Megan Voss, Katherine Smith, and Wayne B Jonas. 2015. "Optimal Healing Environments." *Global Advances in Health and Medicine* 4 (3): 40–45. https://doi.org/10.7453/gahmj.2015.043.

Schweitzer, Marc, Laura Gilpin, and Susan Frampton. 2004. "Healing Spaces: Elements of Environmental Design That Make an Impact on Health." *The Journal of Alternative and Complementary Medicine* 10 (supplement 1): S-71. https://doi.org/10.1089/acm.2004.10.S-71.

Shirazi, M. Reza. 2014. *Towards an Articulated Phenomenological Interpretation of Architecture: Phenomenal Phenomenology*. Routledge.

Skalla, Karen A., and J. Patrick McCoy. 2006. "Spiritual Assessment of Patients With Cancer: The Moral Authority, Vocational, Aesthetic, Social, and Transcendent Model." *Oncology Nursing Forum* 33 (4): 745–51. https://doi.org/10.1188/06.ONF.745-751.

Social Sciences and Humanities Research Council, Government of Canada. 2019. "Social Sciences and Humanities Research Council." March 21, 2019. https://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/definitions-eng.aspx?pedisable=false.

Suess, Courtney, and Makarand Mody. 2017. "Hospitality Healthscapes: A Conjoint Analysis Approach to Understanding Patient Responses to Hotel-like Hospital Rooms." *International Journal of Hospitality Management* 61 (February): 59–72. https://doi.org/10.1016/j.ijhm.2016.11.004.

Tano, Eva, and Åsa Melhus. 2014. "Level of Decontamination after Washing Textiles at 60°C or 70°C Followed by Tumble Drying." *Infection Ecology & Epidemiology* 4 (1): 24314. https://doi.org/10.3402/iee.v4.24314.

Theodore, David. 2016. "Better Design, Better Hospitals." *CMAJ* 188 (12): 902–3. https://doi.org/10.1503/cmaj.151228.

Tyreman, Stephen. 2011. "Homelikeness and Health: An Introduction to the Theme." *Medicine, Health Care and Philosophy* 14 (3): 287–89. https://doi.org/10.1007/s11019-011-9315-2.

Ulrich, Roger. 2001. "Effects of Healthcare Environmental Design on Medical Outcomes." *Design and Health: Proceedings of the Second …*, January.

Visser, Anja, Bert Garssen, and Ad Vingerhoets. 2010. "Spirituality and Well-Being in Cancer Patients: A Review." *Psycho-Oncology* 19 (6): 565–72. https://doi.org/10.1002/pon.1626.

Wall, Jeffrey, Bernd Stahl, and A. Salam. 2015. "Critical Discourse Analysis as a Review Methodology: An Empirical Example." *Communications of the Association for Information Systems* 37 (1). https://doi.org/10.17705/1CAIS.03711.

Willis, Julie, Philip Goad, and Cameron Logan. 2018. *Architecture and the Modern Hospital: Nosokomeion to Hygeia*. Routledge.

Yousefi, Hojatollah, Heidar Ali Abedi, Mohammad Hossein Yarmohammadian, and Doug Elliott. 2009. "Comfort as a Basic Need in Hospitalized Patients in Iran: A Hermeneutic Phenomenology Study." *Journal of Advanced Nursing* 65 (9): 1891–98. https://doi.org/10.1111/j.1365-2648.2009.05026.x.

APPENDIX A: IMAGE ANALYSIS 1- CURRENT STRENGTHS

Designers

Figure 38: Image analysis 1-Current strengths- Designers

The indoor air quality of patient rooms can be improved through ventilation, air conditioning, the choice of materials and cleaning (Leydecker 2017, 55)

LEDs are now widely used as an efficient form of lighting (Leydecker 2017, 60)

Having retractable screens that patients can close for privacy and open when they desire broader interactions (Suess and Mody 2018, 9)

Soft materials associated with intimacy and warmth (Olausson et al. 2019, 337) Materials associated with coziness (Olausson et al. 2019, 337) Long-lasting materials (Olausson et al. 2019, 338) Suitable for medical standpoint

The artificial material (such as imitation wood surface and Imitation leather upholstery) addresses the wish for a classier, hotel-like, warmer and homely atmosphere while fulfilling hygiene requirements and being easy to clean (Leydecker 2017, 48).

the placement of the bed should permit patient's to look outside onto greenery, to see people entering via the door, to watch over their belongings in the bedside cabinet and cupboard, and to watch TV (Leydecker 2017, 27)

Beds should be placed so that they can be reached from three sides, so staff have direct access, in the case of an emergency (Leydecker 2017, 27)

Figure 39: Image analysis 1-Current strengths- Designers

Figure 40: Image analysis 1-Current strengths- Designers
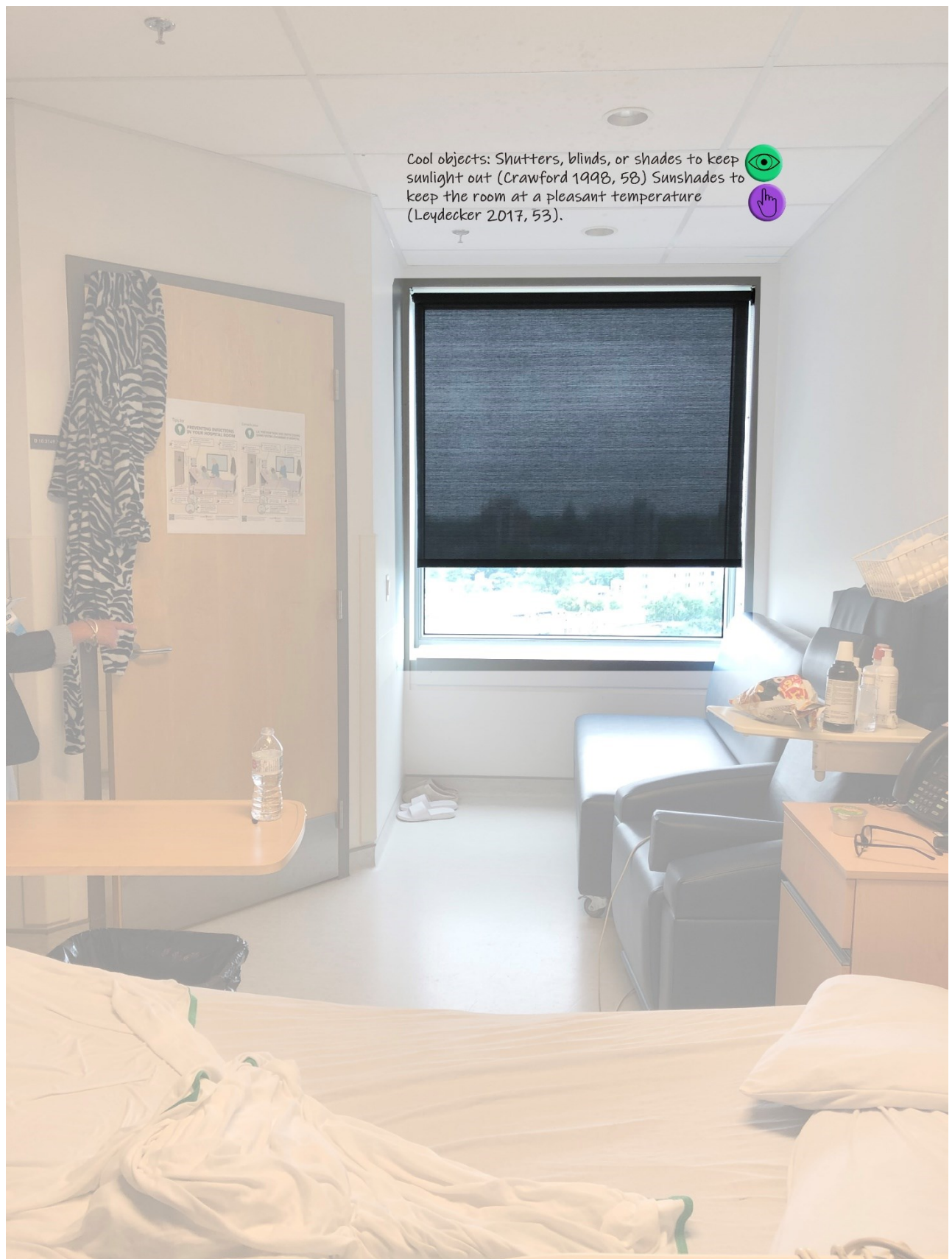
Cool objects: Shutters, blinds, or shades to keep sunlight out (Crawford 1998, 58) Sunshades to keep the room at a pleasant temperature (Leydecker 2017, 53).

Figure 41: Image analysis 1-Current strengths- Designers

Figure 42: Image analysis 1-Current strengths- Designers

Caregivers
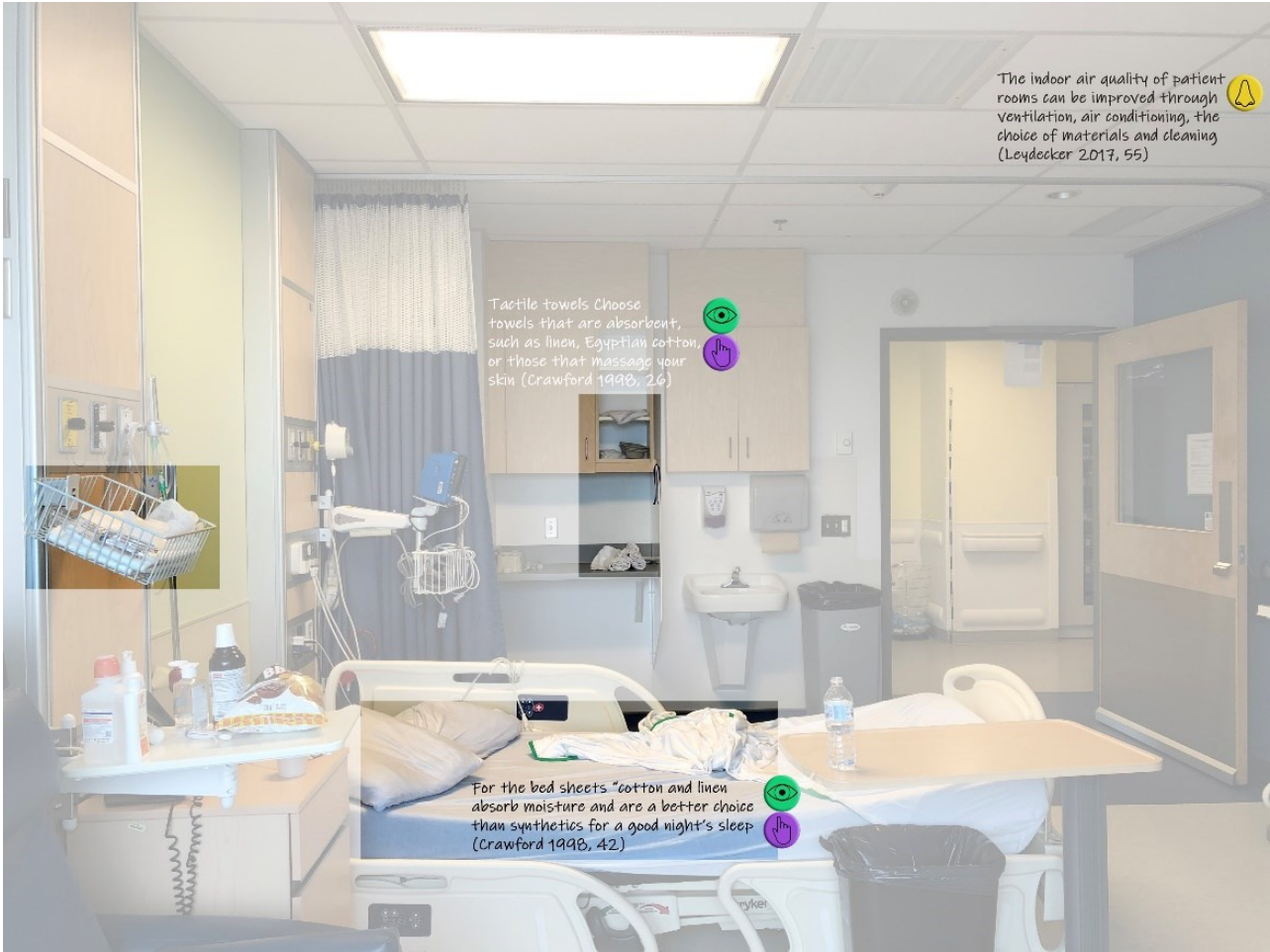
Figure 43: Image analysis 1-Current strengths- Caregivers

The possibility of parents/carers' staying the night in the patient room (Leydecker 2017, 65)

Access to social support; hospitality-certified healthcare staff; hospital employees' ability to listen to patients, treat them with respect, and effectively communicate with them (Suess and Mody 2017, 10) (Suess and Mody 2018, 11) Personal relationships (Gilmour 2006, 18)

Figure 44: Image analysis 1-Current strengths- Caregivers

Figure 45: Image analysis 1-Current strengths- Caregivers

Patients
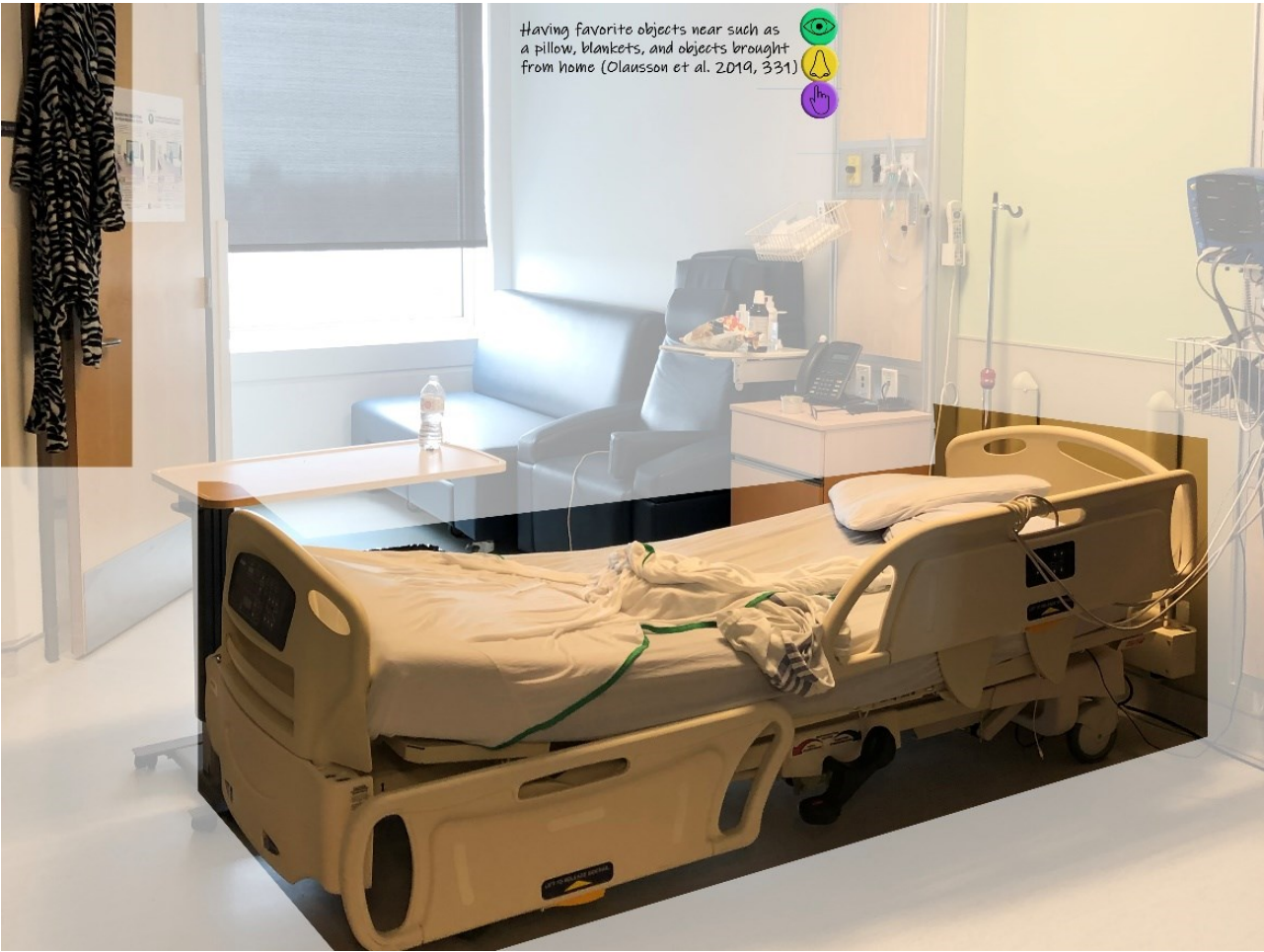
Figure 46: Image analysis 1-Current strengths- Patients

APPENDIX B: IMAGE ANALYSIS 2- FURTHER IMPROVEMENTS
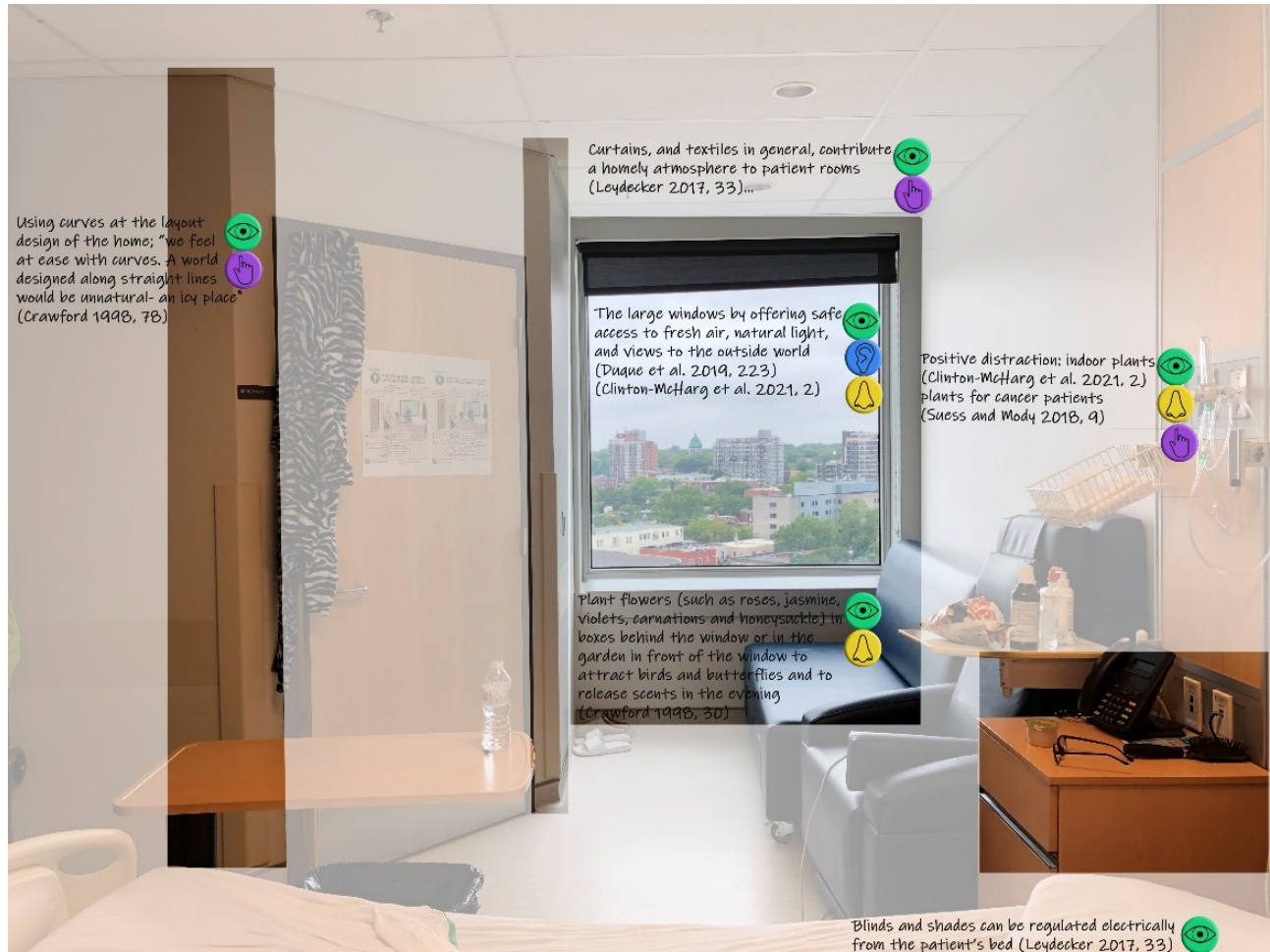
Designers

Figure 47: Image analysis 2- Further improvements- Designers
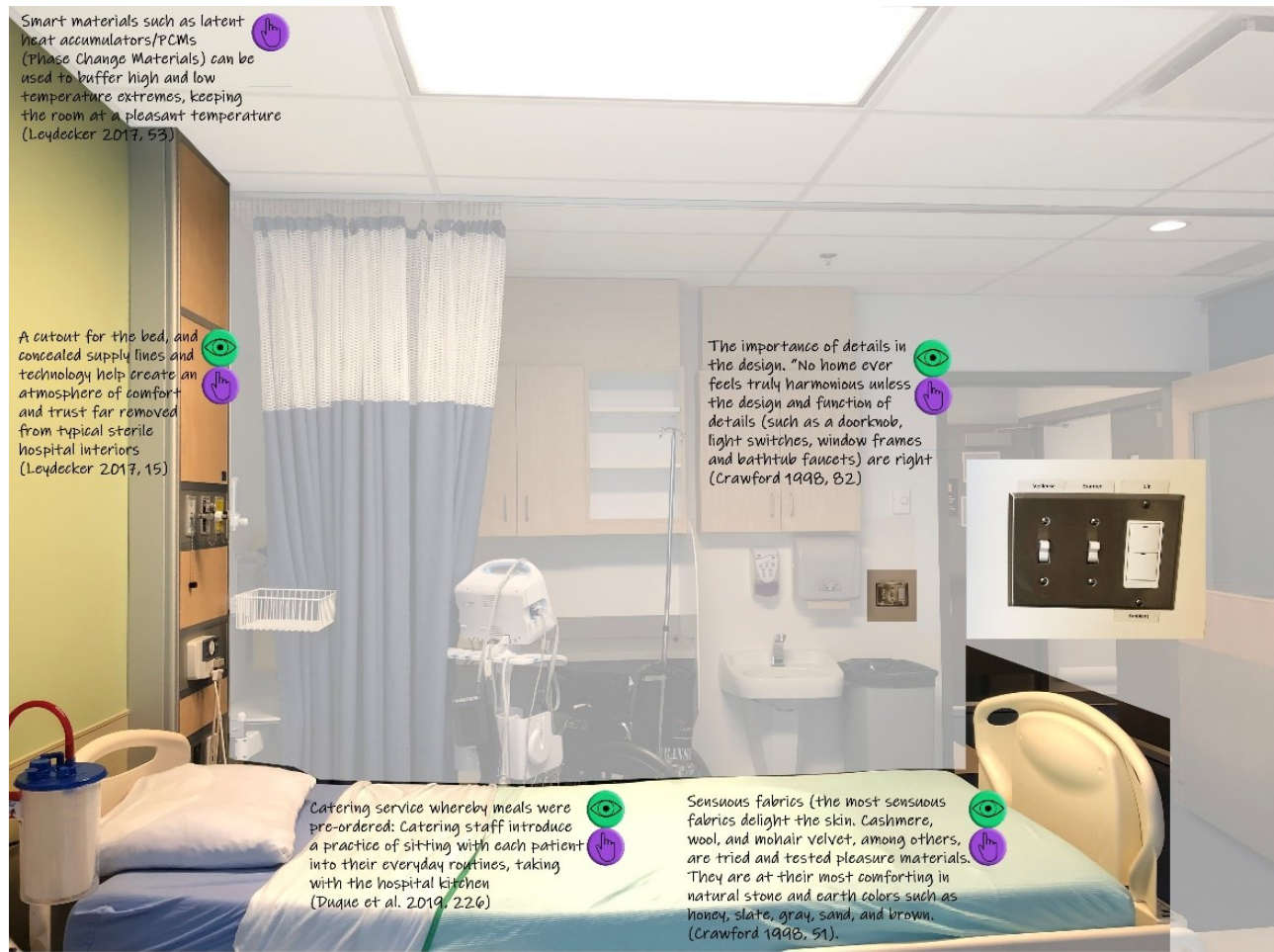
Figure 48: Image analysis 2- Further improvements- Designers

The material concept should harmonise with the colour concept and be augmented by the lighting concept. For example, Naturally-lit spaces with wooden floors and white, not too smooth walls result in pleasant, bright and light interiors that are calm and unfussy, and contrast pleasingly with the world outside (Leydecker 2017, 47)

Painted glass fibre or non-woven wallpaper, or high-quality wall coverings such as patterned or textured wallpapers (Leydecker 2017, 36)

Coffee/tea-maker and refrigerator or minibar, either in the cupboard, in a separate item of furniture or within comfortable reach in the bedside cabinet (Leydecker 2017, 29) (Suess and Mody 2018, 11)

Freestanding items of furniture and built-in fittings to not obstruct work patterns within the room and provide sufficient space to move around, such as Fold-down tables (Leydecker 2017, 27)

Figure 49: Image analysis 2- Further improvements- Designers

Figure 50: Image analysis 2- Further improvements- Designers

Figure 51: Image analysis 2- Further improvements- Designers

Figure 52: Image analysis 2- Further improvements- Designers

Bathroom fittings include a large mirror, good lighting, sufficient storage space, a hairdryer, shaving mirror, presentable towels and toiletries, and a heated towel rail (Leydecker 2017, 33)

wheelchair-accessible wash basins, handles and buttons that are easy to use and mirrors that can be seen from different heights (Leydecker 2017, 33)

Figure 53: Image analysis 2- Further improvements- Designers

Floor-flush shower trays, handles and buttons that are easy to use (Leydecker 2017, 33)

Large-format tiles (with anti-slip floor surfaces) are advisable, not only because of the quality they convey but also because they have fewer joints, which is more hygienic

Figure 54: Image analysis 2- Further improvements- Designers

Caregivers

Figure 55: Image analysis 2- Further improvements- Caregivers

Caring for the patient as if he were a brother, father or grandfather. The patient becomes 'part of your life' (Gilmour 2006, 18)

Having coffee, an afternoon cup of tea, and relaxing with family and friends (Olausson et al. 2019, 337)

Socializing and provide patients with some daily certainty during mealtime periods that can be very uncertain and disorienting (Duque et al. 2019, 227)Food can indeed affect mood. Nearly every important family or social event takes place around the table (Crawford 1998, 126) eating meals around a table or bed with family members or at least one hospital staff
Flexible social boundaries: staff regularly eat with the patients (Gilmour 2006, 18)

Catering service whereby meals were pre-ordered: Catering staff introduce a practice of sitting with each patient into their everyday routines, taking them through the menu options and recording their preferences on a tablet coordinated with the hospital kitchen (Duque et al. 2019, 226)

Figure 56: Image analysis 2- Further improvements- Caregivers

Cool environment: the sound of running water makes us feel cooler (Crawford 1998, 58) Listening to the music and the sound of running water (Crawford 1998, 23) The sound of the sea, for example, appears to be almost universally liked and it is relaxing (Crawford 1998, 44) the sound of rain

Auditory distractions: listening to music, and particularly music that was soft, non-lyrical, and comprised mostly of strings and low tones (Clinton-McHarg et al. 2021, 2)Discreet music from the "good old days" like wise creates a sense of familiarity and well-being (Leydecker 2017, 70)

Freedom of movement of atients in and outside of the unit and in all areas of the ward (Gilmour 2006, 18)

No specific designated space for the nurses and all nursing documentation are completed at the bedside. But with personal private spaces for both patients and staff (Gilmour 2006, 18)
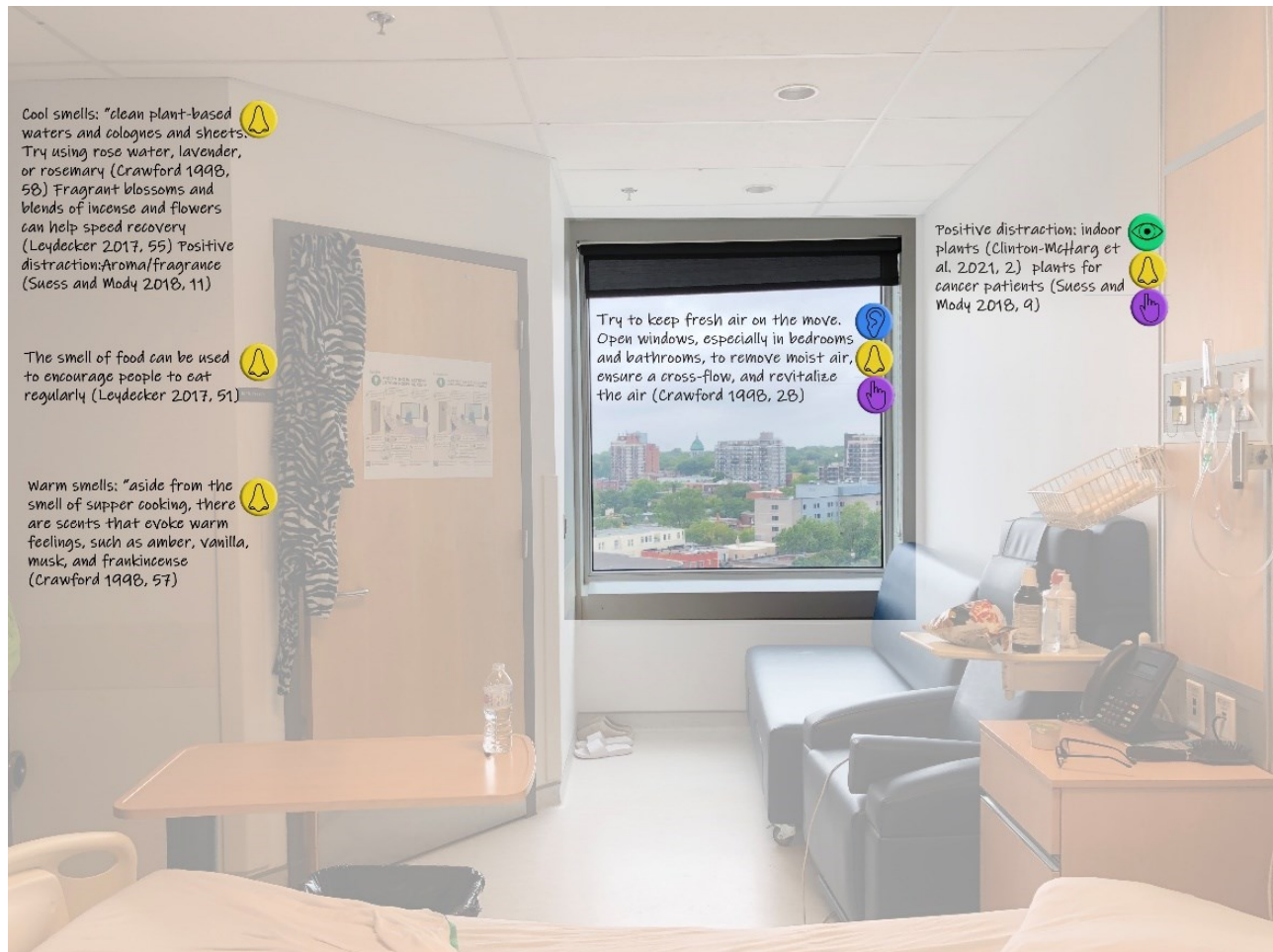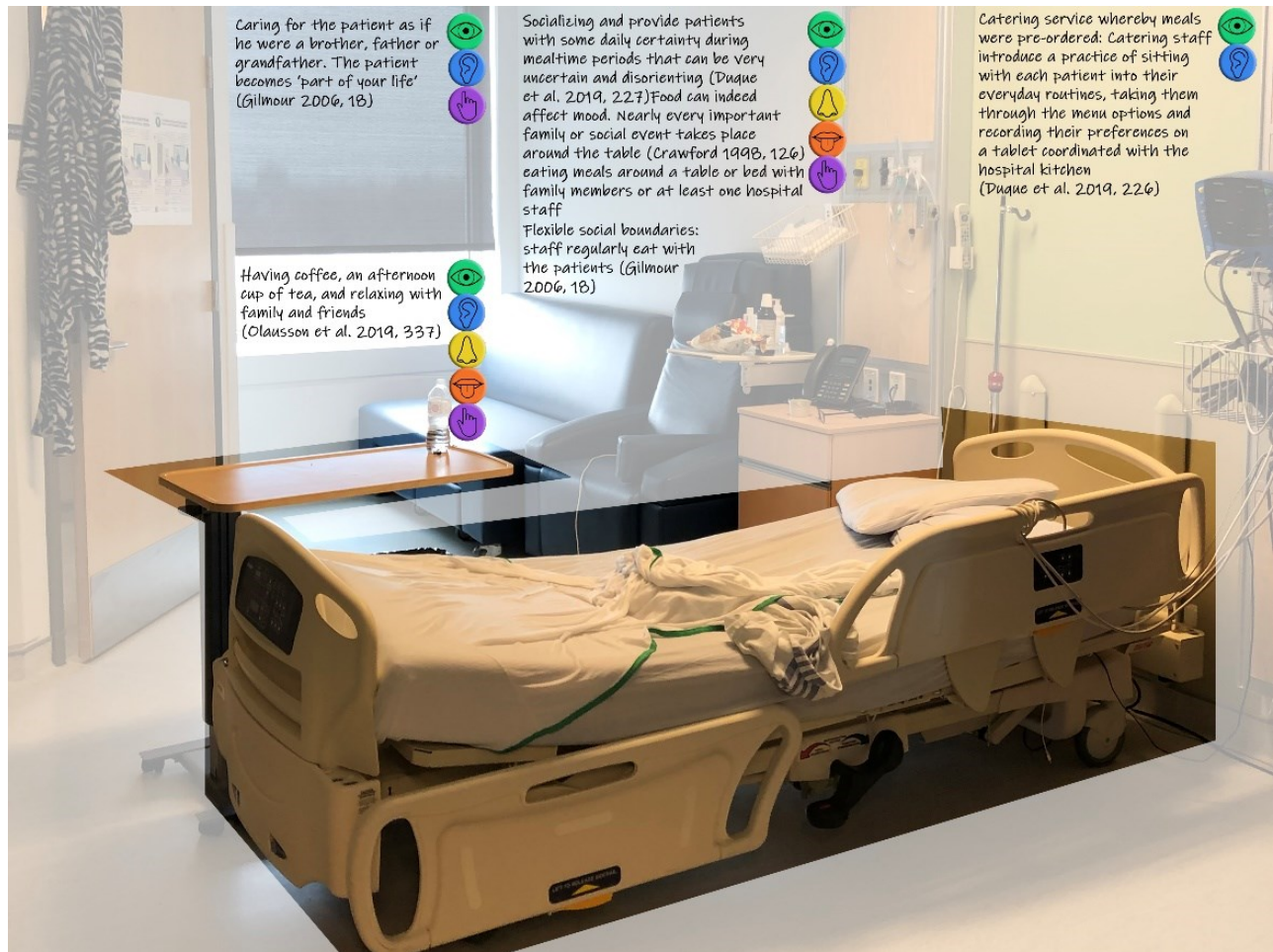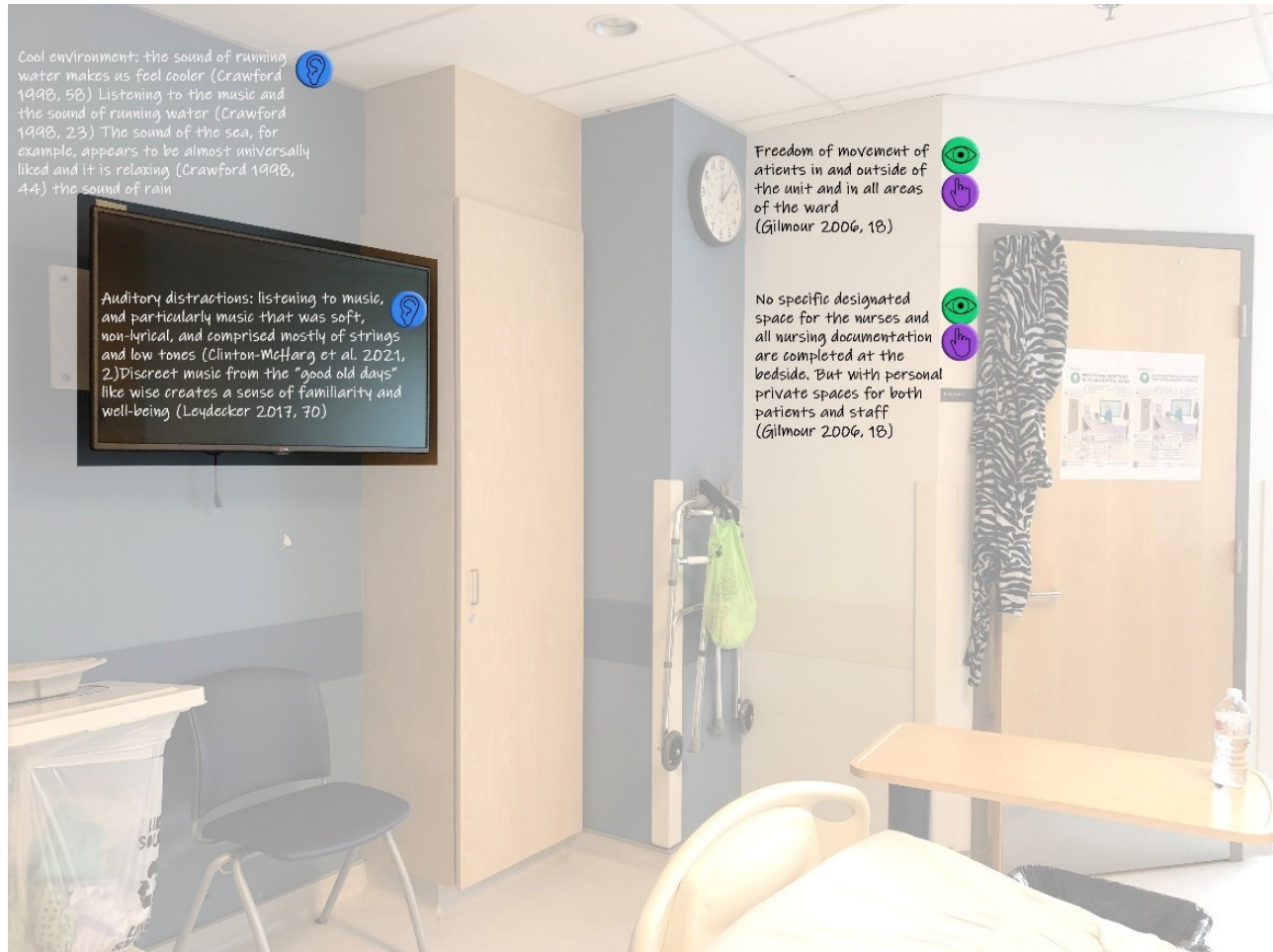
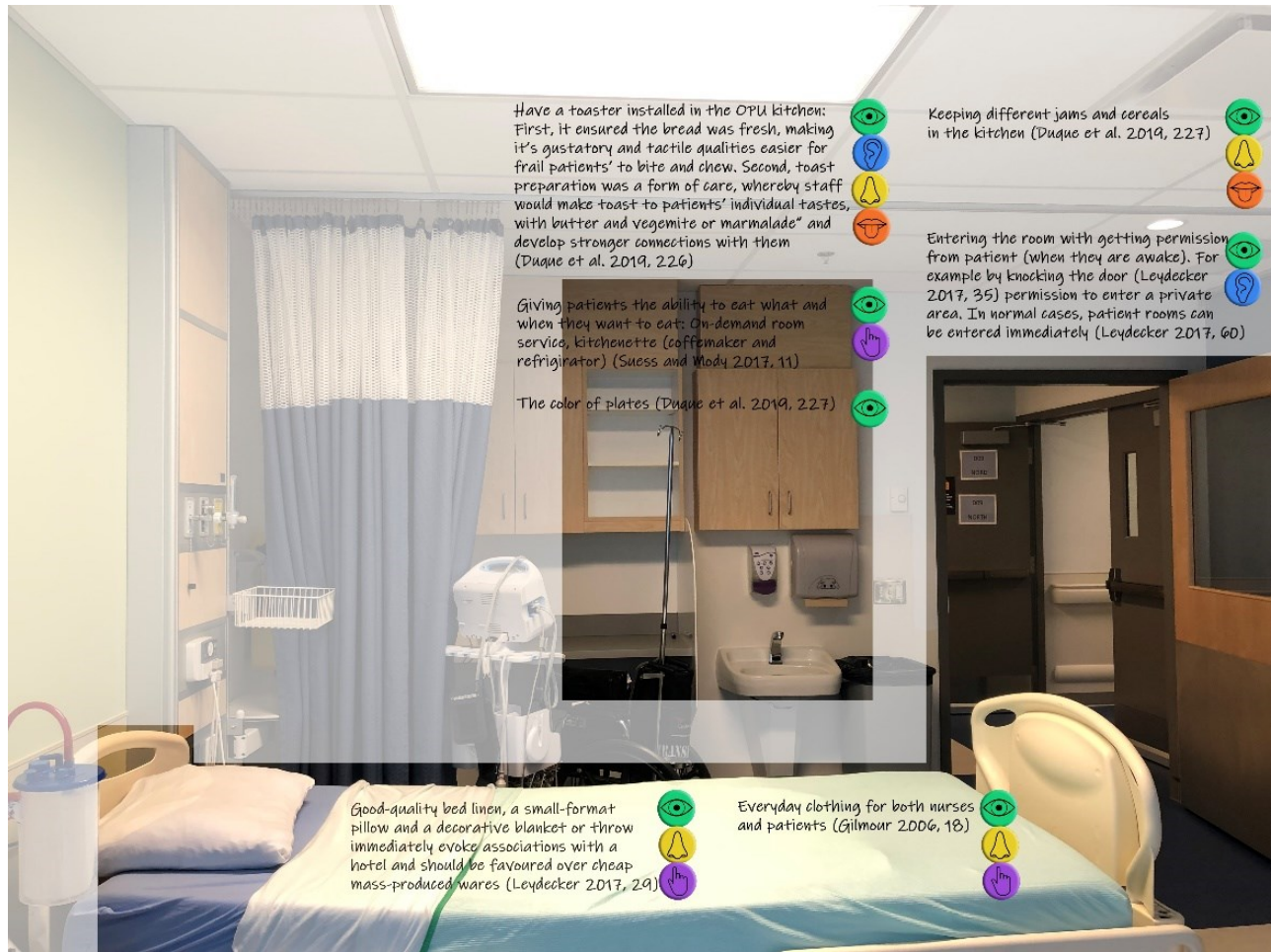Figure 57: Image analysis 2- Further improvements- Caregivers

Figure 58: Image analysis 2- Further improvements- Caregivers

Figure 59: Image analysis 2- Further improvements- Caregivers

Figure 60: Image analysis 2- Further improvements- Caregivers

Patients

Figure 61: Image analysis 2- Further improvements- Patients

Figure 62: Image analysis 2- Further improvements- Patients