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The impact of the hospital environment

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Chapter

General introduction

1

1.1 The hospital environment, why is this important?

A hospital visit is often an anxious and uncertain event for patients and their relatives. Patients are often concerned about a diagnosis and/or the treatment of their disease in an outpatient or inpatient setting. In these hospital settings, the impact of the environment on patients is still not well understood. Knowledge regarding the influence of this environment on patients is essential for facilitating the quality of health care. It is expected that an understanding of the experience of patients will allow designers and decision-makers in hospitals to positively influence the well-being of patients.

Hospitals aim to provide optimal health care and, to achieve this, they are focused on medical procedures and efficiency. In the Netherlands, approximately 50 percent of the adult population has one or more chronic illnesses, and patients with multimorbidity are the primary users of hospitals which increases the complexity of health care in them (CBS, 2018; Salisbury, 2012). Moreover, people live longer and, that the older people become, the more chronic illnesses they have (CBS, 2018). Health care costs are increasing in the Netherlands due to this increased demand, focus on quality of health care, and higher prices (Centraal Planbureau, 2011).

An increasing demand often requires construction changes in the hospital building. Building costs for Dutch hospitals are high and amount to approximately EUR 3,000 per square meter. In the Netherlands, recent developments in the health care real estate funding system make it necessary for hospitals to refund these building costs. Moreover, market forces create a competitive health care system. Health care providers anticipate to these developments by differentiating with spaces and services. However, building decisions are still mainly based on experience and intuition but not on scientific evidence (Becker & Parsons, 2007). How can hospitals be designed in a way that these actually improve patients' experiences and well-being? In this respect, research to understand the holistic experience of patients may be of significance.

To understand the patient's experience, research should be conducted from a wide variety of perspectives such as quality of health care, services, and spaces. According to Donabedian (1988), the quality of health care contains contextual aspects in which health care is delivered (structure), the interaction between patients and health care providers by the delivery of health care (process), and the effect of health care on the health status of patients (outcome). Donabedian contends that a good structure (material resources, human resources, and organizational structure) can positively influence the process which can consequently positively influence the patient's health.

In the structural context, environmental psychology is an interdisciplinary field that focuses on the relation between humans and their surrounding environment (Mehrabian & Russell, 1974). Mehrabian and Russell's model showed that both environmental and personality characteristics influence the emotional response of persons, which subsequently leads to a certain behavior (i.e., desire to approach or avoid an environment). Moreover, Bitner (1992) indicated that physical surroundings (i.e., ambient conditions, space/function, and signs, symbols, and artifacts) have an impact on the well-being of customers and employees in the servicescape (i.e., the environment in which the service is delivered). Customers and employees demonstrate cognitive, emotional, and physical responses to their physical surroundings which, in turn, influence individual behaviors and customer-staff interaction. It is expected that the individual characteristics (e.g., health condition and/or affective state) of patients in hospitals deviate from healthy people and, therefore, are potentially affected differently by the physical surroundings.

In health care, the physical surroundings can potentially modify hospital environments

into healing environments (Dijkstra, Pieterse, & Pruyn, 2006; Stichler, 2001). Hence, the focus of evidence-based design research is the influence of environmental surroundings on both positive and negative patient outcomes (Becker & Parsons, 2007; Ulrich et al., 2008; Ulrich, 1981). The hospital environment can potentially improve the healing process of patients by reducing the length of stay, the severity of pain, levels of anxiety, levels of fatigue, and increasing the quality of sleep and mood or overall satisfaction with health care (Dijkstra et al., 2006; Harris, Ross, McBride, & Curtis, 2002; Ulrich, Quan, Zimring, Joseph, & Choudhary, 2004).

These previous studies have reported that the physical characteristics of organizations can potentially influence the health and well-being of patients. Thus far, however, there has been only minimal discussion regarding the holistic experience of patients that includes their emotional, physical, and cognitive well-being. In this dissertation, a patient-centered approach is applied in order to gain an improved understanding of a more holistic experience for patients (Figure 1.1). The authors analyzed the experience and well-being of patients at specific focal points of the patient journey: From arrival to patient diagnosis and the actual treatment in a hospital. Section 1.2 introduces the topics and the main research questions that are discussed in this thesis.

Figure 1.1 Framework used to understand the experience of the patient journey

1.2 The patient journey in a hospital environment – from arrival to treatment

The process that a patient is exposed to in a hospital can be considered as a chain of actions (Fitzsimmons & Fitzsimmons, 2006). In service literature, the map of all of the actions in the service delivery process (e.g., activities, interventions) is also referred to as the service blueprint. Blueprinting is an important technique to understand the customer-centric journey (Bitner, Ostrom, Carey, & Morgan, 2007). This can also be applied to health care. The steps that a patient goes through in a hospital environment is called the patient journey. This patient journey can differ between patients as different patients may encounter different health care services during a hospital visit.

To understand how patients experience a hospital visit, it is important to understand their entire journey from the patient's perspective. Most patients arrive at the hospital by

some form of transportation (e.g., car, bus, taxi, bike, walking, or ambulance) and enter the hospital. After entering the hospital, they must find their way to their appointment for diagnosis or treatment. Currently, an illness is often diagnosed by imaging techniques and, consequently, treatment will be initiated. Patients receive treatment in a day care setting or on a ward for multi-day treatments. During this journey, patients are exposed to physical surroundings (e.g., hospital exterior, interior, uniforms) and also interact with other people (e.g., registration staff, nursing staff, doctors, fellow patients, etc.) (Fitzsimmons & Fitzsimmons, 2006).

A common patient journey in a hospital may involve visiting several clinics such as a diagnostic, outpatient, or inpatient clinic. This part of the introductory section introduces the topics and main research questions from the perspective of the patient journey and defines what a patient may experience during a hospital visit (Figure 1.2).

Figure 1.2 Patient journey in a hospital environment

1.2.1 Arrival

The patient journey in a hospital begins with entering the building and following a route to find the way in the built environment to the destination of the patient's appointment. This destination can be a diagnostic, outpatient, or inpatient clinic.

Currently, most hospitals are spacious in size due to the increasing demand for health care services. Hospitals include many areas for patients and staff. In addition, university hospitals also contain areas for education and research. Wayfinding in such complex building settings might be particularly difficult for vulnerable people such as the older population.

Wayfinding is a dual-task performance that requires cognitive and sensorimotor skills (Li, Lindenberger, Freund, & Baltes, 2001). Memorizing the destination and actually moving through the building can be considered as a divided attention task. Older people experience even basic movements such as walking as challenging (Davis, 2012). Patients may become (overly) stressed when becoming lost during a hospital visit. A better design may prevent such problems. Therefore, support from the built environment to find the way in a hospital may be important, especially for older persons.

The built environment, like multi-level buildings or multi-building settings, affects the type of wayfinding strategy that people use. For example, in multi-level buildings, it seemed to be most efficient to first move to the correct floor to locate the destination

while, in multi-building settings, it appeared to be better to initially move to the correct building to find the destination prior to finding the correct floor (Hölscher, Büchner, Meilinger, & Strube, 2009; Hölscher, Meilinger, Vrachliotis, Brösamle, & Knauff, 2006). In a wider context, a well-designed building can be seen as a system of nudges (Thaler & Sunstein, 2008) that can stimulate non-mandatory but efficient wayfinding decisions in buildings. Similarly, facilities such as signage can help people in wayfinding, but can also hinder when not done appropriately (Rousek & Hallbeck, 2011).

It is unknown whether the effect of route complexity (i.e., number of building and floor changes) on wayfinding differs for older people with ageing-related physical impairments in both sensory and motor skills.

1.2.2 Diagnostics

Diagnostic scans play a critically important role in the diagnosis and treatment of diseases and are often anxious events for patients because they are usually concerned and worried that they have a serious disease (Munn & Jordan, 2011); not to mention that patients can become overwhelmed by unknown technological innovations. The medical technological development of medical devices and equipment continues to advance and, consequently, the hospital environment is becoming more unhuman from the patient's perspective (Dantendorfer et al., 1997).

Several studies have shown that patients experience elevated levels of anxiety before a scan is taken (Carlsson & Carlsson, 2013; Heyer et al., 2015; Katz, Wilson, & Frazer, 1994). A considerable number of patients (37%) reported moderate to high levels of anxiety for a magnetic resonance imaging (MRI) scan. Even though the prevalence of anxiety for a CT scan is similar compared to an MRI (Heyer et al., 2015), anxiety for an MRI is a recognized problem while anxiety for a CT has received less attention. High levels of anxiety for a CT scan can become a major problem, because it may potentially influence the quality of images due to motion artifacts and may also increase health risks due to an increase in radiation exposure (Bischoff et al., 2009; Gerber, Kantor, & McCollough, 2010).

The physical surroundings and facilities of a diagnostic room may influence the patient experience. An increasing body of evidence showed that views of nature can have a positive impact on people's psychophysiological stress (Malenbaum, Keefe, Williams, Ulrich, & Somers, 2008; Monti et al., 2012; Tanja-Dijkstra et al., 2014; Ulrich, 1984; Vincent, Battisto, Grimes, & McCubbin, 2010). However, it is yet unknown whether a projection of nature in an imaging room can mitigate psychological and physiological anxiety.

1.2.3 Treatment in day care setting

After diagnosis, a growing number of patients receive treatments for cancer or chronic diseases such as muscle or vascular diseases in outpatient infusion centers. The number of day care treatments has increased over five times in the last 20 years, and the group of patients with the diagnosis of cancer has grown the quickest (Dutch Hospital Association (NVZ), 2016). This increasing demand for day care treatments (to replace inpatient treatments) can be explained by financial considerations as day care treatments are less expensive than hospital admissions. Therefore, hospital stays should be as short as possible, and it is preferable that patients do not stay overnight.

Patients may cope differently with this stressful situation. During these treatments, some may prefer a treatment environment that allows them to contemplate and rest (i.e., minimal noise) whereas others may opt for a treatment environment that distracts them and provides them with the opportunity to converse with fellow patients and visitors

(Browall, Koinberg, Falk, & Wijk, 2013). According to the WHO, the critical health effect for patients in a hospital treatment room is the disturbance of rest and recovery (Berglund, Lindvall, & Schwela, 2000). Since hospitals are currently being designed with an increasing number of single rooms or cubicles, the individual preference of patients with respect to social contact is of great interest.

Studies showed that patients reported human-related sounds the most, like talking, laughing, and coughing (Mackrill, Cain, & Jennings, 2013; Park et al., 2014). Some may not be disturbed by these human-related sounds and feel safe and secure when they hear others while others may experience it as annoying and feel helpless because they cannot escape from the noise (Cohen, Evans, Stokols, & Krantz, 1986; Johansson, Bergbom, Waye, Ryherd, & Lindahl, 2012).

Quiet-time interventions may control the actual sound level by encouraging patients to rest and relax (Lower, Bonsack, & Guion, 2003). Previous intervention studies manipulated multiple variables such as a restriction of visitors and staff movements, promotion of closing doors, reduced light intensity, and lowered volume of technical equipment. However, it is still unknown which individual element of quiet-time interventions effectively reduced the sound level. Therefore, it is important to study a single element.

In addition to studying the effect on actual sound levels, it is important to understand the perception of patients. The physical environment can support the psychosocial aspects and can promote social contact among fellow patients (Browall et al., 2013; Larsen, Larsen, & Birkelund, 2014). Many hospitalized oncology patients need to meet fellow patients because they understand each other's situation and can share experiences and information (Steen Isaksen & Gjengedal, 2000). Several studies discussed that a balance is required between the social and privacy aspects in treatment environments (Edvardsson, Sandman, & Rasmussen, 2006; Ulrich, 1991). However, it is currently unknown how patients experience the physical, social, and privacy aspects and how to design an infusion center respecting individual preferences.

1.2.4 Treatment on a ward

Oncology patients undergo surgeries, radiation, and chemo- or immunotherapies as treatments for cancer. Besides treatment in a day care setting, many patients are hospitalized in oncology wards during these treatments. Patients in a day care setting mentioned that they benefitted from going home after treatment (McIlfratrick, Sullivan, McKenna, & Parahoo, 2007), however, in an oncology ward, they are surrounded by the treatment environment for a longer period of time.

The Dutch Federation of University Medical Centers reports that patients become more critical and assertive as well as demanding a higher quality of care. Additionally, ward design is receiving increasing attention in order to decrease hospital-acquired infection rates during hospitalization (King, Noakes, & Sleight, 2015; Taylor, Card, & Piatkowski, 2018a; Ulrich et al., 2008). Consequently, new hospital designs have an increased number of single rooms. However, what do oncology patients actually prefer?

Socially, the majority of oncology patients prefer multi-bed rooms in order to avoid isolation and appreciate the company of others (Pease & Finlay, 2002; Rowlands & Noble, 2008; Williams & Gardiner, 2015). The experience during hospitalization may also depend on the individual characteristics of a patient. People who score high on the extroversion scale generally experience lower levels of arousal and seek outside stimulation while people high on the introversion scale generally experience high levels of arousal and are more likely to seek quiet environments/activities (Eysenck, 1967).

Several studies have shown the advantages and disadvantages that patients experience regarding room types and compared single rooms versus multi-bed rooms (Chaudhury, 2005; Maben et al., 2016; van de Glind, de Roode, & Goossensen, 2007). However, until now, it has not been clear whether there are differences in patients' perceptions between multi-bed rooms with two and four beds and how individual characteristics may affect this experience.

1.3 Outline of the thesis

The current thesis aims to investigate the influence of the physical environment (built complexity, nature, sound level, and patient room) on patients' well-being during the different aspects in a patient journey.

To do so, the second chapter of this thesis addresses the influence of the built environment and simulated physical ageing on wayfinding performance during arrival. The focus is to gain understanding about the relation between the growing ageing population and the growing size of hospitals' built environments. The third chapter investigates the influence of the natural environment on patients' well-being during diagnostics. The aim is to study how a motion nature projection affects the psycho-physiological anxiety of patients. The fourth chapter examines the influence of the sound level on the experience of patients during treatment in an outpatient infusion center. The focus is on the influence of a non-talking behavior rule on both the objective sound level as the perceived sound environment. Chapter 5 provides a broader perspective of the patients' experience of the physical, social, and privacy aspects in the outpatient infusion center. The aim is to gain a better understanding of the patients' experience there and also to answer the question of how to design the spaces and organization of an infusion center. In Chapter 6, the experience of patients during treatment in an oncology ward will be examined. This study addresses the effects of the physical (i.e., room type) and psychosocial (i.e., kindness of roommates and extraversion) aspects on the patients' experience in an oncology ward. Most hospitals are now designed with an increased number of single rooms in order to reduce hospital-acquired infection rates while, from a social perspective, the majority of oncology patients prefer multi-bed rooms. Therefore, it is important to examine the differences between different types of multi-bed rooms to understand how hospitals could take into account the social needs of patients. In Chapter 7, the five studies are summarized. Finally, in Chapter 8 the general findings of this thesis and the implications of these findings are discussed.

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