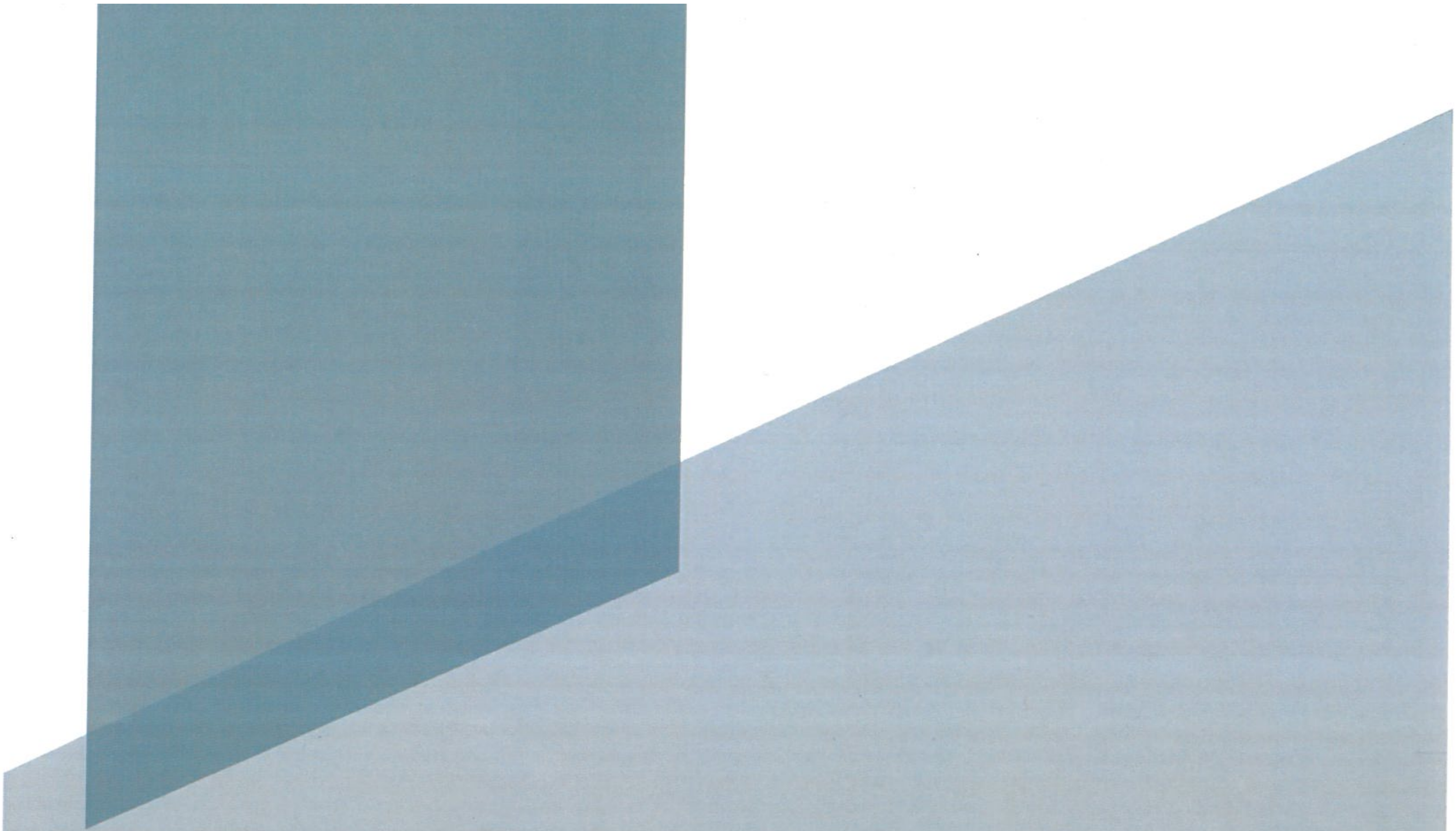

The Built Environment in Cancer Treatment Facilities: Anxiety & the Patient Experience

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Abstract

In 2016, more than one million people were diagnosed with cancer and 14 million people died in the United States. There is no doubt that cancer is a traumatic experience. Using design thinking, the purpose of this study was to determine if the built environment in cancer-care facilities influences anxiety in patients, and to generate solutions to reduce stress. Eight stakeholders, including cancer survivors, patients, caregivers, and staff, participated in three workshops generating ideas for oncology units. In workshop one, participants identified issues through journaling and experience diagramming that caused anxiety, including amount of travel within the facility, small uncomfortable waiting rooms, smells, and institutional spaces. Using prioritizing strategies, participants concluded with, “How can we optimize patients’ time and movements within a facility?” This question informed subsequent workshops where participants brainstormed and prototyped ideas. The final solution optimized patient time and movement through the creation of individualized Patient Treatment Pods (PTP) that provided privacy, comfort, and minimal travel within facilities. Participants clustered the PTPs around a restroom, patient lounge, nurse’s station, and nutrition station. Utilizing participants’ personal experiences along with design thinking led to an effective prototype that creates a cancer treatment facility to better suit patient needs while reducing anxiety.

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Introduction

"What patients now crave is more attention to their states of mind and emotions, and to all those things in the environment that sustain them." (Sternberg, 2009 as cited in Phillips, 2012).

Cancer is one of the leading causes of death worldwide. In 2012, 14 million people were diagnosed with cancer and 8.2 million people died of cancer worldwide. The World Health Organization estimates that the number of new cancer cases will rise by 70% over the next two decades (Cancer, 2015). There is no doubt that cancer is an emotional and often traumatic experience. In Colleen Dolan Fullbright's (2015) guide *How to Help Your Friend with Cancer*, she says, "Few generalities can be made about the cancer experience, except that – for most people – it is the scariest time of their lives. It might be the loneliest time, too (p. ix)." It is important for providers to keep the patient as the central focus throughout the diagnosis and treatment of cancer. As high-quality patient care becomes the expectation of hospitals, the patient experience has become, and will likely remain, a central concern in healthcare for years to come. Awareness of the patient experience and the necessity of patient involvement in creating care methods are becoming necessary for healthcare settings across the continuum of care (Lehrman, Silvera, & Wolf, 2014). Joan Hablutzel (2014) explains the importance of studying the patient experience as, "Being able to define, measure and analyze patient satisfaction and adjust practice operations accordingly will be essential for the future of success of medical practice" (p. 1). One way to achieve this goal is through the use of design thinking, which can aid in the continuous process of improving the patient experience, due to the fact that "healthcare is never static; solutions are never static" (MacFadyen, 2014, p. 4) and neither is design. Design thinking can enhance the improvement of the patient experience by “transforming existing conditions into preferred ones” (MacFadyen, 2014, p. 3). In a healthcare setting, design thinking works to gain empathy for patients by developing and implementing creative solutions to better the healthcare system for all patients (Agutter, 2011).

Negative patient experiences are quite common, not due to substandard care, rather due to difficulty in understanding medical terminology, feeling lost, or an inability to have emotional needs met (Agutter, 2011). Looking specifically at patient emotional well-being, medical technologies designed to improve patient health can actually result in negative and even traumatic experiences, causing a great deal of anxiety. Emotional distress and anxiety due to medical procedures and treatments are particularly common in oncology units focusing on cancer care. Cancer patients feel disempowered and can suffer emotionally as well as physically. As a result, many healthcare professionals are advocating a holistic approach to cancer care. Providers believe that treating patients’ physical and emotional needs is a necessary improvement that the current healthcare system requires (Mullaney, Nyholm, Pettersson, & Stolterman, 2012). Although healthcare providers believe that a focus on emotional needs of cancer patients is essential, little has been done from a design perspective to advocate this mindset. While some action has been taken to provide coping techniques to patients, such as education, therapy, and relaxation techniques, there is a lack of research on the environmental triggers of these anxieties and how design of the built environment could reduce these triggers (Mullaney et al., 2012).

Purpose

Using design thinking strategies, the purpose of this project is to determine if the built environment in cancer care facilities affects anxieties contributing to negative patient experiences and poor mental well-being.

CHEMOTHERAPY TREATMENT SPACE (SKAGIT REGIONAL HEALTH, 2017).

CHEMOTHERAPY SPACE (UNIVERSITY CANCER AND BLOOD CENTER, 2017).

CHEMOTHERAPY INFUSION ROOM (ST. CHARLES HEALTH SYSTEM, 2017).

CHEMOTHERAPY SPACE (NEWPORT LIDO MEDICAL CENTER, 2017).

Definition of Terms

Design Thinking

Agutter (2011) describes design thinking as “a methodological approach for investigating complex ill-defined problems like those faced in healthcare” (para. 3).

Anxiety

A feeling of worry, nervousness or unease. It is characterized by feelings of tension, worried thoughts, and physical changes, such as increased blood pressure.

Patient Experience

All interactions experienced by a patient in a healthcare environment that influence the emotional perceptions across a continuum of care (Mullaney et al., 2012).

Built Environment

The physical and structural form of a space. Within a healthcare setting this would include, but not be limited to, walls, rooms, floor plans, furnishings, paint colors, and floor patterns.

Literature Review

The Importance of Positive Patient Experience and Patient Interaction

For the purpose of this paper, patient experience can be defined as “the sum of all interactions that influence patient perceptions across a continuum of care” (Mullaney et al., 2012, p. 27). Modern healthcare and the implementation of the Affordable Care Act now link the performance of hospitals and patient experience metrics to reimbursement, meaning the pay of hospitals and providers is partly based on how their services are rated by patients (Merlino & Raman, 2013). The patient experience movement was originally inspired by demands from consumers to acknowledge, understand, and improve the patient experience in the medical system. Now, government policy mandates the collection of data through scientifically developed standardized surveys, publicly reporting provider performance, as well as linking a bit of payment. The voices of patients will now be heard, and their voices matter to the well-being of a hospital’s reputation and ability to operate. The patient experience movement has expanded due to research literature that shows a correlation between positive patient experience and clinical outcome measures, patient safety, and readmissions (Lehrman et al., 2014). “Awareness of patient experience and the imperative for patient engagement now seem pervasive in hospitals and other healthcare settings across the continuum of care – from board rooms to bedside” (Lehrman et al., 2014, p. 9).

It is important to note just how imperative patient interaction and involvement is to the patient experience process. In 2012, an industry survey asked hospital leaders what would improve patient experience. The top recommendations were: new facilities, private rooms, food on demand, bedside interactive computers, unrestricted visiting hours, and more quiet time. The problem with these recommendations is that they are not based on systematic examination of what patients really want, but rather what hospital executives felt was important. The most important part of examining and improving the patient experience is to interact with and gain the perspective of patients (Merlino & Raman, 2013). As well as being measurable, patient experience of care is specific, actionable, and improvable (Lehrman et al., 2014, p. 10). Bate and Robert explain this need as “the traditional view of the user as a passive recipient of a product or service has begun to give way to the new view of users as integral to the improvement and innovation process” (2006, p. 307). Hospitals need to make things better for the user. They should be doing this by making the user an integral part of the design process (Bate & Robert, 2006). However, studying the patient experience is more than making money for hospitals. It is providing patients with adequate and comfortable hospital encounters and providing for their well-being inside and outside of the hospital setting.

The Patient Experience

Measureable
Specific
Actionable
Improvable

PATIENT EXPERIENCE.
(LEHRMAN ET AL, 2014, P. 10).

Design Thinking and its Relevance to Healthcare

Design thinking is currently “one of the most popular problem-solving processes on the market” (MacFadyen, 2014, p. 3). A simple design thinking model can be seen in Figure 1. The aim is to creatively solve problems that initiate change, through the use of divergent and convergent thinking. Design thinking seeks innovative solutions to initiate change (MacFadyen, 2014) through an empathetic understanding of other people’s problems and points of view (Kronqvist, Lee, Mattelmaki, & Vaajakallio, 2013). Design thinking and innovation are powered by thorough understanding and direct observation of what people want and what they need (Brown, 2008). Design thinking seeks to find potential solutions for problems at any level or within any discipline (MacFadyen, 2014).

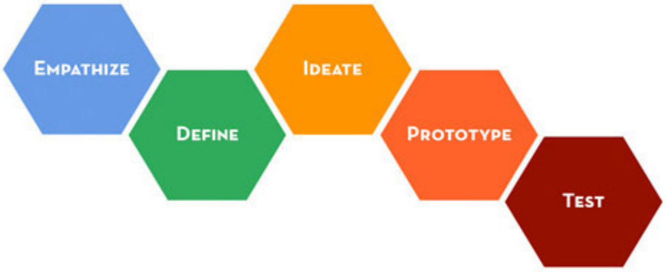


FIGURE 1. DESIGN THINKING PROCESS (POINT OF VIEW, 2014).

More specifically, this means that persons from all sectors of life or within an organization can contribute meaningful ideas to solve problems. Everyone is creative when provided with the proper tools, placed in the correct setting, and asked the right questions (Kronqvist et al., 2013). MacFadyen (2014) provides the example that within a healthcare structure, housekeeping, billing, ward clerks, nurses, doctors, administrators, suppliers, consumers, and patients work within the same room to find a solution to a problem. This eclectic mixture enhances creativity and provides multiple perspectives to the issue in order to transform current conditions into an improved future (MacFadyen, 2014).

Design thinking is a “methodological approach for investigating complex ill-defined problems like those that are faced in healthcare” (Agutter, 2011, para. 3). It adopts empathetic design principles to move beyond typical approaches and design an experience for patients (Agutter, 2011). Design thinking “is a radical collaboration of diverse disciplines whose aim is to creatively solve problems and initiate change” (MacFadyen, 2014, p. 4). The healthcare system and the problems facing it are an evolving process, and design thinking can bring solutions to this process (MacFadyen, 2014). As Bate and Robert (2006) explain, “the link between healthcare design and the discipline of design more generally is that ‘good design’ of healthcare services – and the resulting ‘good experience’ – is essentially no different from good design in any sphere” (p. 307).

Florida Hospital in Orlando is already employing design thinking methods. As part of the Adventist Hospital System, Florida Hospital dedicates a physical space to innovation in the form of an innovation laboratory. The innovation laboratory (see Figure 2) welcomes problems from all areas of the hospital to be solved through the design thinking process. The hospital reports a significant savings in time and cost as a result of the innovation laboratory and the Adventist Hospital System is looking to duplicate this laboratory, in its other hospitals (MacFadyen, 2014). Design thinking is allowing healthcare to create services that better meet the needs and desires of the end users (Brown, 2008); yet there is little research on patients' perceptions of healthcare built environments, specifically, the things they consider to be most important to their health and well-being (Douglas & Douglas, 2005).

FIGURE 2. FLORIDA HOSPITAL INNOVATION LABORATORY (WHAT IS FHIL?, 2016).

Anxiety in Cancer Care

People have unique emotional responses upon hearing they have cancer, and each response is unique to the individual's circumstances and coping skills. A cancer diagnosis disrupts a person's sense of normalcy and security, resulting in uncertainty as well as an assortment of emotions. Patients report emotional concerns such as the fear of death, future care of loved ones, anxiety related to treatment decision making, bodily changes, and anticipated symptoms. Emotional support and caring are crucial for patients throughout their cancer journey (Lester & Rettig, 2009). Illness typically brings feelings of uncertainty and anxiety, and these feelings of stress and anxiety may affect the healing process. Research shows that such psychological stress impairs patient healing. The physical environment of a healthcare setting can make a difference in patient recovery time or how quickly they adapt to acute or chronic conditions (Dijkstra, Pieterse, & Pruyn, 2008). Components of the oncology environment, such as peaceful artwork, can serve as a positive distraction and convey a message of caring and support (Edvardsson, Sandman, & Rasmussen, 2006). High stress levels can have an adverse effect on patients' immune systems and healing, as well as on their overall patient experience; thus the need for innovation in reducing stress and difficulty for people with cancer (Homel et al., 2011).

The Built Environment

> The built environment is everywhere.
>
> The built environment includes our homes, schools, workplaces, parks/recreation areas, business areas and roads. It extends overhead in the form of electric transmission lines, underground in the form of waste disposal sites and subway trains, and across the country in the form of highways. The built environment encompasses all buildings, spaces and products that are created or modified by people. It impacts indoor and outdoor physical environments, as well as social environments and subsequently our health and quality of life. (Srinvasan, O'Fallon, & Dearry, 2003, p. 1446).

The study of environmental psychology reveals that the relationship between humans and their environment is symbiotic, meaning that the environment influences our behaviors (Kopec, 2006). Poor design in healthcare facilities can result in behavior from the patient that includes passivity in care decision making, surrendering beliefs to physicians, and behaviors related to learned helplessness. It is now understood that inviting, easily understood, and non-threatening environments play a pivotal role in patient recovery. Planetree, a non-profit organization dedicated to creating patient centered care in healing environments, advocates for facility design that is conducive to the healing process through layouts that support patient dignity, a home-like atmosphere, non institutional designs, and the removal of unnecessary architectural barriers (Kopec, 2006).

Healthcare facilities have traditionally been built with a functional delivery of care in mind (Dijkstra et al., 2008), rather than the needs of the patient. What works or what is trendy in space design and decoration may not best fit patient needs (Wujcik, 2011). “Although large, spacious clinics may be visually appealing and soothing, the distance a weakened patient has to walk from the parking lot or front door to the treatment chair can be daunting” (Wujcik, 2011, p. 5). The built environment in oncology treatment facilities must be studied to help patients thrive and heal. Space planning and physical amenities can enhance the patient care environment (Mitchell, 2011). Current research supports the idea that built healthcare environments have an impact on the health and well-being of patients, directing more attention to the psychological consequences of the built environment (Dijkstra et al., 2008).

> The built environment has direct and indirect effects on mental health. High-rise housing is inimical to the psychological well-being of women with young children…Alzheimer’s patients adjust better to small-scale, homier facilities that also have lower levels of stimulation. They are also better adjusted in buildings that accommodate physical wandering. Residential crowding (number of people per room) and loud exterior noise sources (e.g., airports) elevate psychological distress…Insufficient daylight is reliably associated with increased depressive symptoms. (Evans, 2003, p. 536).

Research is the USA and the UK have begun to identify the contribution that patient environments have on health and well-being during patients’ recovery from illness, meaning well designed healthcare environments can positively influence health outcomes (Douglas & Douglas, 2005). People have better mental health when they can control their surroundings, and whenever their control is thwarted, helplessness can occur (Evans, 2003).

Douglas and Douglas (2005) explored patients' perceptions of the built environment of healthcare wards. Their study concluded that patients need control of their environment. The loss of simple day-to-day actions, such as switching lights on and off, adjusting the heating, making a cup of tea, looking through the window, or entertaining a visitor, causes great stress. The key element they found was that individuals should have ownership and control over the space they inhabit. Hospitals should be designed with an increased focus around the interest of the patient. They should provide sustainable and supportive environments, minimizing anxiety and promoting healing. Patients require environments that support a home-like atmosphere conducive to a normal lifestyle (Douglas & Douglas, 2005).

FIGURE 3. PHOTOS OF NORTH STAR LODGE (YAKIMA VALLEY MEMORIAL HOSPITAL, 2015).

The North Star Lodge in Yakima, WA is a cancer center designed to look like an outdoor lodge. Photos of North Star Lodge can be seen in Figure 3. The area the center serves is a rich agricultural area with natural beauty. It was very important to designers that the lodge have a tranquil, peaceful environment with an emphasis on nature. The treatment center offers a warm, healing atmosphere with glass walls overlooking man-made waterfalls and large stone fireplaces. The North Star Lodge relies on nature and natural light to be soothing, along with positive distractions for patients and families within the center. Not all clinics have access to direct sunlight or natural beauty, but it can be stimulated with large windows that let in natural light, live plants in waiting areas, and artwork featuring scenes of nature (Mitchell, 2011).

The built environment of healthcare facilities is crucial to the well-being of current and future patients, as well as other stakeholders. Poor design has been linked to increased anxiety, greater need for medication, sleeplessness, and higher rates of delirium (Douglas & Douglas, 2005). Although beautiful cancer treatment centers exist, no one has studied how they affect patients or what patients prefer. As various plans for healthcare environments are considered, designs that help reduce stress and anxiety must be considered (Kopec, 2006).

Related Studies

Hospitals are trusted to treat and support the health and safety of some of society's most vulnerable members (Hellmich & Zborowsky, 2011). Healthcare facilities have traditionally been built with a functional delivery of care in mind (Dijkstra et al., 2008). However, today's healthcare buildings are "focused on issues such as how design and planning can impact quality improvement; patient, family and staff satisfaction and perception of care; and patient safety" (Hellmich & Zborowsky, 2011, p. 27). Design and construction organizations dedicated to healthcare, such as the American Institute of Architects and the American Society of Healthcare Engineers, partnering with the Facility Guidelines Institute, now acknowledge the relationship between the built environment and its effects on healthcare. This recognition heightens the awareness of this relationship among designers and healthcare setting planners (Hellmich & Zborowsky, 2011).

Design thinking in healthcare is not a new concept, yet only a few studies exist that directly identify how design thinking and the built environment can reduce anxiety in patients in cancer treatment settings. A study conducted in New Zealand found the use of design to be of upmost importance in the information, communication, navigation, coordination, and environmental setting of a breast cancer treatment service known as The Breast Service. The Breast Service provides breast cancer screening and treatment services at two different hospitals in New Zealand (Boyd, McKernon, Mullin, & Old, 2012). For the purpose of their study they defined their use of design as "…a method of designing better experiences for patients, [caregivers] and staff. It involves patients and staff exploring the care pathway and the emotional journey patients experience along it, capturing experiences, then working together to understand these experiences and improve them" (Boyd et al., 2012, p. 76). The Breast Service decided to utilize co-design to encourage patients to take an active role in the review and development of services, focusing strongly on designing services around the patient experience and utilizing techniques and tools common in the design world, such as prototyping, storyboarding, etc. (Boyd et al., 2012).

The purpose of their study was to follow the emotional journey that patients take from diagnosis through treatment and to improve the patient experience through their services based on these results. To do so, the researchers used patient journey mapping, experience-based surveys, and co-design workshops. Patient journey mapping and the experience-based surveys revealed the most about anxiety within patients. While patient journey mapping recorded the experience of patients over time, including their contacts, emotions, touch points, and suggested improvements for The Breast Service, experience-based surveys focused on one part of the hospital journey and allowed for patients to come up with specific suggestions for improvement. Surveys were distributed to all patients who attended a Breast Clinic appointment or mammogram. These surveys revealed a great amount of anxiety occurred while waiting, especially if staff did not provide ongoing information, as well as during procedures (mammography and biopsy) and clinic appointments (Boyd et al., 2012). The patient ratings of their experience involved in their journey can be found in Figure 4.

Each of the three tools used in this study yielded different information that could be applied to help The Breast Service improve their patient experience ratings. This study concluded that design within The Breast Service provided "tangible improvements and has demonstrated the value of engaging patients and focusing on their experiences" (Boyd et al., 2012, p. 76). The specific improvements formulated by the use of co-design in this study can be found in Figure 5.

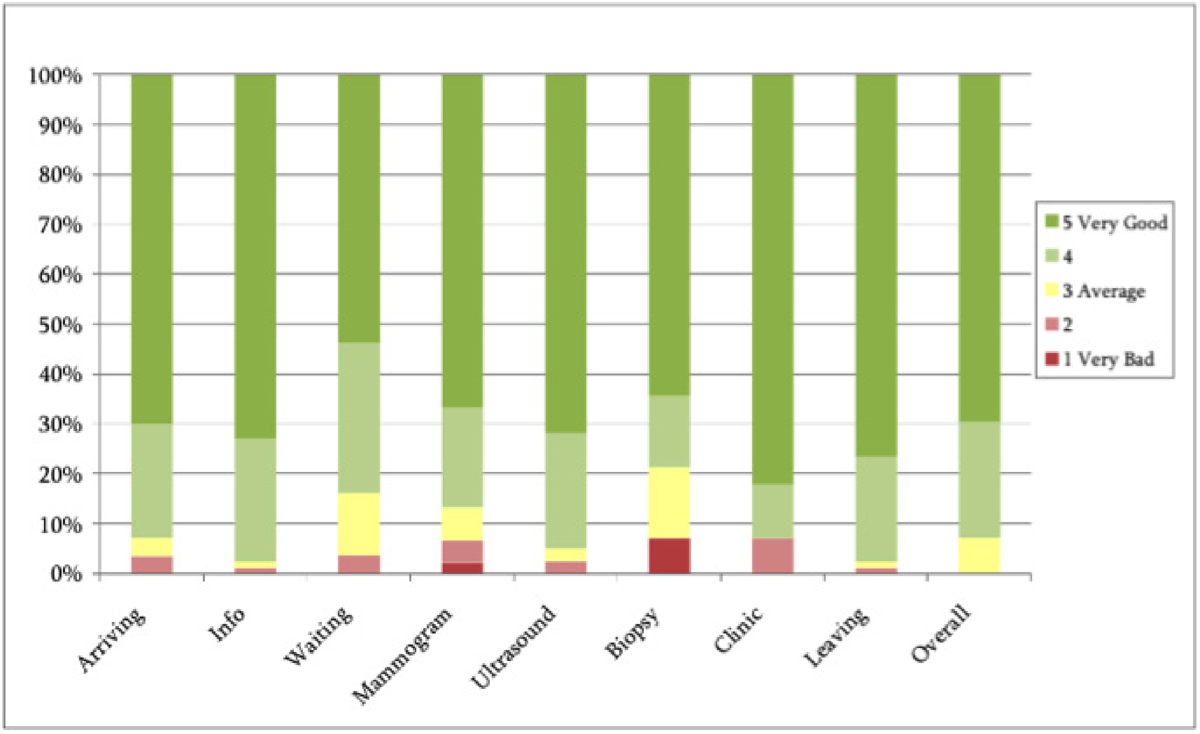
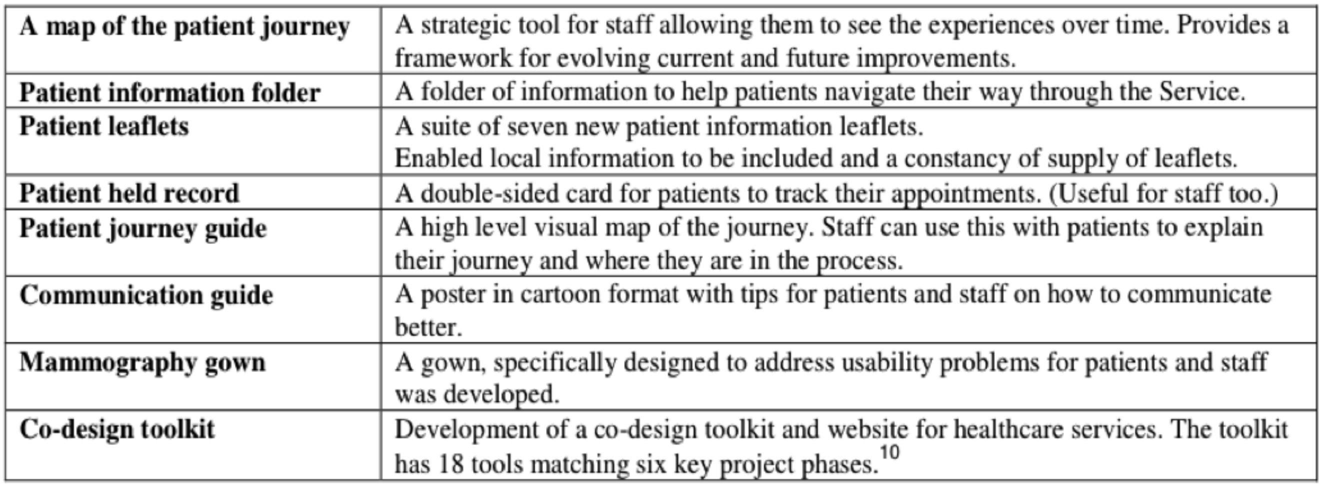


FIGURE 4. PATIENT RATINGS OF JOURNEY EXPERIENCE (BOYD ET AL, 2012, P. 81).



A map of the patient journey	A strategic tool for staff allowing them to see the experiences over time. Provides a framework for evolving current and future improvements.
Patient information folder	A folder of information to help patients navigate their way through the Service.
Patient leaflets	A suite of seven new patient information leaflets. Enabled local information to be included and a constancy of supply of leaflets.
Patient held record	A double-sided card for patients to track their appointments. (Useful for staff too.)
Patient journey guide	A high level visual map of the journey. Staff can use this with patients to explain their journey and where they are in the process.
Communication guide	A poster in cartoon format with tips for patients and staff on how to communicate better.
Mammography gown	A gown, specifically designed to address usability problems for patients and staff was developed.
Co-design toolkit	Development of a co-design toolkit and website for healthcare services. The toolkit has 18 tools matching six key project phases.[10]

FIGURE 5. LIST OF IMPROVEMENTS (BOYD ET AL, 2012, P. 83).

Design thinking has also been used in terms of studying human-centered care in cancer care. Mullaney et al. (2012) used human-centered design to examine the patient experience in specific cancer treatments holistically, and discover new solutions to mediating and preventing situational anxiety in radiotherapy cancer treatments. Their goal was to use care that was pre-emptive rather than responsive to anxiety. Researchers looked closely at patients' interactions with care providers, technology used, and the environment, in order to narrow in on situational sources of anxiety during radiotherapy treatments. The study collected ethnographic research in the form of stories told by patients and caregivers, as well as detailed field notes (Mullaney et al., 2012). Carlson and Bultz (2003) found that at this time the main anxiety reducing techniques are in the form of psychosocial interventions, including education about the disease, relaxation and stress management training, group support therapy, and individual support therapy (as cited in Mullaney et al., 2012). These methods give patients tools to manage their anxiety once it occurs, but does little to impact the triggers of their anxiety (Mullaney et al., 2012).

The study focused heavily on the built environment in relation to the radiotherapy treatment method. Researchers conducted observations in each type of treatment room in the clinic to understand the different interactions patients experience in each space. Radiotherapy uses different fixation devices to immobilize different parts of the body to receive the treatment. The use of fixation devices can be a traumatizing experience for patients, and a clear relationship exists between patient anxiety and the fixation device used in treatment. The study opened a new window for moving beyond methods for coping with anxiety in cancer patients to the need of targeting triggers of anxiety within the built environment of cancer treatment centers (Mullaney et al., 2012).

These two studies have effectively applied design thinking methods, through the use of co-design and human centered design, in improving the patient experience. Boyd et al. (2012) identified how interactions and services can provoke anxiety in hospitals, while Mullaney et al. (2012) discovered how the fixation device used in radiotherapy treatments causes major anxiety and distress to patients in clinics. While both of these studies illustrate how design thinking can impact and improve patients' experiences, as well as their overall mental well-being, Mullaney et al. focused specifically on radiotherapy and Boyd examined breast care. Little to no research has been conducted on oncology units where patients receive chemotherapy as part of their cancer care. Can design thinking methods aid in the identification of negative environmental triggers of the built environment to reduce the triggers of anxiety contributing to negative patient experience and poor mental well-being in patients receiving cancer care within hospital oncology units?

Significance of Study

Mullaney et al. (2012) states, "It is important to study the emotional aspects of [cancer] treatment and the impacts the built care environment can have upon patient well-being" (p. 27). Medical technology is designed with the intention of improving a patient's physical health. However, it is sometimes this technology that evokes the anxiety that patients feel in their treatments (Mullaney et al., 2012). The ancient Greek culture believed that a holistic approach to healing existed, an approach armed with nature, magic, dreams, and a journey to the temples of healing. While their methods have been advanced by technology, their idea of the connection between healing and the environment remains true today (Hellmich & Zborowsky, 2011). "Design is uniquely qualified to expand the landscape of anxiety interventions within cancer care due to its human-centered focus and its ability to approach the situation with an open-minded, holistic prospective" (Mullaney et al., 2012, p. 29). Design thinking "integrates multidisciplinary expertise to enhance human well-being and empower people, and it leads to systems, machines, products, services and processes which are physically, perceptually, cognitively and emotionally intuitive to use" (Mullaney et al., 2012, p. 36). Having cancer is an emotional process in itself. Design thinking could have the ability to avoid the situational anxiety caused to patients by the built environment of hospital oncology units. Work needs to be done to identify, improve, and eliminate triggers of anxiety in these environments.

Methodology

Design thinking methodology was utilized to practice human-centered design. The methods are divided into three main categories: looking, understanding and making. The duration of each method varied and several methods occured simultaneously. The final thesis deliverable is an immediate solution to be implemented into cancer treatment facilities.

Looking:

Think Aloud Testing

Understanding:

Experience Diagramming
Affinity Clustering
Visualize the Vote
Sentence Starters
Rose, Thorn, Bud

Making:

Round Robin
Rough & Ready Prototyping
Concept Poster

A non-random, purposive sampling technique was used for this study and participants for the study included:

- Any cancer patient, male or female, sick or cured, who has been diagnosed with, treated for, or monitored for cancer for at least a three-month period within the past 18 years.
- Any caregiver, spouse, grown child (18+), friend, or family member who attended cancer diagnostic or treatment appointments, or was present in the home with a cancer patient.
- Any nurse, physician, certified nursing assistant, or administrative staff member who has worked directly with oncology patients for at least one calendar year.

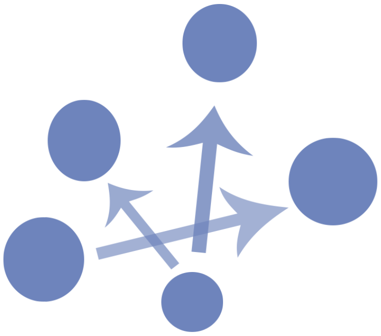
The participants in this study ranged in age from 30-60. The participants were selected and asked to participate directly by the researcher.

Research was conducted in three separate design thinking workshops held by the researcher. The workshops were one hour and 30 minutes to two hours in length. The workshops were held in a private room at the St. John's Education Building in Salisbury, NC. The number of participants chosen for the study was dependent on the design thinking methodology used and varied by workshop. Each design thinking workshop utilized simple materials such as: a camera, sticky notes, sharpies, paper, computer, poster paper, and relevant template.

Design Thinking Methods

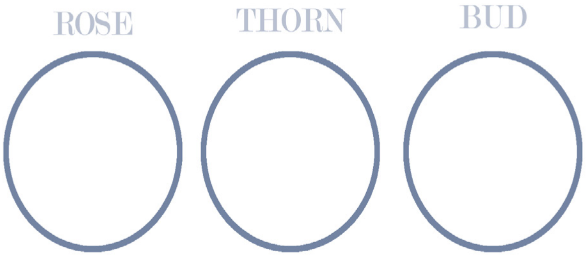
Experience Diagramming

Experience Diagramming was used to have participants chart their experience in a cancer treatment facility. Experience Diagramming gives a detailed account of participants' key decisions, as well as the people, places, and things that they encounter moving through a cancer treatment facility. This method revealed the complexity and struggles that participants are forced to adapt to while in a cancer treatment facility. Participants drew a map and described their experience step by step.



Rose, Thorn, Bud

Rose, Thorn, Bud is a method that was used to identify the positives, negatives, and opportunities in a given situation. This method helped to identify issues and insights, while gathering input from all of the participants. For this study, Rose, Thorn, Bud was used to help participants identify each of these traits within cancer treatment facilities. Participants identified a positive experience (Rose), a negative experience (Thorn), and an opportunity (Bud). Participants wrote



one of each of these identifiers on different colored sticky notes for each of the stages in the experience diagram.

Affinity Clustering

Affinity Clustering is a form of mind mapping and allowed for the grouping and organization of large amounts of research data. Items were sorted on perceived similarities, and grouping of the data allowed for patterns to be revealed and new ideas to be generated. Affinity Clustering helped identify thematic patterns and built a shared understanding.

Statement Starters

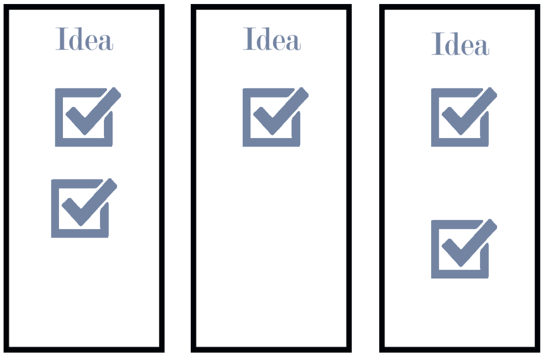
Statement Starters is a methodology that turned simple problems into ideas for change. Statement Starters helped participants reveal ideas or change in cancer treatment facilities. Participants asked a question that included one of the three statement starters: “How might we…?” “In what ways might we…?” and “How to….?” Participants’ answers revealed potential solutions for change.

Round Robin

Round Robin is a method that allowed for multiple minds to solve a single problem. The collective nature of this activity allowed for participants to come up with solutions that they would have never found on their own. Round Robin asked for participants to critique and improve the idea that the participant before them provided. The approach caused participants to build on one another’s ideas by thinking critically and enlarging their own thought process. The Round Robin helped to find immediate solutions for change that can be implemented in cancer treatment facilities. A template was used to help participants organize their ideas (see Appendix A).

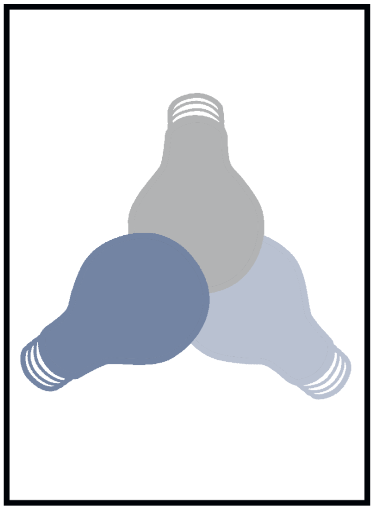
Visualize the Vote

Visualize the Vote allowed for each participant's voice to be heard in determining a solution to a problem. This method allowed for a democratic decision making process that helped to rate and rank preferences among participants. Each participant was given different colored sticky notes to vote for the solutions they found to be the most successful.



Concept Poster

The Concept Poster method allowed participants to display the idea created through the Round Robin and selected through Visualize the Vote. The Concept Poster helped to promote the idea and work out the specifics. The big idea was shown and described with short phrases, main points, and supporting information. The poster showed what the idea was, why it mattered, and what made it important. The Concept Poster allowed for the group to come together and expand on the idea, as well as communicate the idea to a larger audience.

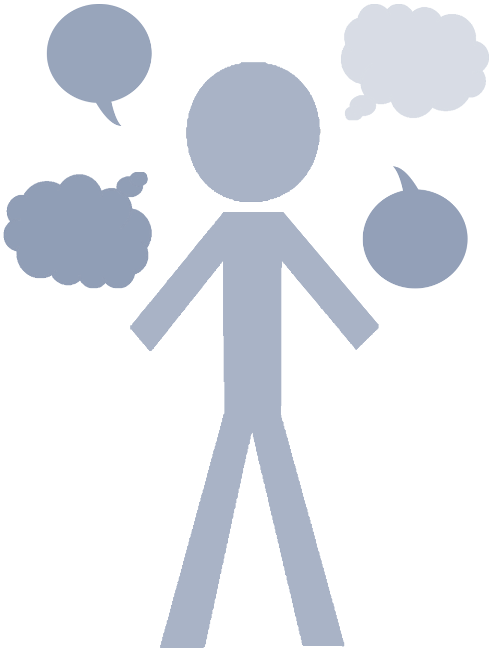


Rough and Ready Prototyping

Rough and Ready Prototyping allowed for quick creation and testing of ideas to be implemented as solutions to the problem. It also allowed for honest feedback about the particular experience. Participants were given basic materials such as pen, paper, tape, and scissors. The participants used these materials to create the idea determined most useful by the Visualize the Vote and displayed on the Concept Poster.

Think Aloud Testing

Think Aloud Testing provided a thought-by-thought account of the use of a prototype developed during the Rough & Ready Prototyping method. Participants were encouraged to say things out loud as they worked their way through the prototype. These thoughts would typically be limited to internal thought processes. This type of testing revealed important insights that participants may not have thought were noteworthy when giving feedback about a particular experience.



Design Thinking Workshops

Workshop 1:

Design Thinking Workshop 1 took place at the St. John's Education Building. Seven participants were invited to the workshop for conversation and several design thinking methodologies initiated by the researcher. Four participants came to the workshop and one participant completed the Experience Diagramming/Journaling prior to the workshop because she was unable to attend the workshop due to a cancer-related surgery. Once all of the participants arrived, the researcher explained the purpose of the workshop and provided a brief overview of what the participants would be doing at the workshop. Once the workshop was explained, participants were asked to sign consent forms. The participants were asked to introduce themselves and they each explained their perspective on cancer care. In this workshop, one participant was a caregiver for a deceased cancer patient who had a short cancer journey, one particpant was a caregiver for a deceased cancer patient who had a long cancer journey, two of the participants were current cancer patients, and the final participant was a cancer survivor who also works in a cancer treatment facility. Water and snacks were provided.

20 minutes – **Experience Diagramming/Journaling**: Two participants who are currently being treated for cancer were asked ahead of time to journal their experience with a routine cancer treatment visit. They were asked to journal their experience from the time they left their house, through their experience at the facility, to the time that they returned home. They were asked to identify the people, places, and things they encountered, as well as the pros, cons, and raw emotions of their experience. Participants were prompted with questions such as: What do you think is important to share about your experience? What do you see? What do you feel? Who is around? They were asked to document their descriptions and to chart the anxieties associated with their experiences on an experience diagram (Appendix 1). Their descriptions and maps were used to inform the Rose, Thorn, Bud method.

30 minutes – **Rose, Thorn, Bud**: This method was utilized to determine the pros, cons, and opportunities within the experience diagram. One of the two participants who completed the experience diagramming presented his/her own diagram to the group. The researcher presented the Experience Diagram of the other participant who was unable to be present. The four participants present in the workshop were prompted with questions such as: What does it feel like? What do you like? What is driving you nuts? What are the pros? What are the cons? Each of the traits was placed on individual sticky notes and displayed on the wall. This information informed Affinity Clustering.

20 minutes – **Affinity Clustering**: Information from the Rose, Thorn, Bud method was placed on individual sticky notes and placed into groups based on similarity by participants. The four participants in the workshop worked to group individual ideas into clusters. This information helped to inform the Statement Starters method.

20 minutes – **Statement Starters**: The categories determined by Affinity Clustering were used to generate questions for potential problems to solve within cancer treatment facilities. The four participants in the workshop generated Statement Starters such as “In what ways might we make treatment centers less stressful?” Each statement starter was placed on an individual sticky note. The Statement Starters were used to inform the Visualize the Vote method.

10 minutes – **Visualize the Vote**: Participants voted on statements generated from Statement Starters. Each participant was given three different colored sticky notes. Each color had a different level of importance. The four participants were instructed to place their sticky notes on the three statements that they found the most valuable in determining a solution. This information was used to inform the Round Robin method for the second design thinking workshop. It provided the best ideas as voted by the group.

Workshop 2:

Design Thinking Workshop 2 took place at the St. John’s Education Building. Ten participants were invited to the workshop for conversation and several design thinking methodologies initiated by the researcher. Four of the participants were able to attend. One of the participants was present in Workshop 1; the other three were new participants. Once all of the participants arrived, the researcher explained the purpose of the workshop and provided a brief overview of what the participants would be doing at the workshop. Once the workshop was explained, participants were asked to sign consent forms. The participants were asked to introduce themselves and explain their perspective on cancer care. One of the participants was a caregiver of a deceased cancer patient who had a short cancer journey, one was a caregiver of a deceased cancer patient who had a 22-year cancer journey, one was an 18-year stage 4 colon cancer survivor, and the other participant was a healthcare provider. Water was available for the participants.

30 minutes – **Round Robin**: This method helped find immediate solutions for change that can be implemented in cancer treatment facilities. The Statement Starter method provided the questions that the solutions addressed. The four participants were given a template (Appendix B). Participants were instructed to write the problem at the top of their template. Then, each participant was told to write his or her wildest idea, with no concerns of time or money. Once they wrote their idea, they passed their template to the person on their right. This person listed reasons why the idea may fail. Once they finished they passed it to the person on their right. The final person reviewed the problem, the wild idea, and the reasons it may fail, and created a realistic idea that could be implemented. Each member presented their final idea.

10 minutes – **Visualize the Vote**: Information from the Round Robin was displayed for each participant to review. Each of the four participants was given three sticky notes to

vote for their first, second, and third choice of ideas.

30 minutes – **Concept Poster**: This method utilized the idea created during the Round Robin and selected by the group through Visualize the Vote. The participants were given large paper and basic drawing materials. They used these materials to create a concept poster displaying the idea to help improve cancer treatment facilities. Participants were encouraged to use short phrases and supporting details to explain why the idea was important and why it would benefit the audience. The information included on the Concept Poster helped to inform the third design thinking workshop.

Workshop 3:

Design Thinking Workshop 3 took place at the St. John’s Education Building. The same four participants from Workshop 2 were invited to the workshop for conversation and several design thinking methodologies initiated by the researcher. Three of the four participants attended. Once all of the participants arrived, the researcher explained the purpose of the workshop and provided a brief overview of what the participants would be doing at the workshop. One of the participants was a caregiver of a deceased cancer patient who had a 22-year cancer journey, one was an 18-year stage 4 colon cancer survivor, and the other participant was a healthcare provider. Water was available for the participants.

60 minutes – **Rough and Ready Prototyping**: This method allowed for quick creation of the potential solution for improving cancer treatment centers. Participants were provided with basic building materials such as: pen, paper, tape, and scissors. They were asked to create a prototype of the concept created in the second design thinking workshop to hopefully one day be tested for use in a cancer treatment facility.

45 minutes – **Think Aloud Testing**: This method allowed for the researcher to determine if the prototype created in Rough and Ready Prototyping needed to undergo changes. Each participant was asked to explain the process involved with the prototype as a solution to the problem. The participants were asked to share their experience in real time while moving through the prototype. The researcher listened and took careful notes that were used to inform changes that were made to the prototype.

45 minutes – **Review and Incorporate Feedback**: The group reworked and improved a few aspects of its prototype based on the information provided during the Think Aloud Testing. This allowed for participants to finish the workshop with the best prototype possible.

Results

Design Thinking Results

The investigator conducted design thinking methods over a six-week period with participants who fit the specified criteria. The participants completed interactive design thinking methods during three workshops. These workshops provided insightful ideas and creative solutions for change in cancer care. While traditional research methods are often used in healthcare, non-traditional methodology utilized personal experiences in cancer treatment facilities to provide empathetic and meaningful solutions.

Location:

All three design thinking workshops were held at the St. John's Education building in downtown Salisbury, NC. This location provided a neutral place where participants would be comfortable expressing their ideas and emotions. The participants and the researcher sat around one large table filled with sticky notes, pens, extra paper, and any other materials necessary to complete the design thinking strategies. Participants were encouraged to relax, drink water, enjoy snacks, and

FIGURE 6. TABLE SET UP FOR WORKSHOPS IN ST. JOHN'S EDUCATION BUILDING

share their experiences and thoughts. The workshops were held on Sunday afternoons while the education building was quiet. Each workshop lasted for approximately two hours.

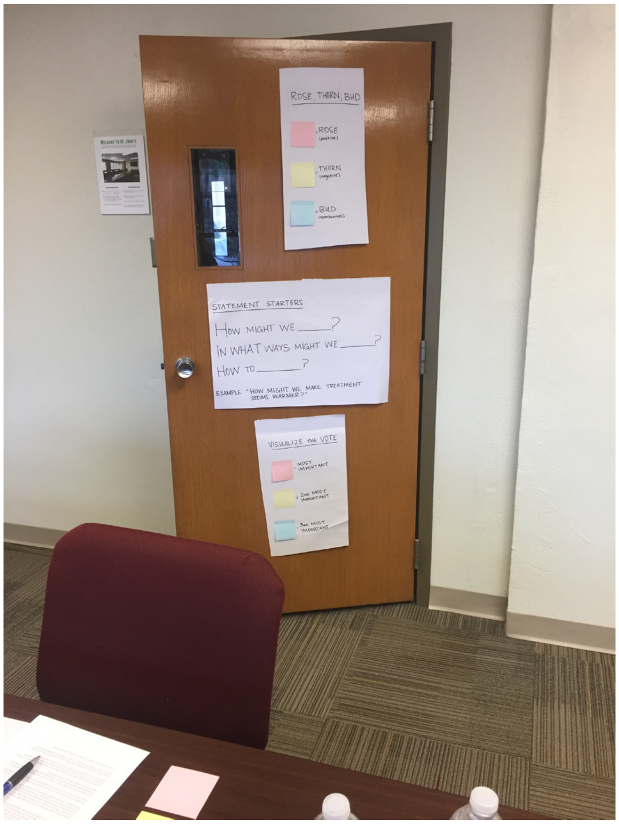


FIGURE 7. POSTERS PROVIDED TO AID PARTICIPANTS THROUGH THE DESIGN THINKING METHODS

Workshop 1:

Five participants were a part of Workshop 1. The participants were informed of the methods that would be completed during the workshop and asked to sign consent forms. Once all participants were comfortable, they each gave a brief background of who they were and what their relationship was with cancer treatment. All five represented different parts of the cancer experience. At the time of the workshop, one had endured a 6-year cancer journey as a caregiver, one had endured a 2.5-year journey as a caregiver, one was a breast cancer survivor who also worked in a cancer treatment facility as a registrar, one currently had metastatic lung cancer, and one currently had breast cancer. The five participants worked together to complete a series of design thinking methods to create a framework for the next two workshops.

Experience Diagramming/Journaling: Two participants completed the experience diagramming/journaling prior to the workshop, one for a chemotherapy treatment and the other for a cancer-related surgery. The participants brought their experience diagrams and journals to share at the workshop. Both participants completed their journaling and experience diagramming using a scale of 1-10 to rank their anxiety with 1 being low anxiety, but not an absence of anxiety, and 10 being full panic. The lowest either participant ranked themselves throughout the visit to a cancer facility was a 3 out of 10. The highest was an 8 out of 10.

The participant who completed the activity for a chemotherapy visit ranged in anxiety levels from 3 out of 10 to 6 out of 10. At the time of treatment, the participant was being treated for a tumor in her lungs. This was the participant's first ever time being treated with chemotherapy. It was also the first treatment of any type they received for her cancer. The participant's anxiety was the lowest, 3 out of 10, as she left her home for the 1.5 hour drive to the treatment center. The highest anxiety experienced

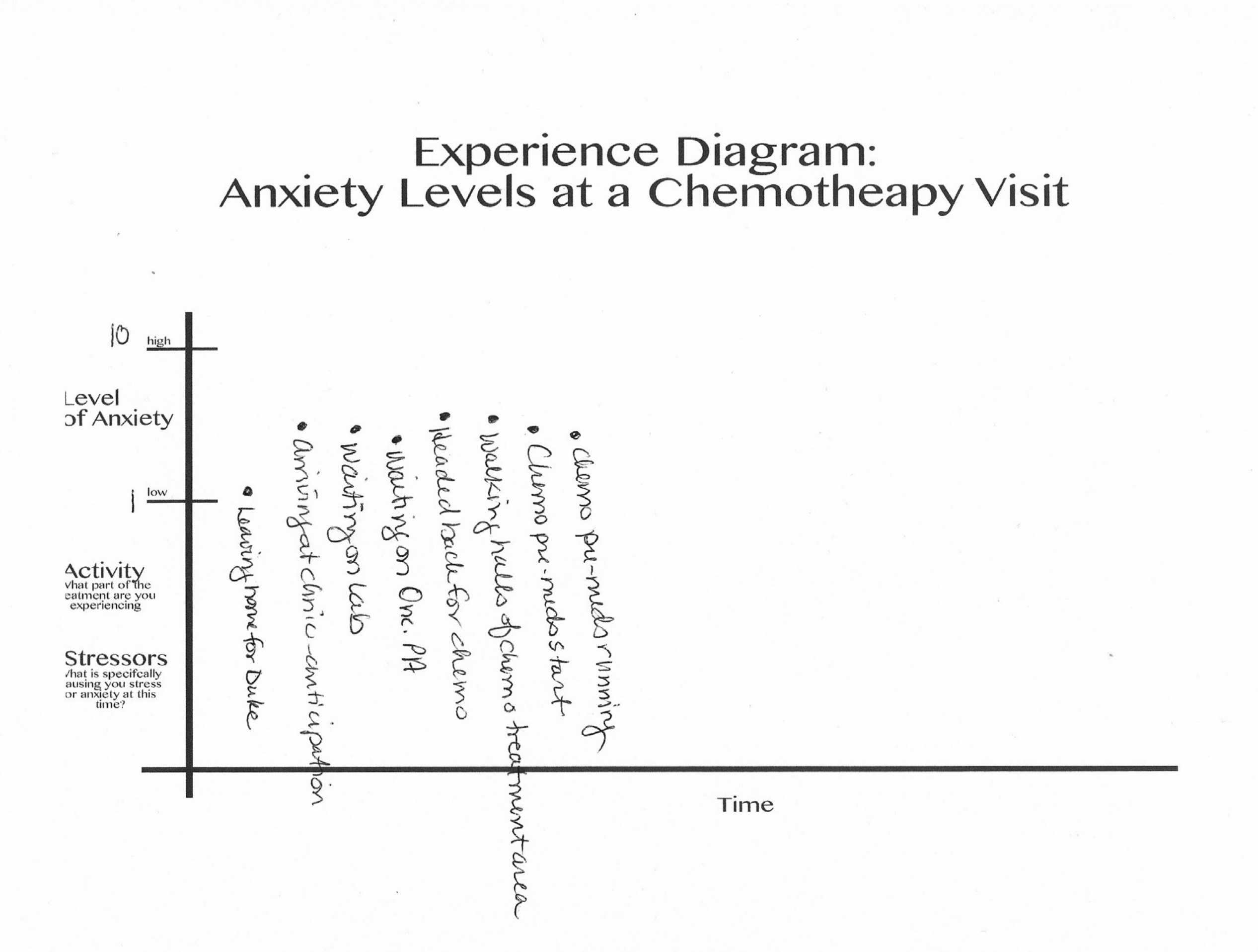


FIGURE 8. PARTICIPANT'S EXPERIENCE DIAGRAM CHARTING ANXIETY LEVELS DURING A CHEMOTHERAPY TREATMENT

was while being escorted to the treatment room. The participant described passing a great number of rooms and being able to see other patients in their rooms, in various states of illness. The participant could see that some patients had beds in their treatment rooms leading her to wonder how long she would be kept for treatment. The participant noted that a physician asked her about her anxiety levels during her treatment. Medication was given to this participant to help sooth her anxiety levels. The participant noted that her spouse and her spirituality helped her cope with her anxiety. Figure 8 shows how the participant diagrammed her chemotherapy visit experience. Figure 9 shows the participant's journal of the experience.

The participant who completed the activity for a cancer-related surgery ranged in anxiety levels from 4 out of 10 to 8 out of 10. The patient previously had two lumpectomies for breast cancer. Both were successful, but did not have 100% clear margins. The participant experienced the greatest amount of anxiety, 8 out of 10, upon hearing the results of the second lumpectomy. The questionable success of the previous two lumpectomies gave the participant a great amount of anxiety. The participant then decided, voluntarily, to have a mastectomy and reconstructive surgery. Upon making this decision the participant experienced the lowest level of anxiety at 4 out of 10. The participant did not experience anxiety above 7 out of 10 during the actual surgery. The participant noted that her spouse and other family members, as well as her spirituality, helped her cope with her anxiety.

We have chosen to treat my lung cancer at Duke which is 1.5 hours from home so my experience begins with getting up very early and getting in the car for a drive. I have a day full of appointments and will have labs drawn first. I am tired as I get up. I have slept well the night before, but there is some anticipation as I get up to get ready to go. I am thankful that my mom is here visiting from out of state and my husband is also off of work to go with me. I have hopeful feelings that I will have successful treatments and as of now, my outlook is positive on my treatment and I am hopeful that the plan in place will cure my cancer.

It is still dark out as we head toward Duke and my anxiety level is at a 3/10 as we head that way. I am sitting in the front seat next to my husband and my mom is in the backseat. I try to rest along the way and close my eyes from time to time. I am helping my husband to navigate so I feel useful. The trip itself is uneventful, but as we arrive my anxiety is 5/10 as we approach the clinic. My husband drops us off at the door and goes to park.

There are so many people. I am surrounded by families and patients as I wait for my beeper to go off for my lab appointment. Anxiety is still around 5/10. I am thankful to be wearing my rally shirt, which is a bright colored shirt with my motto on it: Live in the moment, Hope for the future and Trust in the Lord. I plan to wear it every time I go to Duke.

The lab process is very efficient. The stick for my lab work is hardly painful. The lady phlebotomist has scripture and references to God in her cubicle which I find comforting.

I cannot imagine anyone going through this without Faith in God and Jesus. He has been my companion and comforter over the last month or so. I find solace in my faith.

After lab we head up to the 3rd floor to check in with my oncologist. Though there are many people, they are on time and my wait is short. Anxiety is a little less at 4/10 as we sit and wait on PA to come in to talk with me. I have settled in with the thought that I am where I need to be and this process is meant to HELP me not hurt me. My mom and my husband are in the room with me.

Her visit is short and my labs are fine. Next we head to the 4th floor to check in. I end up standing on the wrong side of the sign to check in and I am quickly corrected. I notice that the people behind the desk are used to checking in so many people that they seem to be a little less patient than some of the others we have encountered. The waiting room is large and full of people. The wait is long as they have "worked me in" this time. Finally I am called back. The girl who escorts us to our room is "business-like" and anxiety is 6/10.

The room they bring me to has large windows and a view of outside. We passed SOOOO many rooms on our way here and I was able to see a few people in those rooms along the way. Some had beds which made me wonder how long those patients are staying since they have beds to lay in. Some look more sick than others and it makes my anxiety remain at 6/10.

There is one larger chair in the room that is more comfortable that is for me. The nurse comes in and warmly greets me and explains the first step will be to place an IV. She gathers her supplies and begins to look at my arms to find a place to stick. She begins by looking at my left arm and I point out the best vein is in my antecubital (AC) area, but is also used often because it is so prominent. She decides to stick first further down my arm. I have been to the OR twice for biopsies and they numbed the area before a stick, but they don't do that here. I was told I wouldn't need a port because my chemo treatments won't be so numerous that it would be necessary. I was also assured I could always GET a port if necessary later down the line. Those thoughts don't comfort me much at this point as she sticks me and misses. She decides to go for the large vein in my AC after all. She gets the IV this time and starts my fluids. She brings me some pills to swallow to help with the side effects that may accompany chemo.

I am settled in and pre-chemo fluids are running. I decide to take a selfie and post on Facebook as I have been sharing a lot about my journey on Facebook. Anxiety is at about 5/10. The room is comfortable and I have asked my mom and husband to let me *lead the tone and noise level in the room. I don't want a bunch of talking or having the TV on as I want to do some breathing to relax and listen to some Christian music.*

After a short period a nurse practitioner comes in to talk with me about how I am doing and ask if I am tolerating all the meds I am taking before my chemo today. They have given me several different meds to take, all in effort to keep me from getting sick from chemo. I have tolerated them well and have taken them as directed. We get to talking about something for anxiety. I have still been able to function, but all of this has raised my anxiety level and I want some other options rather than benzodiazepines to relieve my anxiety. Part way through our conversation my pharmacist comes in and she takes over the conversation. The nurse practitioner leaves to go see someone else. Anxiety is still 5/10 and all this time I am still on my pre-chemo fluids.

I really would like to rest and relax, but there is so much going on. My family is still present with me and my mom is reading a book and David is playing on his Ipad. After the pharmacist leaves, there is a little time for me to rest and listen to a few songs.

The nurse comes back in shortly thereafter and hangs my first chemo. This one runs over only 10 minutes and then they will start the next one. The process for hanging chemo involves the nurse gowning up and having a second nurse verify the dosage and rate at which it will run. This makes me wonder how much this chemo will affect my 5 year old since it is going into my body. They have assured me it is safe to be around him, but with all this gowning it makes me think about it.

I am able to rest a bit before the nurse comes back in to run the second bag of chemo. It goes much like the first bag, but will run over a longer time. We started out at 6:30 this morning and it is now 1:30. We should be done by 3:30 or 4pm which makes for a long day.

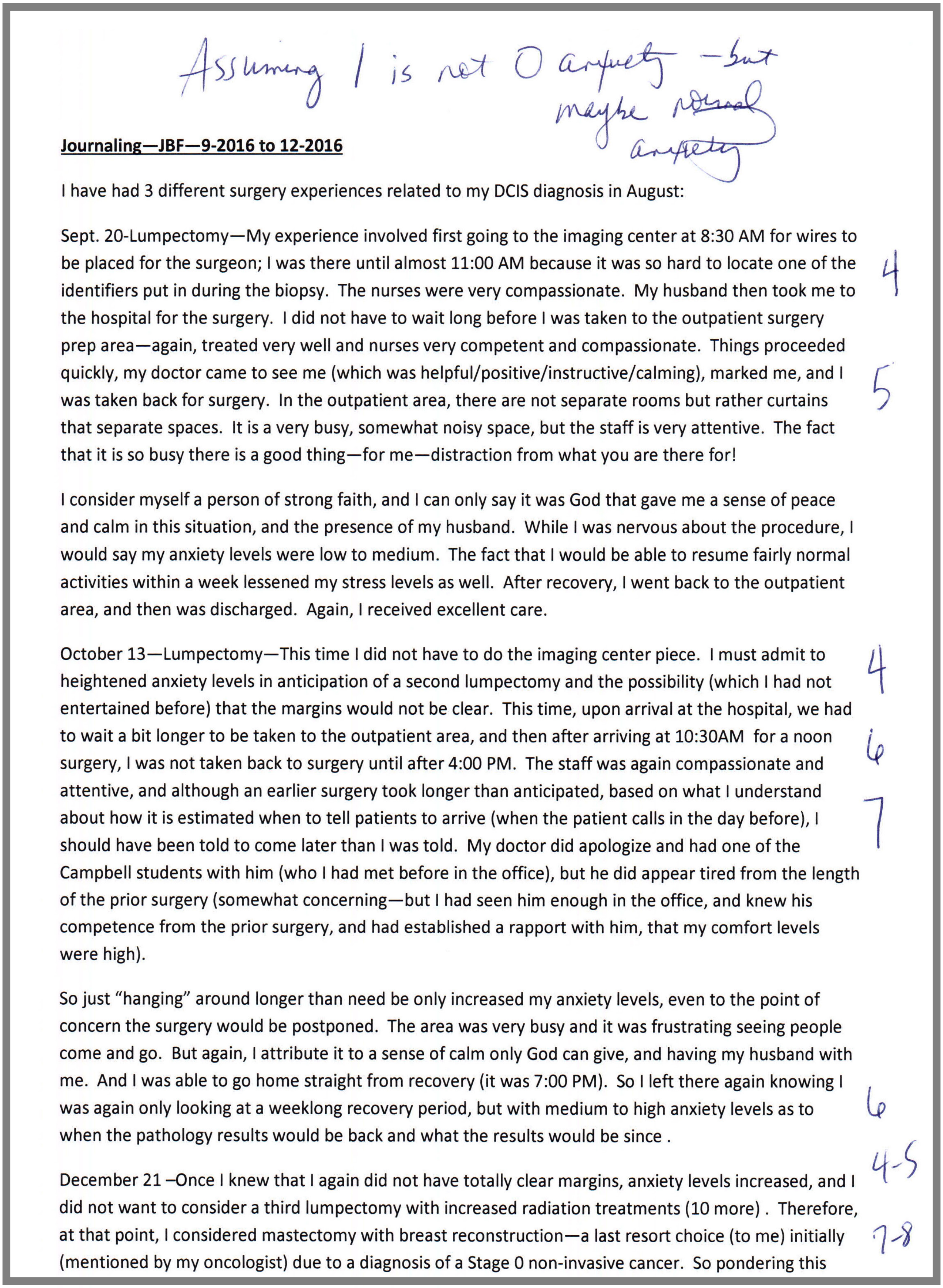
During the second bag of chemo the therapist comes in. He wanted to check on us because I listed my anxiety as high when I met with the PA in the oncology office and it is their practice to offer counseling to those reporting high anxiety. The curtain on the *room closes, but it isn't really private as there are people right across the hall. Also, the nurse is coming in and out and my mom is in the room. I know she would leave if I asked her to, but it isn't the most private place to talk so our conversation isn't very deep or very long.*

Anxiety is still around 5/10 as I haven't had much time to "be still" as I had planned. I know there is much they have to do and conversations that need to take place, but it is nothing like I had planned it to be. I really wanted to have quiet time and relaxation be part of this experience.

After my second bag of chemo comes to an end, there is some post-chemo hydration. She runs the bag really fast and I get the idea they want us to finish so they can have the room for the next patient. The bag finishes and the RN comes in to take out the IV. She tells us we are free to go and wishes me well.

We leave around 4:15 and head home. It is our plan to stop for supper on the way home, but I am tired. It was emotionally tiring and a long day. On the way home I seem to have more difficulty breathing. Not really bad, but the nurse in me wonders if I am overloaded with fluids as they ran a lot in in a short period of time. Then I also wonder if it is more related to anxiety and me being tired. I have much anticipation about how I will do over the next few days. I wonder if I will be sick to my stomach or be able to eat. I will continue to pray that I do well and chemo side effects are minimal. I plan to go back to work on Monday. My more immediate plans are to go home and love on my son and go to bed for some rest.

FIGURE 9. PARTICIPANT'S JOURNAL OF CHEMOTHERAPY TREATMENT



Assuming 1 is not 0 anxiety —but
maybe normal
anxiety

Journaling—JBF—9-2016 to 12-2016

I have had 3 different surgery experiences related to my DCIS diagnosis in August:

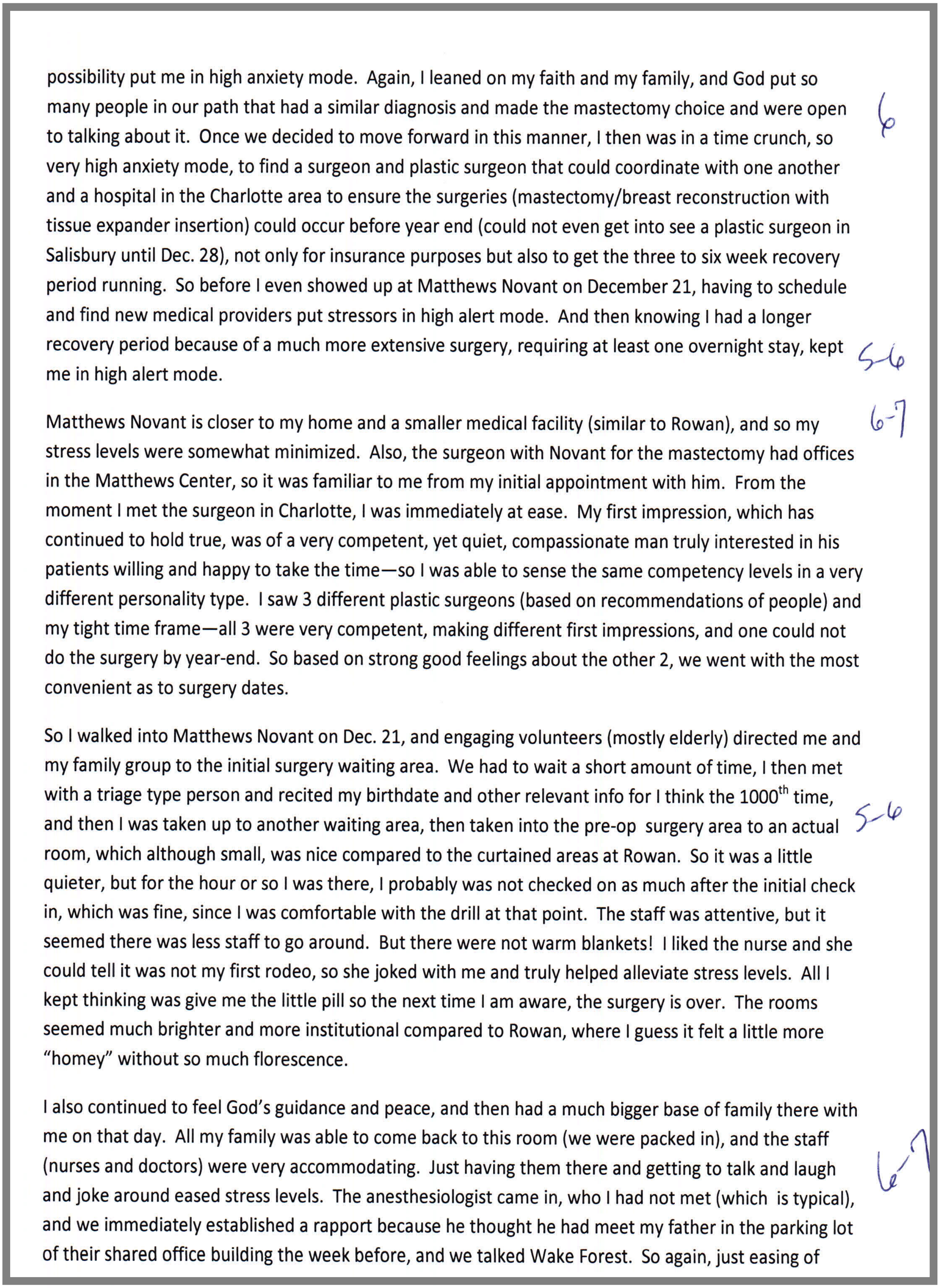
Sept. 20-Lumpectomy—My experience involved first going to the imaging center at 8:30 AM for wires to
be placed for the surgeon; I was there until almost 11:00 AM because it was so hard to locate one of the 4
identifiers put in during the biopsy. The nurses were very compassionate. My husband then took me to
the hospital for the surgery. I did not have to wait long before I was taken to the outpatient surgery
prep area—again, treated very well and nurses very competent and compassionate. Things proceeded
quickly, my doctor came to see me (which was helpful/positive/instructive/calming), marked me, and I 5
was taken back for surgery. In the outpatient area, there are not separate rooms but rather curtains
that separate spaces. It is a very busy, somewhat noisy space, but the staff is very attentive. The fact
that it is so busy there is a good thing—for me—distraction from what you are there for!

I consider myself a person of strong faith, and I can only say it was God that gave me a sense of peace and calm in this situation, and the presence of my husband. While I was nervous about the procedure, I would say my anxiety levels were low to medium. The fact that I would be able to resume fairly normal activities within a week lessened my stress levels as well. After recovery, I went back to the outpatient area, and then was discharged. Again, I received excellent care.

October 13—Lumpectomy—This time I did not have to do the imaging center piece. I must admit to
heightened anxiety levels in anticipation of a second lumpectomy and the possibility (which I had not 4
entertained before) that the margins would not be clear. This time, upon arrival at the hospital, we had
to wait a bit longer to be taken to the outpatient area, and then after arriving at 10:30AM for a noon 6
surgery, I was not taken back to surgery until after 4:00 PM. The staff was again compassionate and
attentive, and although an earlier surgery took longer than anticipated, based on what I understand
about how it is estimated when to tell patients to arrive (when the patient calls in the day before), I 7
should have been told to come later than I was told. My doctor did apologize and had one of the
Campbell students with him (who I had met before in the office), but he did appear tired from the length
of the prior surgery (somewhat concerning—but I had seen him enough in the office, and knew his
competence from the prior surgery, and had established a rapport with him, that my comfort levels
were high).

So just "hanging" around longer than need be only increased my anxiety levels, even to the point of
concern the surgery would be postponed. The area was very busy and it was frustrating seeing people
come and go. But again, I attribute it to a sense of calm only God can give, and having my husband with
me. And I was able to go home straight from recovery (it was 7:00 PM). So I left there again knowing I
was again only looking at a weeklong recovery period, but with medium to high anxiety levels as to 6
when the pathology results would be back and what the results would be since .

December 21 –Once I knew that I again did not have totally clear margins, anxiety levels increased, and I 4-5
did not want to consider a third lumpectomy with increased radiation treatments (10 more) . Therefore,
at that point, I considered mastectomy with breast reconstruction—a last resort choice (to me) initially 7-8
(mentioned by my oncologist) due to a diagnosis of a Stage 0 non-invasive cancer. So pondering this

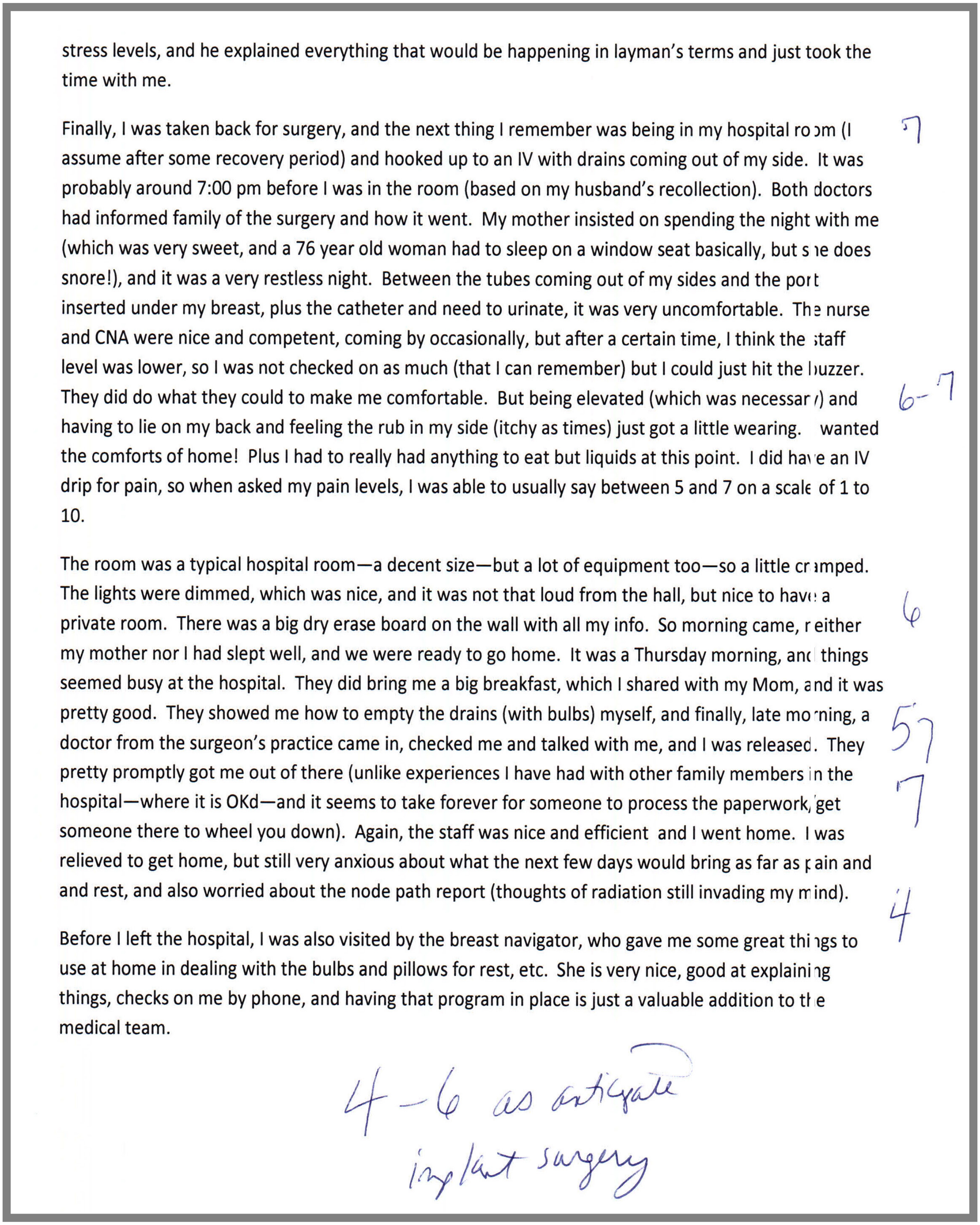


possibility put me in high anxiety mode. Again, I leaned on my faith and my family, and God put so many people in our path that had a similar diagnosis and made the mastectomy choice and were open to talking about it. 6 Once we decided to move forward in this manner, I then was in a time crunch, so very high anxiety mode, to find a surgeon and plastic surgeon that could coordinate with one another and a hospital in the Charlotte area to ensure the surgeries (mastectomy/breast reconstruction with tissue expander insertion) could occur before year end (could not even get into see a plastic surgeon in Salisbury until Dec. 28), not only for insurance purposes but also to get the three to six week recovery period running. So before I even showed up at Matthews Novant on December 21, having to schedule and find new medical providers put stressors in high alert mode. And then knowing I had a longer recovery period because of a much more extensive surgery, requiring at least one overnight stay, kept me in high alert mode. 5-6

Matthews Novant is closer to my home and a smaller medical facility (similar to Rowan), and so my stress levels were somewhat minimized. 6-7 Also, the surgeon with Novant for the mastectomy had offices in the Matthews Center, so it was familiar to me from my initial appointment with him. From the moment I met the surgeon in Charlotte, I was immediately at ease. My first impression, which has continued to hold true, was of a very competent, yet quiet, compassionate man truly interested in his patients willing and happy to take the time—so I was able to sense the same competency levels in a very different personality type. I saw 3 different plastic surgeons (based on recommendations of people) and my tight time frame—all 3 were very competent, making different first impressions, and one could not do the surgery by year-end. So based on strong good feelings about the other 2, we went with the most convenient as to surgery dates.

So I walked into Matthews Novant on Dec. 21, and engaging volunteers (mostly elderly) directed me and my family group to the initial surgery waiting area. We had to wait a short amount of time, I then met with a triage type person and recited my birthdate and other relevant info for I think the 1000th time, and then I was taken up to another waiting area, then taken into the pre-op surgery area to an actual room, which although small, was nice compared to the curtained areas at Rowan. 5-6 So it was a little quieter, but for the hour or so I was there, I probably was not checked on as much after the initial check in, which was fine, since I was comfortable with the drill at that point. The staff was attentive, but it seemed there was less staff to go around. But there were not warm blankets! I liked the nurse and she could tell it was not my first rodeo, so she joked with me and truly helped alleviate stress levels. All I kept thinking was give me the little pill so the next time I am aware, the surgery is over. The rooms seemed much brighter and more institutional compared to Rowan, where I guess it felt a little more "homey" without so much florescence.

I also continued to feel God's guidance and peace, and then had a much bigger base of family there with me on that day. All my family was able to come back to this room (we were packed in), and the staff (nurses and doctors) were very accommodating. 6-7 Just having them there and getting to talk and laugh and joke around eased stress levels. The anesthesiologist came in, who I had not met (which is typical), and we immediately established a rapport because he thought he had meet my father in the parking lot of their shared office building the week before, and we talked Wake Forest. So again, just easing of



stress levels, and he explained everything that would be happening in layman's terms and just took the
time with me.

Finally, I was taken back for surgery, and the next thing I remember was being in my hospital room (I 7
assume after some recovery period) and hooked up to an IV with drains coming out of my side. It was
probably around 7:00 pm before I was in the room (based on my husband's recollection). Both doctors
had informed family of the surgery and how it went. My mother insisted on spending the night with me
(which was very sweet, and a 76 year old woman had to sleep on a window seat basically, but she does
snore!), and it was a very restless night. Between the tubes coming out of my sides and the port
inserted under my breast, plus the catheter and need to urinate, it was very uncomfortable. The nurse
and CNA were nice and competent, coming by occasionally, but after a certain time, I think the staff
level was lower, so I was not checked on as much (that I can remember) but I could just hit the buzzer.
They did do what they could to make me comfortable. But being elevated (which was necessary) and 6-7
having to lie on my back and feeling the rub in my side (itchy as times) just got a little wearing. I wanted
the comforts of home! Plus I had to really had anything to eat but liquids at this point. I did have an IV
drip for pain, so when asked my pain levels, I was able to usually say between 5 and 7 on a scale of 1 to
10.

The room was a typical hospital room—a decent size—but a lot of equipment too—so a little cramped.
The lights were dimmed, which was nice, and it was not that loud from the hall, but nice to have a 6
private room. There was a big dry erase board on the wall with all my info. So morning came, neither
my mother nor I had slept well, and we were ready to go home. It was a Thursday morning, and things
seemed busy at the hospital. They did bring me a big breakfast, which I shared with my Mom, and it was
pretty good. They showed me how to empty the drains (with bulbs) myself, and finally, late morning, a 57
doctor from the surgeon's practice came in, checked me and talked with me, and I was released. They
pretty promptly got me out of there (unlike experiences I have had with other family members in the
hospital—where it is OKd—and it seems to take forever for someone to process the paperwork, get 7
someone there to wheel you down). Again, the staff was nice and efficient and I went home. I was
relieved to get home, but still very anxious about what the next few days would bring as far as pain and
and rest, and also worried about the node path report (thoughts of radiation still invading my mind). 4

Before I left the hospital, I was also visited by the breast navigator, who gave me some great things to
use at home in dealing with the bulbs and pillows for rest, etc. She is very nice, good at explaining
things, checks on me by phone, and having that program in place is just a valuable addition to the
medical team.

4-6 as anticipate
implant surgery

FIGURE 10. PARTICIPANT'S JOURNAL OF A CANCER-RELATED SURGERY EXPERIENCE

FIGURE 11. PARTICIPANT'S PHOTOS OF FACILITIES VISITED THROUGHOUT THE TREATMENT PROCESS

Rose, Thorn, Bud:

Utilizing information from the journaling/experience diagramming presentation, as well as information from their own personal experiences, the participants completed the Rose, Thorn, Bud activity.

Rose (positive): Driving to and from facility (allowed time for you to collect your thoughts and talk to your spouse or family member); warm blankets (provide warmth and comfort; but also feel like a “warm hug”); homey waiting areas (makes the patient and family feel comfortable; like they are in someone’s home rather than a waiting room); new facilities are warmer and brighter (natural light is more comfortable and windows with sunlight provide a chance to warm up against the air conditioning, older facilities have all fluorescent institutional lighting); patient navigator (explain processes and expectations for certain appointments and treatments, helps you know what to expect instead of going in blind); personal items (photos, blankets, encouraging t-shirts from friends make the space your own); flowers from doctor (one participant received flowers from her doctor after surgery making her feel hopeful and remembered rather than as another surgery on his list); program for children to understand and learn about cancer (One participant had three young children between the ages of 1 and 9 at the time of her diagnosis. The facility offered a program by trained professionals to help children understand, discuss and meet other children whose parents have cancer.); friendly and concerned staff (nice people make things more comfortable); ease of facility navigation (signage and way finding techniques make some facilities easy to navigate); parking (smaller facilities have parking right out front that does not require much walking or coordination).

Thorn (negative): No valet parking (Large hospitals that do not offer valet make it difficult for patients to get into the facility if they are unable to walk long distances. The best solution is for their family member to leave them standing alone while going through the parking process.), lengthy travel time (excessive travel can bring exhaustion and extra stress), drive time constraints (if appointments are first thing in the morning you have to leave very early and often sit in rush hour traffic), smell (hospitals have odd smells and chemotherapy patients often have a sensitivity to certain smells), older facility felt institutionalized (fluorescent lighting and other old hospital elements make the facility seem institutionalized), small waiting room was overwhelming (small waiting rooms make you feel trapped, especially if there are a lot of people), social media (some people like to post things about your cancer journey on social media without permission), uncompassionate nurses (unkind and impatient nurses make the experience more stressful), learning results of tests (it often takes a long time to hear test results, sometimes days, waiting for these results, especially if they are bad, bring a great deal of anxiety), wait time (you arrive to wait, have one thing done, then wait more, move somewhere else, wait more), parking (parking can be challenging at a larger facility, especially if the patient is too tired or unable to walk from a parking garage), travel within the facility (patients are constantly moving within the facility, it would be nice to eliminate some of this travel), cost estimates (it would be helpful to have some cost estimate of treatments before they take place, rather than having sticker shock after the fact).

Bud (opportunities): Driving (driving can be a positive or a negative, there is potential for innovation), décor, inspirational quotes and bright colors (facilities could be made more personal, uplifting and encouraging), having personal mementos (patients could be encouraged to bring personal belongings with them, or hospitals could use technology to bring personalization to the room), access to wheelchairs (sometimes patients cannot walk to all of the various hospital locations, it would be easier to transport them if wheelchairs were readily available), waiting room (the waiting room can be seen as a negative due to long wait times, but this is a place that could be utilized to promote comfort), lighting (working with different types of lighting could promote happiness), patients have heightened senses (many chemotherapy patients have heightened senses and sensitivities, this could be used to the advantage of the patient by exposing them to smells that make them comfortable), Caring Bridge or other patient centered blogs and social media (some people enjoy sharing their story, using these platforms can help patients connect with their friends and family and share their news and updates), nurses share faith and experiences with patients (many oncology nurses have had cancer themselves and many nurses have their own spirituality that could be shared with patients if they wish), knowing the journey of others within the space (efforts could be made for patients who choose to share their story with others they meet within the facility in order to create a community), seeing others laugh (one participant noted that when she went in for her first chemotherapy treatment she saw a woman with no hair [due to chemotherapy] laughing with her husband during the infusion, this gave her the courage to embrace happiness through her infusion), conversations about the anxiety being experienced (if nurses, doctors, other patients and family members are willing to discuss the anxiety and distress that the patient is experiencing, it could help resolve it or make it easier to gain tools to help curb it), maintaining a positive attitude (people working within the facility can help promote a positive attitude by sharing positivity and being kind), spirituality if desired (many cancer patients are spiritual and sharing this spirituality [if desired] can help with healing), social workers (to talk to patient, children and family and help them find ways to ease the burdens that cancer brings), better estimation of time (don’t have people show up at 7:30 a.m. just to wait and wait), financial counseling (provide counseling on how to handle medical bills, which bills to pay first, etc.).

Affinity Clustering: The participants utilized the information generated during Rose, Thorn, Bud to inform their affinity clusters. They created four clusters: Travel, Logistics, Facility, and Emotional Well-being. See Figure 12.

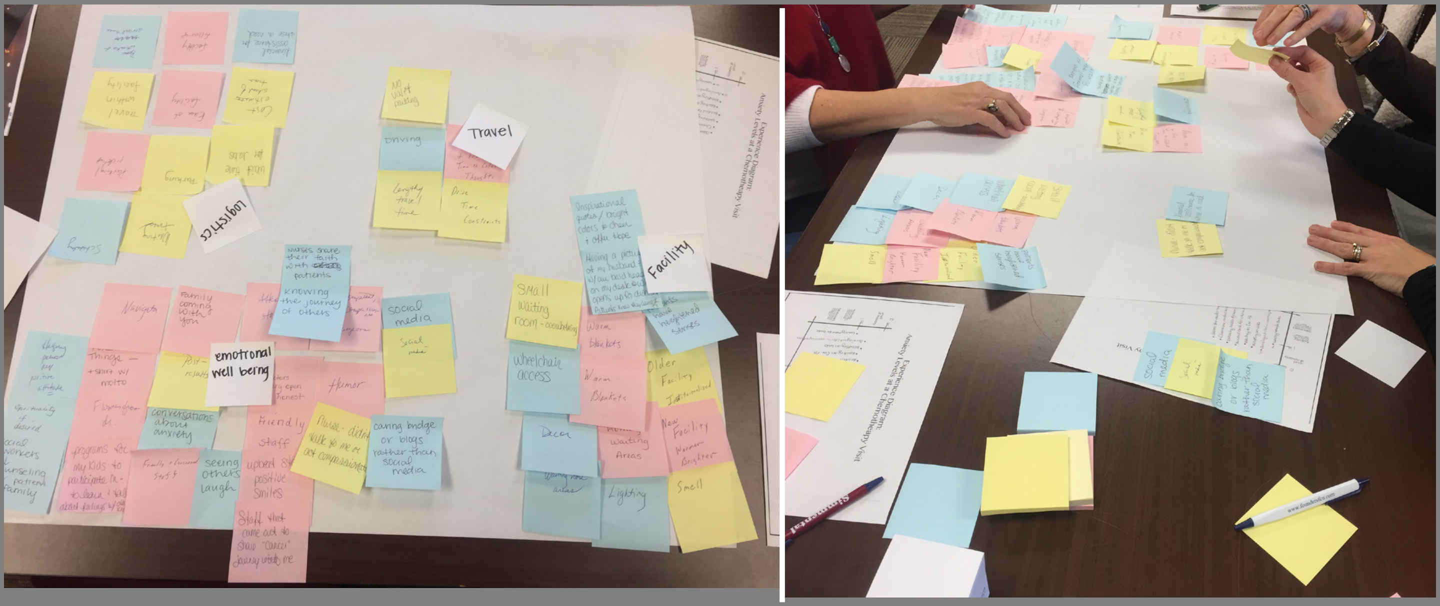


FIGURE 12. PARTICIPANTS COMPLETING THE AFFINITY CLUSTER METHOD

Sentence Starters: Once the clusters were established, participants used sentence starters to create problem statements that could eventually be furthered into solutions. Their problem statements included:

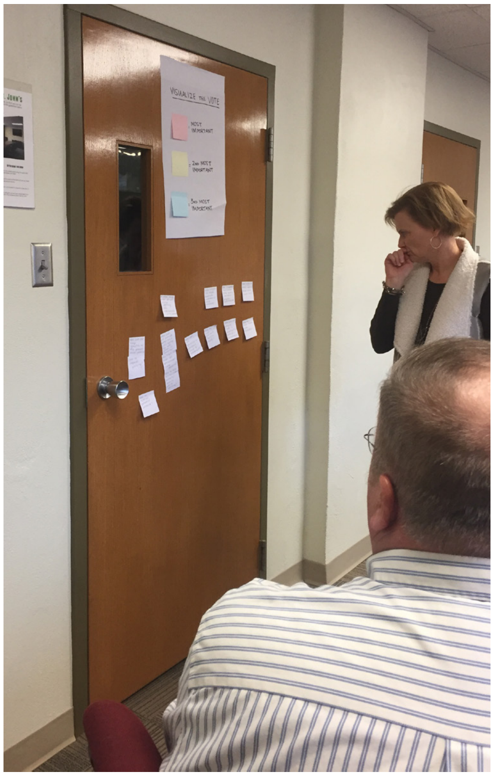


FIGURE 13. PARTICIPANTS COMPLETING THE STATEMENT STARTERS METHOD

How can we optimize a patients' time and movements within the facility?

How can we promote emotional well-being for all when in the facility?

How might we make the environment more personal?

How can we help comfort/entertain patients and family?

How do we increase personal contact while ensuring the staff is compassionate and empathetic?

How might we make educational materials and tools such as wheelchairs more readily available within the facility to help patients?

How might we make the facility more home-like, less institutionalized and better suited to patients' sensory needs?

Visualize the Vote: The participants further grouped the statement starters before voting on which were the most important to advance to solutions. The four groups were:

1. How can we optimize a patient's time and movements within the facility?
2. How can we promote emotional well-being for all when in the facility?

How might we make the environment more personal?

How to help comfort/entertain patients and family?

How do we increase personal contact while ensuring the staff is compassionate and empathetic?

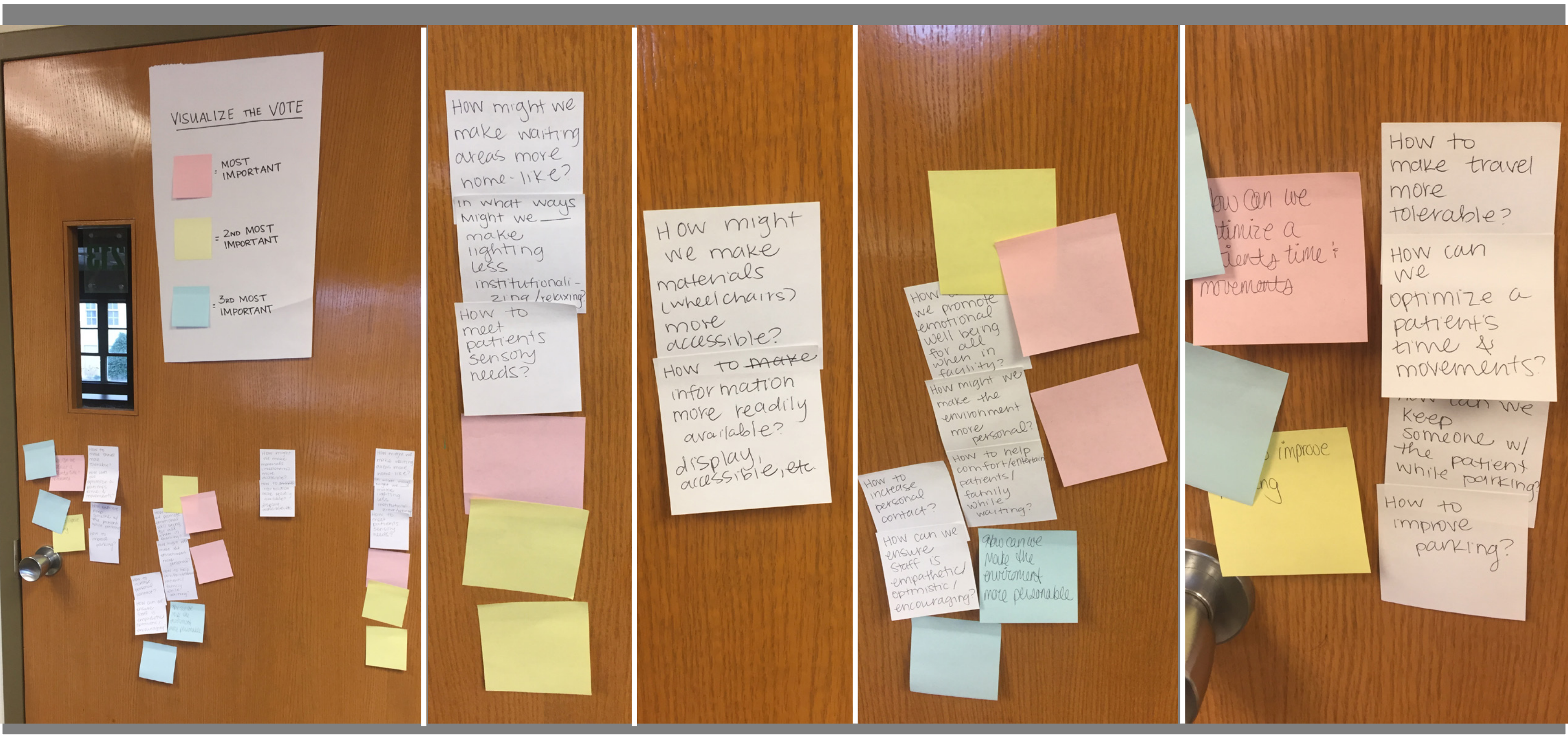


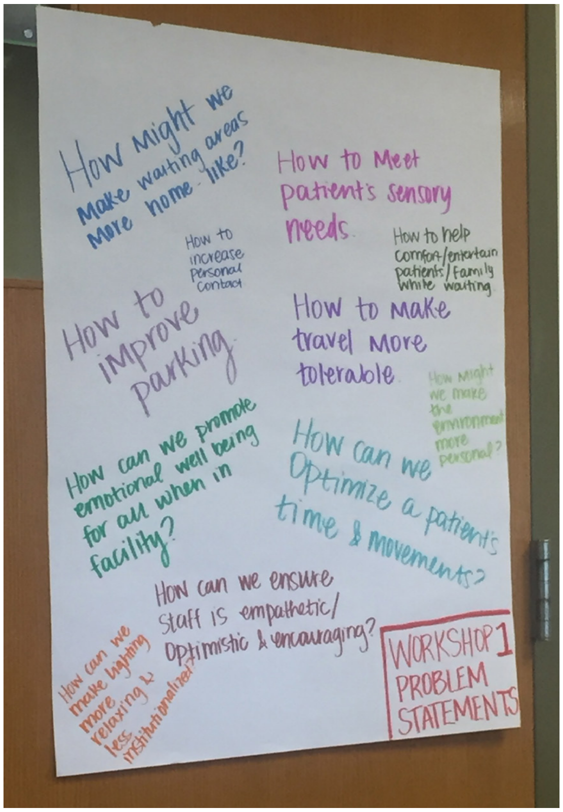
FIGURE 14. VISUALIZE THE VOTE METHOD BEING USED TO VOTE ON THE STATEMENT STARTER THAT SHOULD BE ADVANCED

3. How might we make educational materials and tools such as wheelchairs more readily available within the facility to help patients?
4. How might we make the facility more home like, less institutionalized and bet ter suited to patient's sensory needs.

The partcipants selected the first statement starter to advance into Workshop 2; How can we optimize a patient's time and movement within the facility?

Discussion: Workshop 1 provided informative insight into what truly mattered to the participants. Design thinking is allowing healthcare to create services that better meet the needs and desires of the end users (Brown 2008); yet there is little research on patients' perceptions of healthcare built environments specifically, the things they consider to be most important to their health and well-being (Douglas & Douglas, 2005). The idea of mental health was introduced immediately during the experience diagram and journaling presentations. Participants explained that they were aware of the emotions that they were experiencing and they were able to pinpoint several reasons why, waiting times, impatient staff, wondering if treatment will work, and seeing other sick patients. Research shows that such psychological stress impairs patients from healing (Dijkstra et al., 2008). Carlson and Bultz (2003) found that at this time the main anxiety reducing techniques are in the form of psychosocial interventions, including education about the disease, relaxation and stress management training, group support therapy, and individual support therapy (as cited in Mullaney et al., 2012). These methods give patients tools to manage their anxiety once it occurs, but does little to impact the triggers of their anxiety (Mullaney et al., 2012). While the participants found that emotional health was a main issue with cancer treatment facilities, they also noted that the facility itself helped to induce the stress and anxiety. Along with emotional well-being, the participants generated a list of attributes associated with the facility that revealed patterns of travel, logistics, and facility. More specifically, they focused on the lack of convenience for patients.

Mullaney et al. (2012) states, “It is important to study the emotional aspects of [cancer] treatment and the impacts the built environment can have upon patient well-being,” (p. 27). Cancer treatment facilities should be inviting and convenient for all patients and their families. The participants in Workshop 1 concluded their work by selecting the major question that framed the future workshops and the research as a whole: “How can we optimize a patient’s time and movements within a facility?” Healthcare facilities have traditionally been built with a functional delivery of care in mind (Dijkstra et al., 2008), rather than the needs of the patient.



How Might we Make waiting areas More home-like?

How to Meet patient's sensory needs.

How to increase Personal Contact

How to help comfort/entertain patients/Family while waiting

How to improve parking.

How to Make travel More tolerable.

How Might we make the environment more personal?

How can we promote emotional well being for all when in facility?

How can we Optimize a patient's time & movements?

How can we ensure Staff is empathetic/ Optimistic & encouraging?

How can we make lighting more relaxing & less institutionalized?

WORKSHOP 1
PROBLEM
STATEMENTS

FIGURE 15. WORKSHOP 1 SYNOPSIS POSTER PROVIDED TO PARTICIPANTS IN WORKSHOP 2

Workshop 2:

Four participants were a part of Workshop 2. The participants were informed of the methods that would be completed during the workshop and asked to sign consent forms. Once all participants were comfortable, they each gave a brief background of who they were and what their relationship was with cancer treatment. All four represented different parts of the cancer experience. At the time of the workshop, one had endured a 22-year cancer journey as a caregiver, one had endured a 2.5-year cancer journey as a caregiver, one was a healthcare provider, and one was a stage 4 colon cancer survivor. The researcher gave the group a synopsis of Workshop 1, as seen in Figure 15, and explained how this would inform Workshop 2.

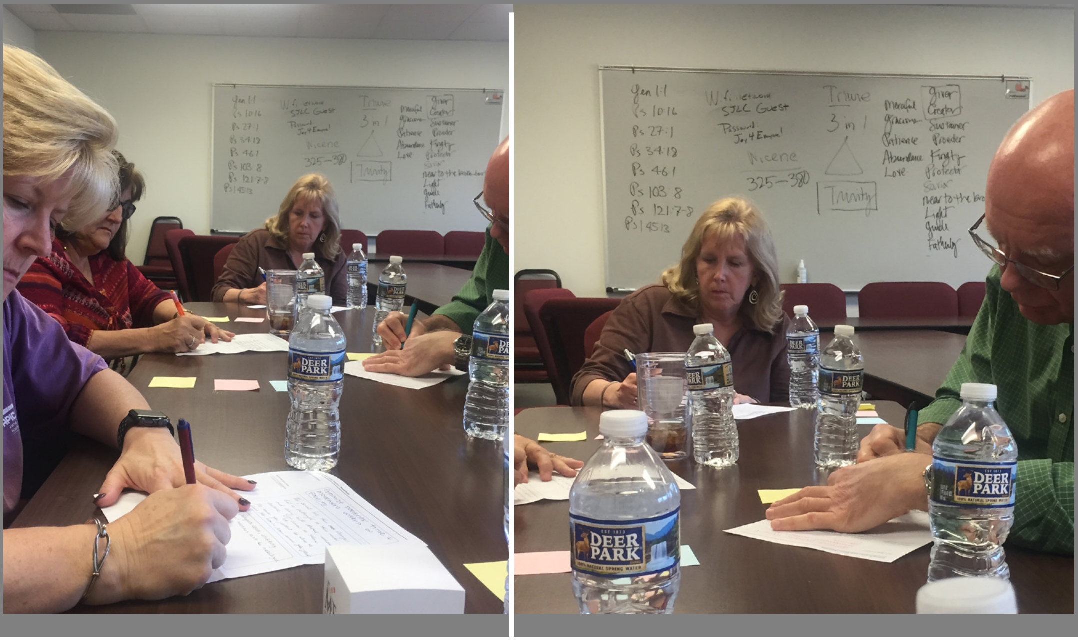


FIGURE 16. PARTICIPANTS COMPLETING THE ROUND ROBIN METHOD

Round Robin: Each participant was given a Round Robin template with the problem statement voted most worthy of exploration at Workshop 1.

Problem Statement: *Optimize patients' time and movement within a facility.*

Once this template was in front of the participants, the researcher gave them three minutes to write down an unconventional idea for solving the problem. Once complete, the participants were instructed to pass their template to the person on their right. The participants were given three minutes to write why the idea on the template in front of them would fail. Once three minutes were up, the participants passed their templates to the right once more. The participants were then given three minutes to take all the information on the template in front of them and create a final concept incorporating all of the previous information.

Each of the four participants generated ideas that were similar to one another. They each involved the patient remaining in one place for the duration of the visit. This would eliminate and optimize the constant movement of the patient from place to place within the facility. The patient would no longer be the moving part, but instead the treatment and providers would move around them.

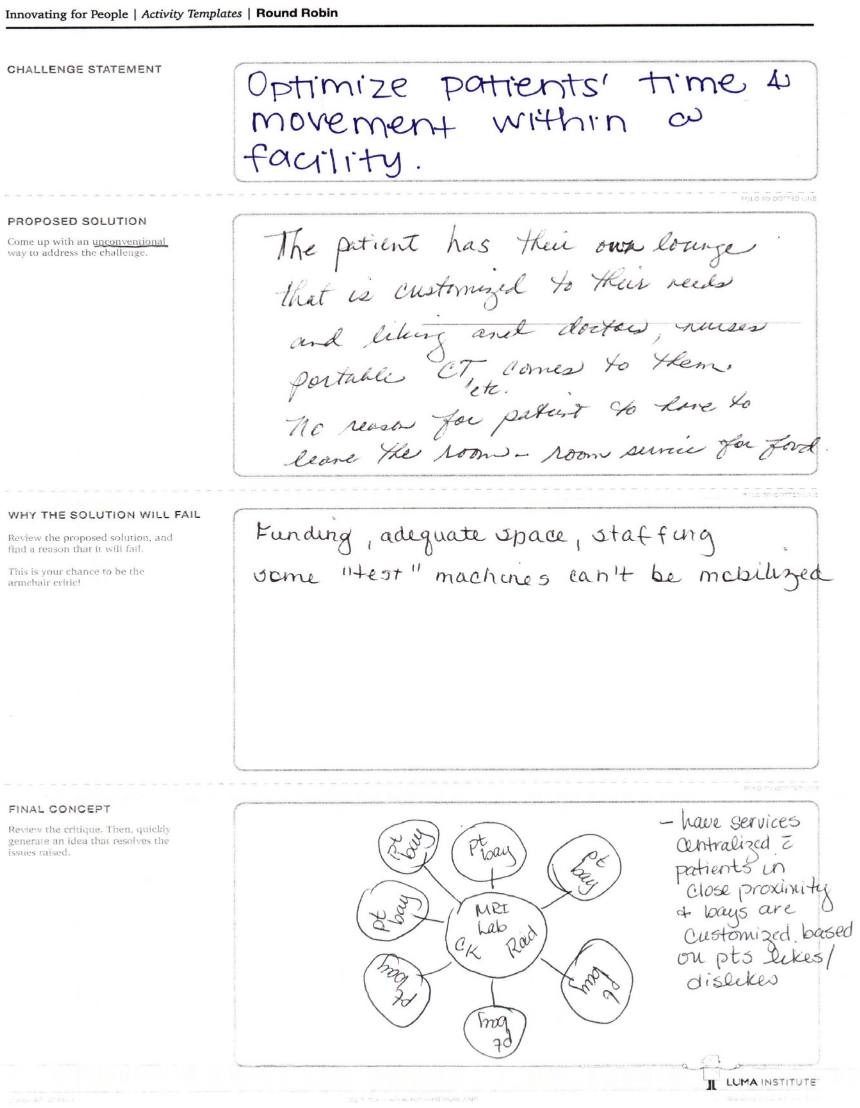
Template 1 (Figure 17):

Challenge Statement: Optimize patients' time and movement within a facility.

Proposed Solution: The patient had their own lounge that is customized to their needs and liking and doctors, nurses, portable CT, etc. comes to them. No reason for patient to have to leave the room – room service for food.

Why the solution will fail: Funding, adequate space, staffing, some test machines can't be mobilized.

Final Concept: Patient bays with centralized services so patients in close proximity and bays are customized based on patients' likes and dislikes.



Innovating for People | *Activity Templates* | **Round Robin**

CHALLENGE STATEMENT

Optimize patients' time & movement within a facility.

PROPOSED SOLUTION

Come up with an unconventional way to address the challenge.

The patient has their own lounge that is customized to their needs and liking and doctors, nurses portable CT, etc. comes to them. No reason for patient to have to leave the room – room service for food.

WHY THE SOLUTION WILL FAIL

Review the proposed solution, and find a reason that it will fail.

This is your chance to be the armchair critic!

Funding, adequate space, staffing some "test" machines can't be mobilized

FINAL CONCEPT

Review the critique. Then, quickly generate an idea that resolves the issues raised.

- have services centralized c̄ patients in close proximity & bays are customized based on pts likes/ dislikes

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FIGURE 17. ROUND ROBIN TEMPLATE 1

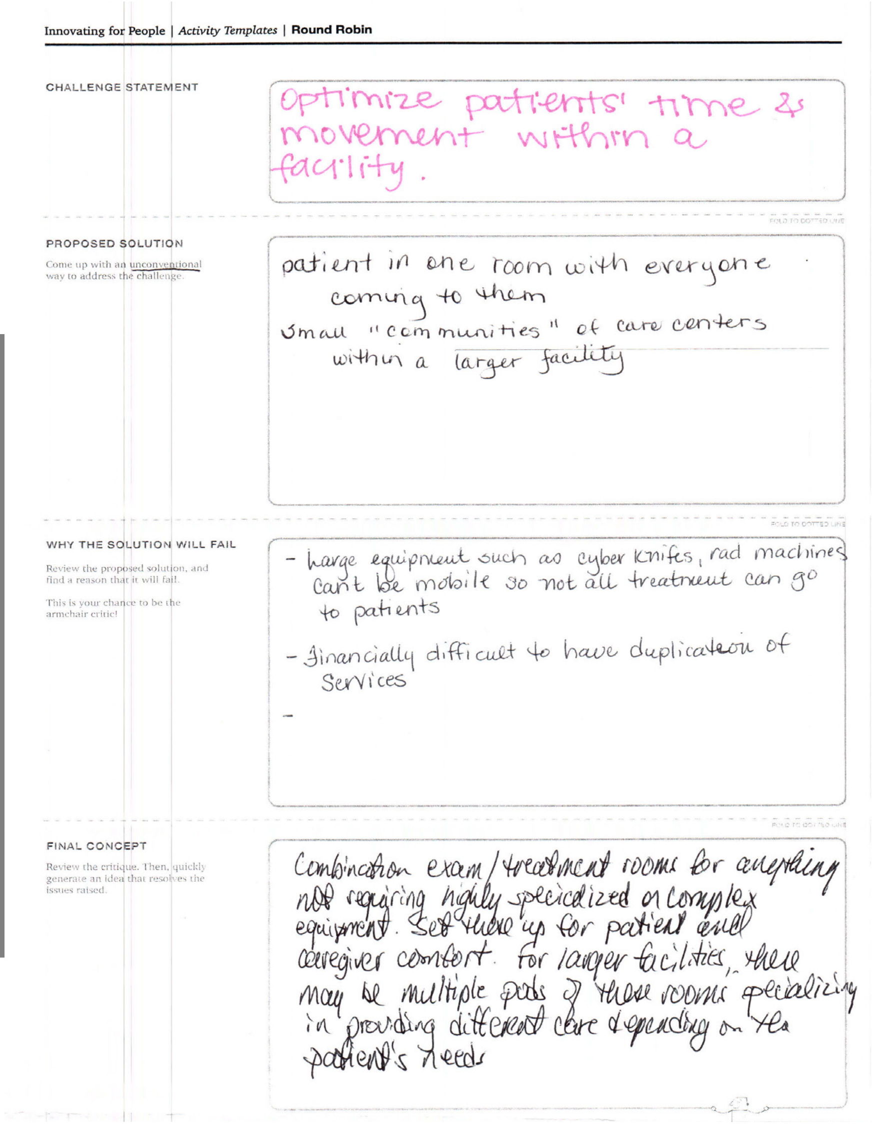
Template 2 (Figure 18):

Challenge Statement: Optimize patients’ time and movement within a facility.

Proposed Solution: Patient in one room with everyone coming to them; small communities of care centers within a larger facility.

Why the solution will fail: Large equipment such as cyber knifes, rad machines can’t be mobile, so not all treatment can go to patients; financially difficult to have duplicate services.

Final Concept: Combination exam/treatment rooms for anything not requiring highly specialized or complex equipment. Set these up for patient and caregiver comfort. For larger facilities there may be multiple pods of these rooms specializing in providing different care depending on the patients’ needs.



Innovating for People | *Activity Templates* | **Round Robin**

CHALLENGE STATEMENT	Optimize patients' time & movement within a facility.
PROPOSED SOLUTION Come up with an unconventional way to address the challenge.	patient in one room with everyone coming to them small "communities" of care centers within a larger facility
WHY THE SOLUTION WILL FAIL Review the proposed solution, and find a reason that it will fail. This is your chance to be the armchair critic!	- Large equipment such as cyber knifes, rad machines can't be mobile so not all treatment can go to patients - financially difficult to have duplicateon of Services -
FINAL CONCEPT Review the critique. Then, quickly generate an idea that resolves the issues raised.	Combination exam/treatment rooms for anything not requiring highly specialized or complex equipment. Set these up for patient and caregiver comfort. For larger facilities, there may be multiple pods of these rooms specializing in providing different care depending on the patient's needs

FOLD TO DOTTED LINE

FIGURE 18.
ROUND ROBIN
TEMPLATE 2

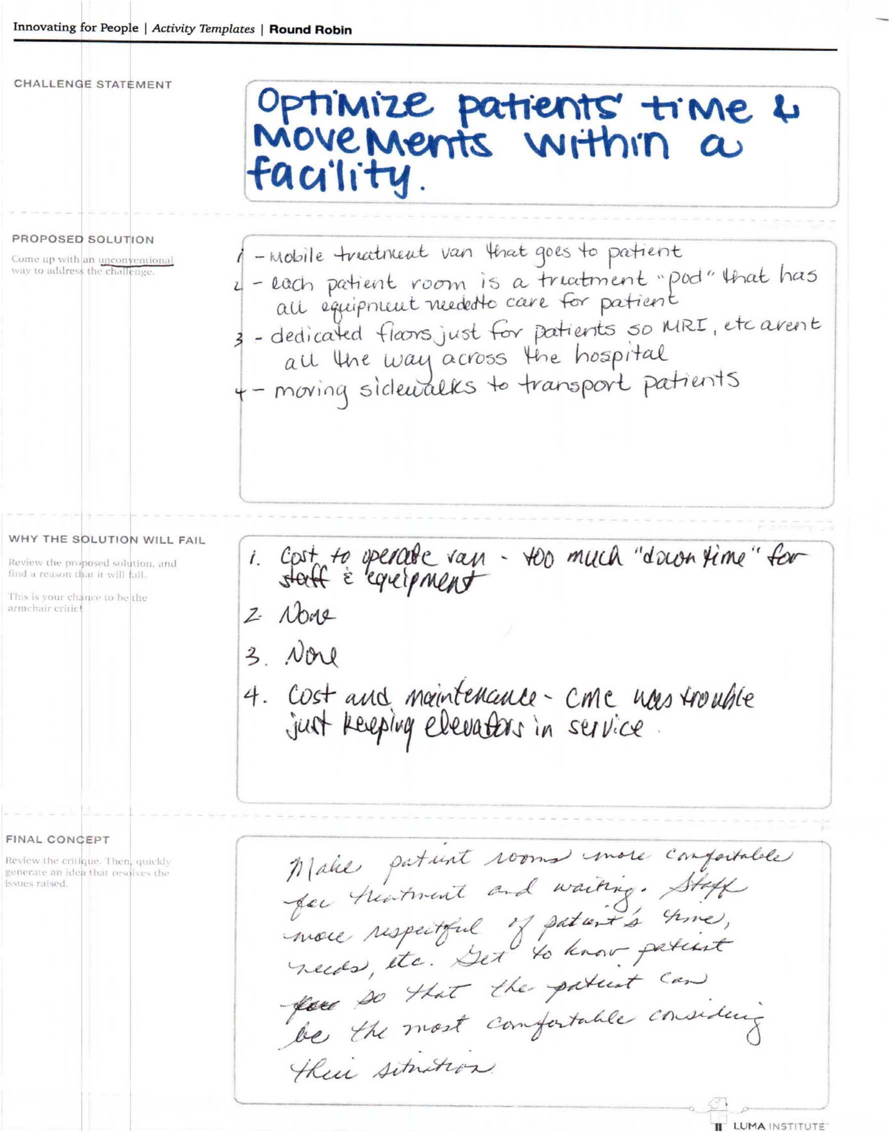
Template 3 (Figure 19):

Challenge Statement: Optimize patients’ time and movement within a facility.

Proposed Solution: Mobile treatment unit that goes to patient; each patient room is a treatment pod that has all equipment needed to care for patient; dedicate floors just for patients so MRI, etc. aren’t all the way across the hospital, moving sidewalks to transport patients.

Why the solution will fail: Cost to operate van; too much downtime for staff and equipment, cost and maintenance – Carolina’s Medical Center has trouble just keeping elevators in service

Final Concept: Make patient rooms more comfortable for treatment and waiting. Staff more respectful of patients’ time, needs, etc. Get to know patient so that the patient can be the most comfortable considering their situation.



Innovating for People | *Activity Templates* | **Round Robin**

CHALLENGE STATEMENT

Optimize patients' time & Movements within a facility.

PROPOSED SOLUTION

Come up with an unconventional way to address the challenge.

1 - Mobile treatment van that goes to patient
2 - each patient room is a treatment "pod" that has all equipment neededto care for patient
3 - dedicated floors just for patients so MRI, etc arent all the way across the hospital
4 - moving sidewalks to transport patients

WHY THE SOLUTION WILL FAIL

Review the proposed solution, and find a reason that it will fail.

This is your chance to be the armchair critic!

1. Cost to operate van - too much "down time" for staff c̄ equipment
2. None
3. None
4. Cost and maintenance - CMC was trouble just keeping elevators in service.

FINAL CONCEPT

Review the critique. Then, quickly generate an idea that resolves the issues raised.

Make patient rooms more comfortable for treatment and waiting. Staff more respectful of patient's time, needs, etc. Get to know patient ~~face~~ so that the patient can be the most comfortable considering their situation

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FIGURE 19.
ROUND ROBIN
TEMPLATE 3

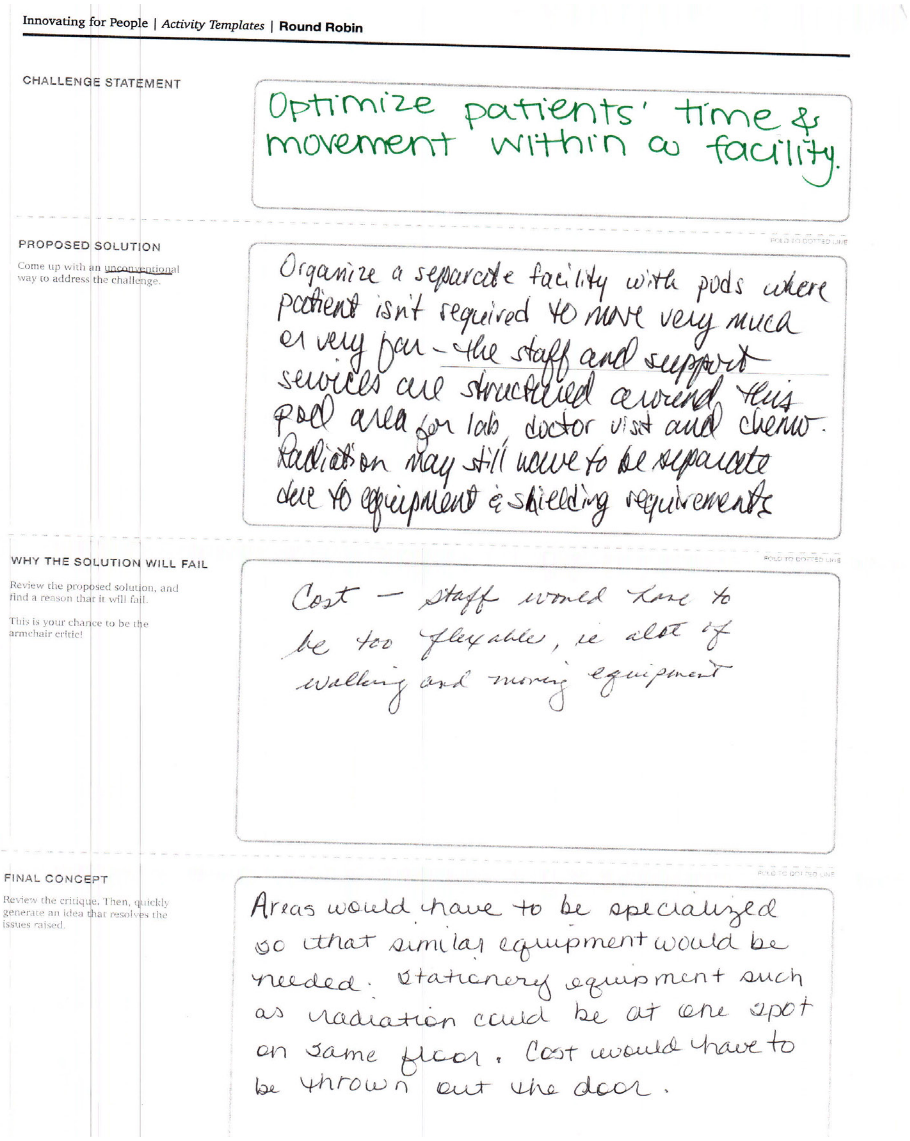
Template 4 (Figure 20):

Challenge Statement: Optimize patients' time and movement within a facility.

Proposed Solution: Organize a separate facility with pods where patient isn't required to move very much or very far – the staff and support services are structured around this pod area for lab, doctor visit and chemo. Radiation may still have to be separate due to equipment and shielding requirements.

Why the solution will fail: Cost – staff would have to be too flexible, i.e., a lot of walking and moving equipment.

Final Concept: Areas would have to be specialized so that similar equipment would be needed; stationary equipment such as radiation could be at one spot on the same floor; cost would have to be thrown out the door.



Innovating for People | *Activity Templates* | **Round Robin**

CHALLENGE STATEMENT

Optimize patients' time & movement within a facility.

FOLD TO DOTTED LINE

PROPOSED SOLUTION

Come up with an unconventional way to address the challenge.

Organize a separate facility with pods where patient isn't required to move very much or very far - the staff and support services are structured around this pod area for lab, doctor visit and chemo. Radiation may still have to be separate due to equipment & shielding requirements

FOLD TO DOTTED LINE

WHY THE SOLUTION WILL FAIL

Review the proposed solution, and find a reason that it will fail.

This is your chance to be the armchair critic!

Cost — staff would have to be too flexable, ie alot of walking and moving equipment

FOLD TO DOTTED LINE

FINAL CONCEPT

Review the critique. Then, quickly generate an idea that resolves the issues raised.

Areas would have to be specialized so that similar equipment would be needed. Stationery equipment such as radiation could be at one spot on same floor. Cost would have to be thrown out the door.

FIGURE 20.
ROUND ROBIN
TEMPLATE 4

Visualize the Vote: Since the four ideas generated during Round Robin were so similar to one another, participants had an easy time deciding which solution they would select. Template 1 received all four of the participants' first place votes. Template 2 received three of four second place votes. Template 3 received one of four second place votes. Template 4 received no votes.

Concept Poster: The four participants worked together to create a Concept Poster, seen in Figure 22, which further explored the idea selected in Visualize the Vote. They titled their concept "Patient Treatment Pod (PTP)." They used short phrases and drawings to further develop their idea. An overview drawing of their concept shows a centralized location at the center of each treatment floor that contains one or more of each of the major tests and scans completed on cancer patients, as well as a laboratory and pharmacy. Surrounding the centralized treatment locations are patient rooms where a patient goes for the duration of their visit. Blood work, infusions, and doctor visits take place within this room, allowing the patient to remain still. If the patient does need to leave the room for scans or specialized treatment, a transport team will come take them to the treatment by wheelchair, preventing them from making multiple trips down long hallways.

Patient Treatment Pod (PTP):

- The patient is no longer the moving part
- Scalable up and down, in and out, and by needs
- Can have a floor specifically for infusions

Key ideas:

- Patient has minimal movement: The patient is given their room upon arrival and they do not leave the room from start to finish.
- If they do move, it is by transport: If the patient does need to leave the room for a

specialized treatment, a transport team will come take them to the centralized location by wheelchair.

- All additional treatment needs are centralized: All specialized treatments that cannot be administered within the room will be in one centralized location on the treatment floor.
- Primary nursing care: Patients have the same nurse(s) for the duration of their visit and for each of their treatments, much like you have the same doctor each time you visit.
- Rooms with beds or chairs, windows or no windows: Room set ups should vary and be best matched with patients' needs and preferences.
- Bring food or snacks to room: Food should be brought to the rooms during treatments. Patients and/or caregivers should not be taking long walks to restaurants or cafeterias to meet basic needs.
- Restrooms in close proximity: Patients and caregivers alike need quick access to restrooms. Some patients need a restroom nearby during their treatments and need to feel comfortable.
- Electronic Medical Records store patient treatment history and preferences: Much like providers store detailed treatment information related to dosage, etc. in medical records, providers should record patient preferences in regards to their space. This way the rooms can be assigned and set up to make the patient most comfortable upon arrival.
- Support Lounges: Designated areas should exist for patients and caregivers to visit before, during, or after their treatments to talk to other patients and/or caregivers.
- Floors by cancers: Larger facilities could divide treatment floors by cancer. For example, the floor outlined on the concept poster could just be the breast cancer floor. An identical floor could be above it for colon cancer.
- Outside entrances for pets: Ground level floors could have outside entrances that

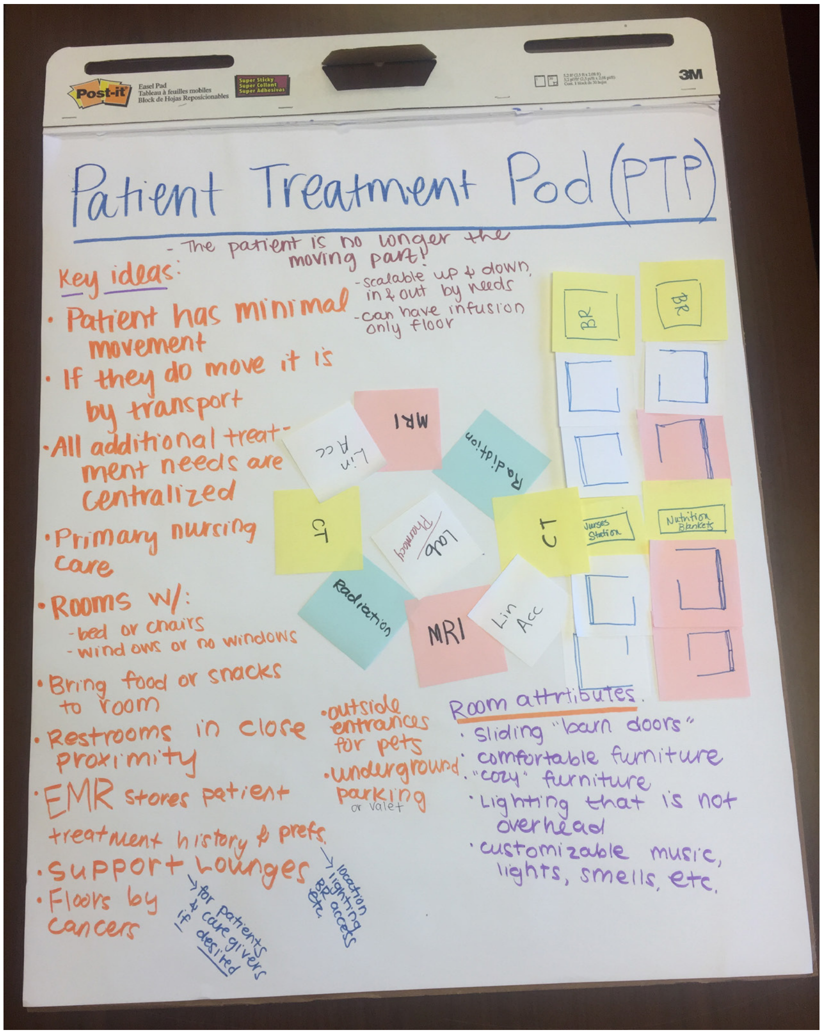
would allow people to bring their pets in during their treatments.

- Underground/valet parking: Simplifying parking could change the entire experience for the day.

Room Attributes:

- Sliding barn doors: Sliding doors will eliminate noise and create privacy. This type of door will be quiet, easy to clean, allow access for transport, and stay out of the way.
- Comfortable furniture: Furniture should meet hospital cleaning requirements, but be more comfortable for patients and their family.
- Lighting that is not overhead: Overhead lighting should not be the only lighting within the room. Patients should have the option to turn off the overhead lighting and use a lamp or natural light.
- Customizable music, lights, smells, etc.: Features could be available to change the music, lighting style, or smell of the room. The more customization available to the patient can help alleviate the stress associated with the long treatment days in the facility.

FIGURE 21. PARTICIPANTS COMPLETING THE CONCEPT POSTER METHOD



Patient Treatment Pod (PTP)

- The patient is no longer the moving part!

Key ideas:

- Patient has minimal movement
  - scalable up & down, in & out by needs
  - can have infusion only floor
- If they do move it is by transport
- All additional treatment needs are centralized
- Primary nursing care
- Rooms w/:
  - bed or chairs
  - windows or no windows
- Bring food or snacks to room
- Restrooms in close proximity
- EMR stores patient treatment history & prefs.
- Support Lounges
  - → for patients & caregivers if desired
  - → location lighting BR access etc.
- Floors by cancers
- outside entrances for pets
- underground parking or valet

Room attributes.

- Sliding "barn doors"
- comfortable furniture
- "cozy" furniture
- Lighting that is not overhead
- customizable music, lights, smells, etc.

FIGURE 22. FINAL CONCEPT POSTER

Discussion: Workshop 2 provided insight into the specific details of the built environment in cancer treatment facilities. Participants all generated similar ideas based on the question "How can we optimize a patient's movements within a facility?" They all sought a customizable space that provided privacy, comfort, and minimal moving from place to place. Douglas and Douglas (2005) explored patients' perceptions of the built environment of healthcare wards. Their study concluded that patients need control of their environment. Hospitals should be designed with an increased focus around the interest of the patient (Douglas & Douglas, 2005). This study found the work of Douglas and Douglas to be true. Patients desire to customize their environment by changing lighting, sounds, and the like. The participants in Workshop 2 designed a space centered around the patient's needs called the Patient Treatment Pod (PTP). Upon entering the facility, patients are escorted from the waiting room directly to the PTP. Blood work and all other preliminary tests are done in the PTP prior to treatment. The treatment is in the same room. Any other scans or tests the patient may need are nearby, and the patient is taken by transport so that they do not have to walk. A restroom for patients and caregivers is no more than a few steps away from any room in the facility. Space planning and physical amenities can enhance the patient care environment (Mitchell, 2011). Current research supports the idea that built healthcare environments have an impact on the health and well-being of patients, leading more attention to the psychological consequences of the built environment (Dijkstra et al., 2008). This study, and more specifically Workshop 2, advance this notion, and goes further to bring insight into how cancer treatment facilities should be designed in order to promote the health and well-being of patients.

Workshop 3:

Three participants were a part of Workshop 3. These participants were all a part of Workshop 2 and were familiar with the process. At the time of the workshop, the three participants represented included one had endured a 22-year cancer journey as a caregiver, one who was a healthcare provider, one who was a stage 4 colon cancer survivor. The researcher reviewed what they had accomplished in Workshop 2 and what the goal for Workshop 3 would be.

Rough and Ready Prototyping: The researcher explained the Rough and Ready Prototyping method to the group. The group then decided that the best use of their prototyping would be in developing the floor plan of the unit that would house their Patient Treatment Pods (PTP). They felt that the PTPs had been described thoroughly on their concept poster and wanted to make sure that the process involving the PTPs was complete and free of complications. The participants referred to their concept poster from Workshop 2 for guidance. They started by moving around some of the sticky notes to get a better understanding of what needed to be done. Then the group started on the prototyping and created the floor plan using color-coded sticky notes on a poster.

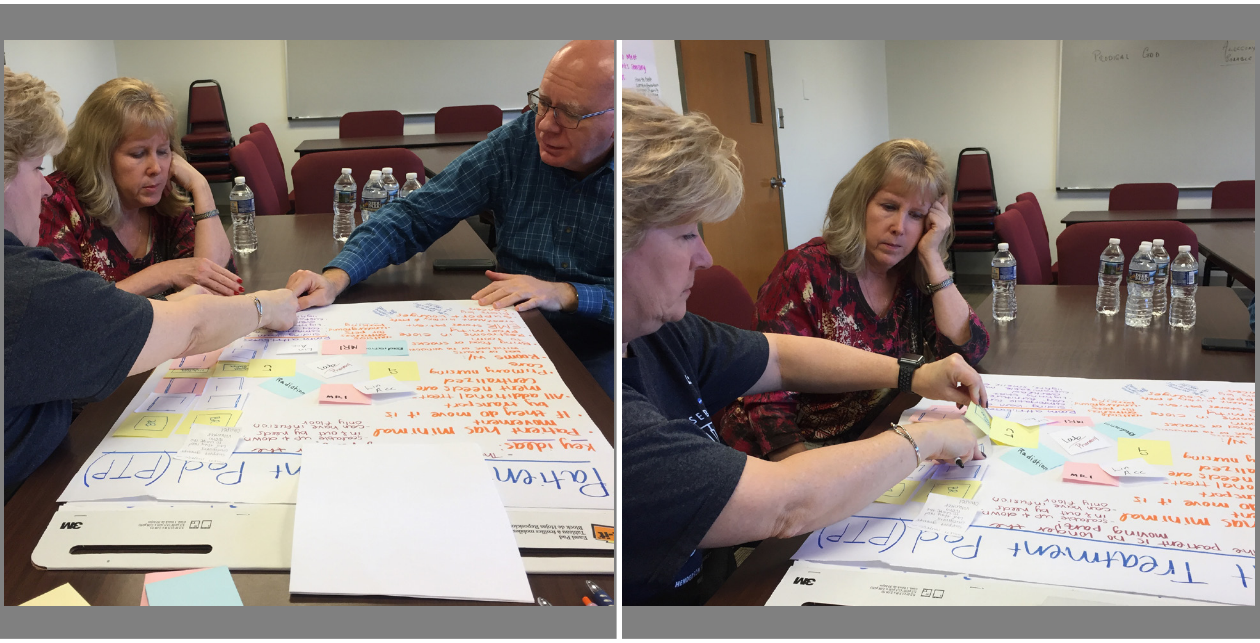


FIGURE 23. PARTICIPANTS REVIEWING THE CONCEPT POSTER FROM WORKSHOP 2 TO DETERMINE WHAT CHANGES SHOULD BE MADE PRIOR TO PROTOTYPING

FIGURE 24. PARTICIPANTS CREATING A PROTOTYPE OF THE FLOOR PLAN FOR THE FACILITY THAT WILL CONTAIN THEIR PATIENT TREATMENT PODS

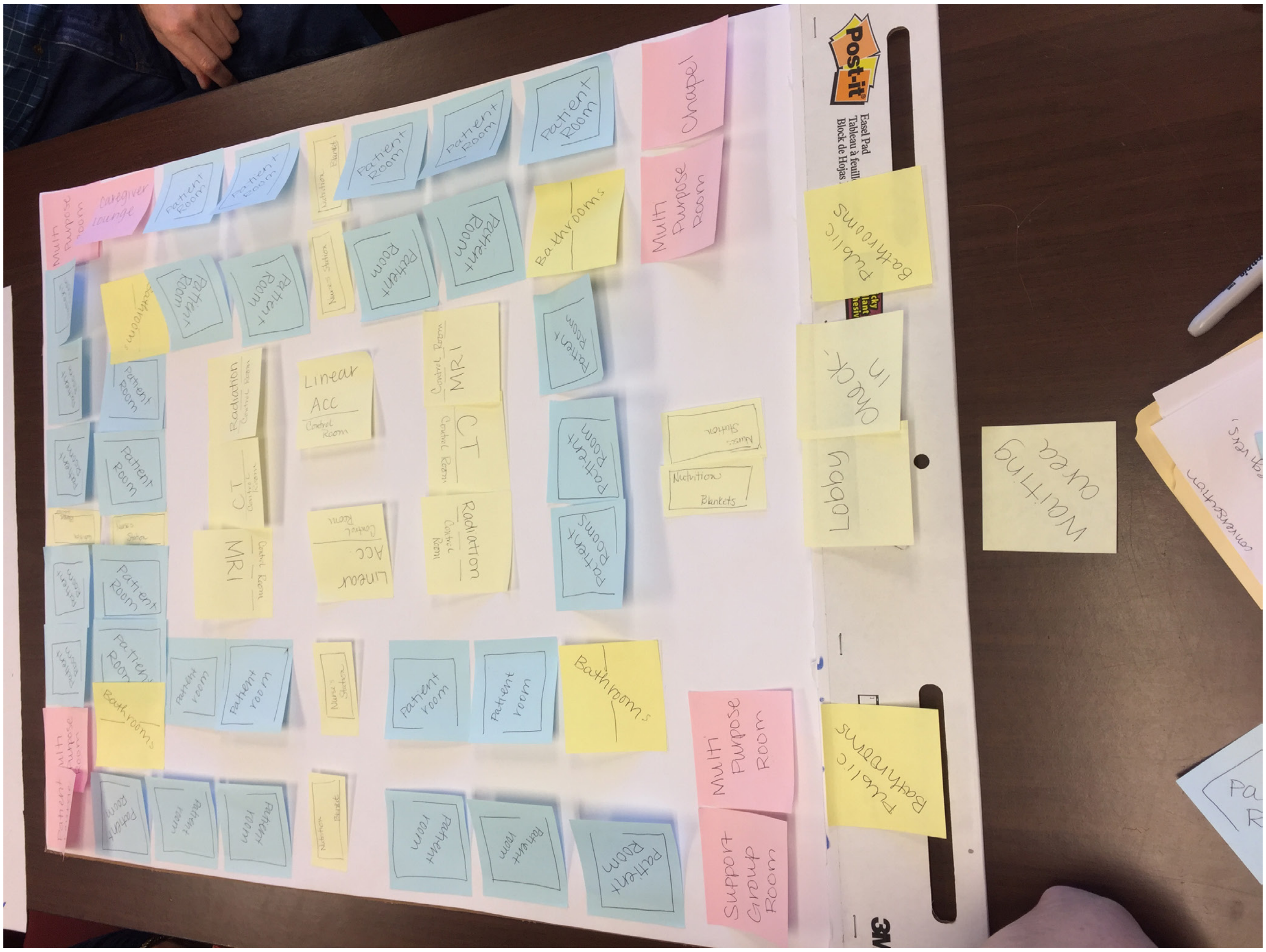


FIGURE 25. COMPLETE FLOOR PLAN PROTOTYPE

Think Aloud Testing: Once the floor plan was complete, the team talked through the process. This led them to move some of the sticky notes around to better facilitate the environment. It also allowed them to place arrows on the floor plan of how a patient would move throughout the facility. Figure 26 shows that they followed a patient into the facility, through waiting, checking in, and into the treatment room. They then took the patient to the restroom and to a treatment via transport that required him/her to leave the PTP. Arrows with straight lines represent patient walking; arrows with squiggle lines represent the patient being moved by transport. There are very few arrows shown, exemplifying that their goal of moving the patient around as little as possible was successful.

Once the patient reaches the PTP, he/she does not leave again other than to use the restroom or by transport. Having a healthcare provider involved in the group allowed the participants to account for specific hospital needs, such as adequate nursing stations and control rooms. Their design truly incorporates the needs of the patients and caregivers first, but keeps the needs of the providers at a close second.

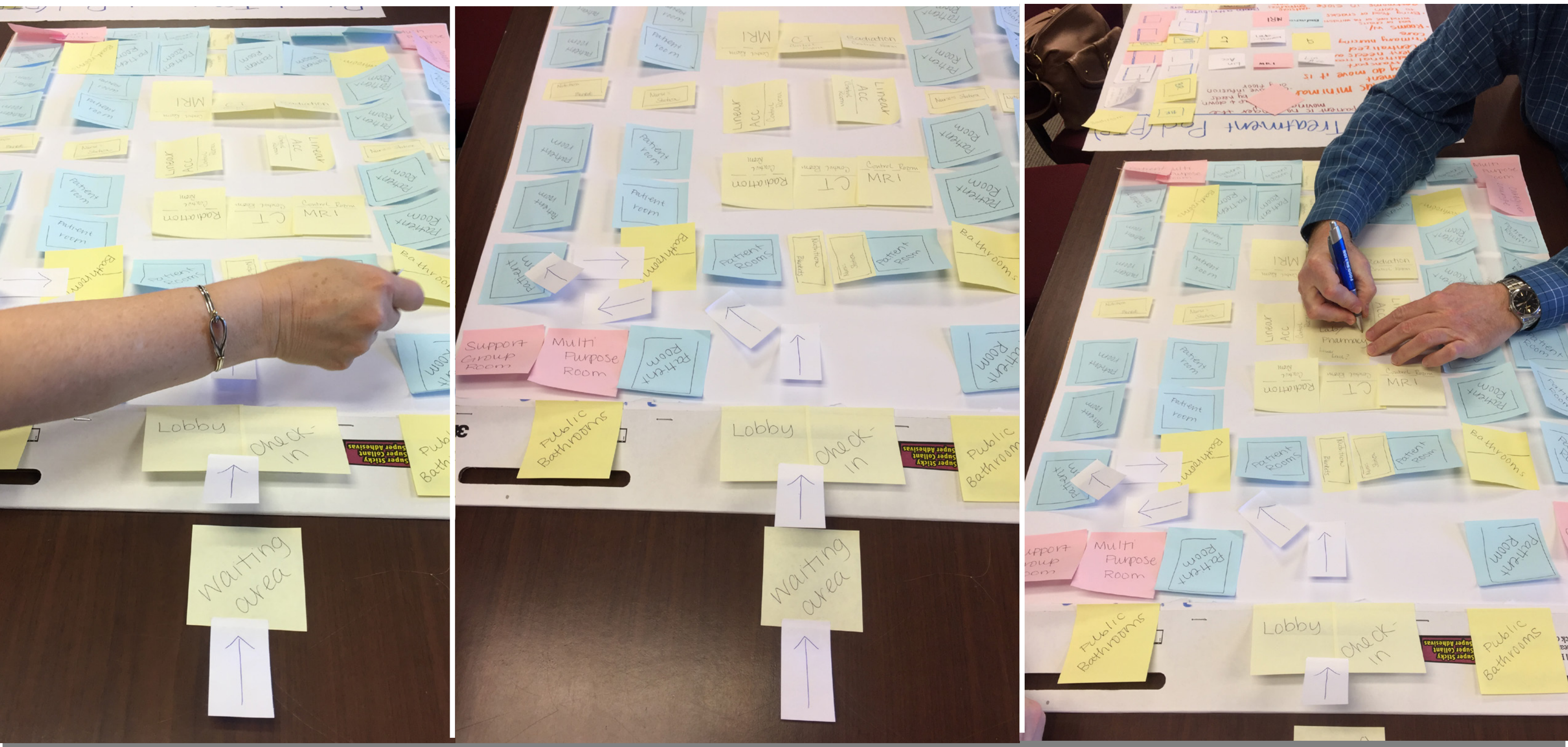


FIGURE 26. PARTICIPANTS COMPLETING THE THINK ALOUD TESTING METHOD

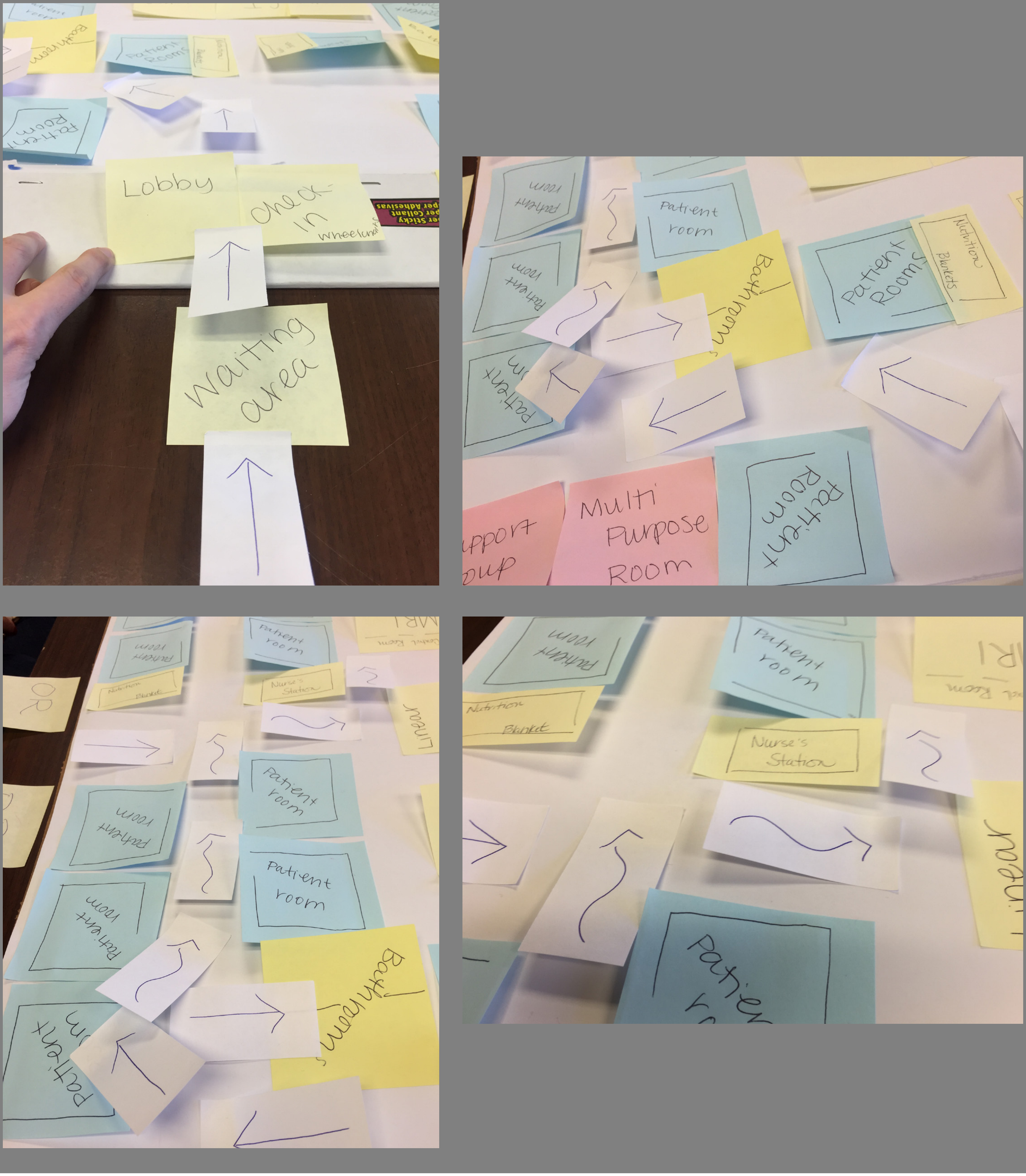


FIGURE 27. COMPLETE THINK ALOUD TESTING

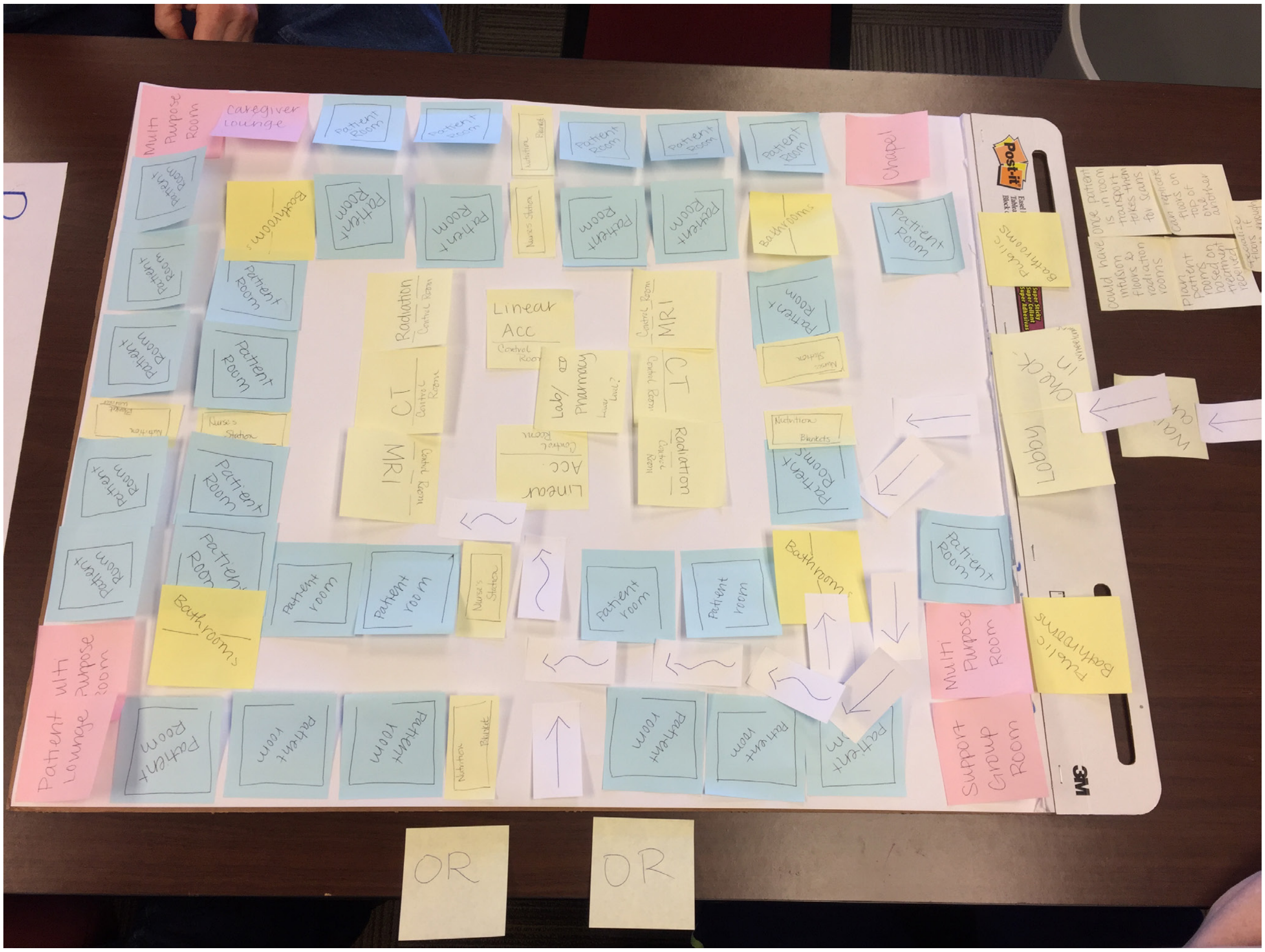


FIGURE 28. COMPLETE AND REVISED PROTOTYPE AFTER THINK ALOUD TESTING

Discussion: “Although large, spacious clinics may be visually appealing and soothing, the distance a weakened patient has to walk from the parking lot or front door to the treatment chair can be daunting” (Wujcik, 2011, p. 5). This is the precise idea proven through the prototyping completed in Workshop 3. Participants created a floor plan of a cancer treatment facility infusion floor. The floor plan eliminated all unnecessary movement and kept the patient in one place throughout his/her entire visit in the facility, other than to use the restroom. Restrooms are a very short distance from every room on the floor. If they did require movement for additional scans or tests, a transport team would come to the room and take the patient to and from the additional scan or test. If patients wish to walk, that is fine, but the transport team allows for weakened patients to preserve their energy for other things. The most important part of examining and improving the patient experience is to interact with and gain the perspective of patients (Merlino & Raman, 2013). Utilizing the participants' personal experiences made the floor plan prototyping effective. Each participant applied his/her specific experiences to give ideas and feedback for the prototyping and think aloud testing completed on an individual's idea. Bringing their experiences back to life proved to be an emotional experience. The participants became so involved in the process over the series of workshops. The participants sought a prototype that would advocate and allow for the needs of the patients and families.

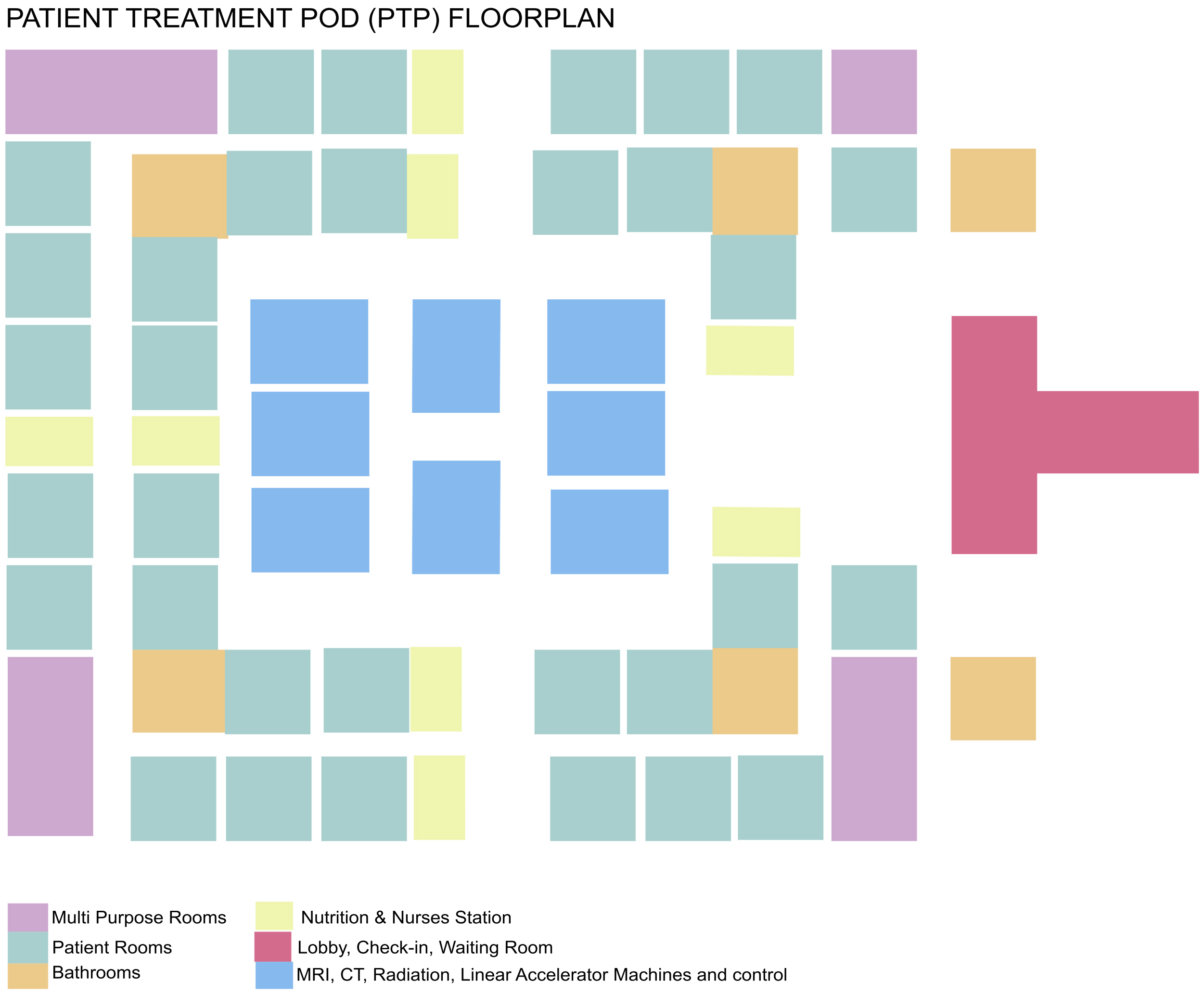


FIGURE 29. GRAPHICAL REPRESENTATION OF FLOOR PLAN PROTOTYPE CREATED IN WORKSHOP 3

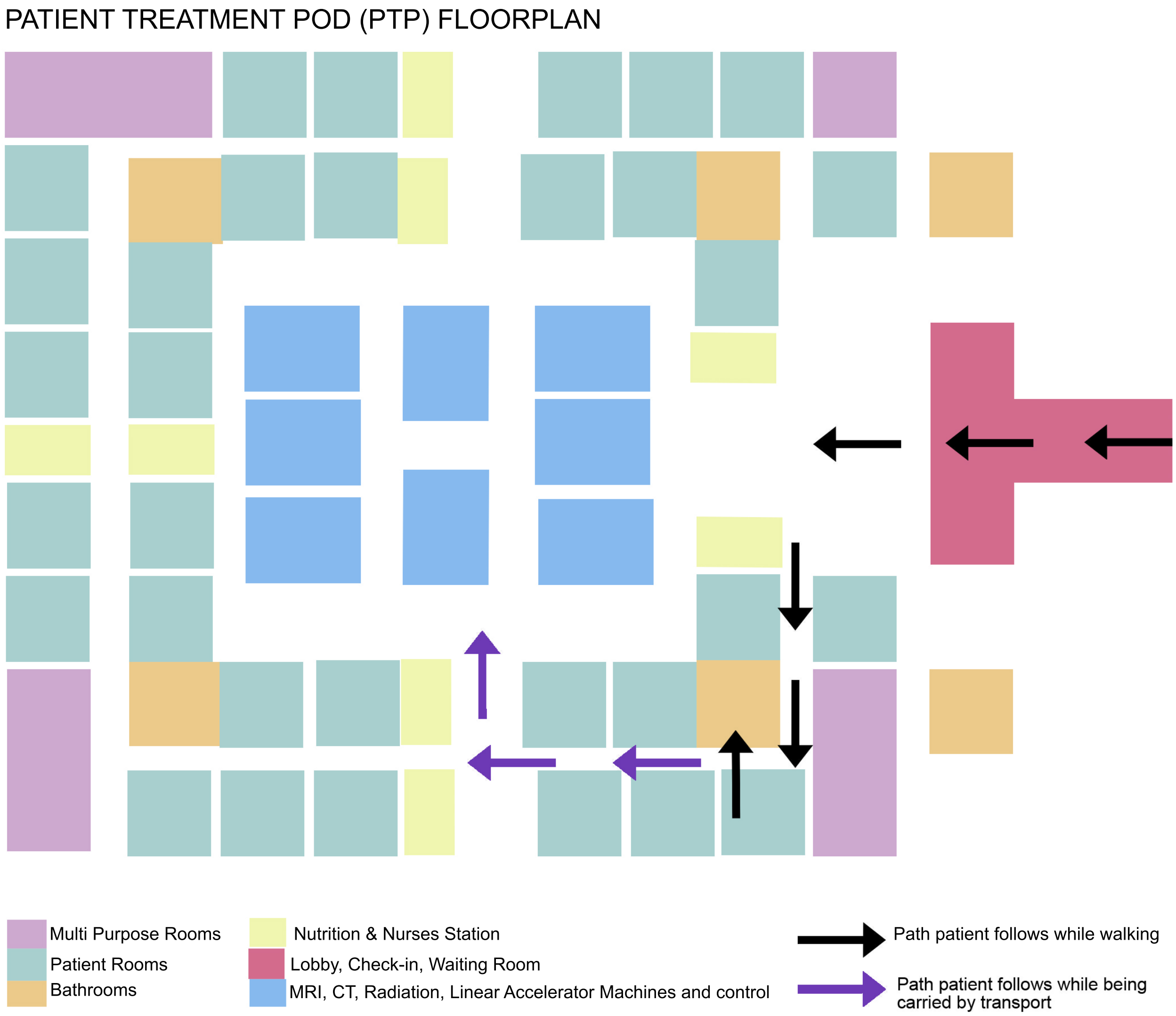

PATIENT TREATMENT POD (PTP) FLOORPLAN

FIGURE 30. GRAPHICAL REPRESENTATION OF FLOOR PLAN PROTOTYPE CREATED IN WORKSHOP 3 WITH THINK ALOUD TESTING PROCESS OUTLINED WITH ARROWS

Limitations

Bate and Robert (2006) state that hospitals need to make things better for the user and they should be doing this by making the user an integral part of the design process. Making the user an integral part of the design process is exactly what this study sought to do. Bringing participants together with various experiences and relationships with cancer and utilizing design thinking methods to embrace empathy and understanding proved to be useful in enhancing the built environment in cancer treatment facilities to better suit the needs of the patient. The built environment of healthcare facilities is crucial to the well-being of current and future patients (Douglas & Douglas, 2005). Poor design has been linked to increased anxiety, greater need for medication, sleeplessness, and higher rates of delirium. Although beautiful cancer treatment centers exist, no one has studied what patients prefer. As various plans for healthcare environments are considered, designs that help reduce stress and anxiety must be considered (Kopec, 2006). Plans such as the one developed in Workshop 3 of this study should be considered to provide patients with the least amount of movement and the greatest amount of comfort avliable to them. While this study offers new evidence and insight into the patient experience in cancer treatment facilities, there are limitations. For instance, it is assumed that the information participants provided during design thinking workshops was accurate and truthful. Also, all of the participants received cancer treatment in the states of North Carolina or Virginia. It is possible that treatment facilities have regional styles or trends that may differ from facilities in other parts of the country. The convenience of the sample along with the small group studied makes generalization of the findings limited. Finally, the volunteer status of participants made attendance sporadic. Three more participants had agreed to come to Workshop 2 who were unable to attend for various reasons. This made Workshop 2 attendance low, and as result left low attendance at Workshop 3.

Conclusion

The relationship between humans and their environment is symbiotic, meaning that the environment influences their behaviors (Kopec, 2006). High stress levels have an adverse effect on patients' immune systems and healing, as well as on their overall patient experience; thus there is a need for innovation in reducing stress and difficulty for people with cancer (Homel et al., 2011). This study sought to determine if and what characteristics of the built environment caused stress and unneccesary anxiety to patients in cancer treatment facilities. Patients are already experiencing a great amount of stress due to their illness and should not be further inhibited by their environment. Design thinking adopts empathetic design principles to move beyond typical approaches and design an experience for patients (Agutter, 2011). Design thinking seeks solutions through an empathetic understanding of other people's problems and points of view (Kronqvist, Lee, Mattelmaki, & Vaajakallio, 2013). The use of design thinking in this study allowed the researcher to work directly with patients, survivors, caregivers, and providers to determine what elements of the built environment could be improved to reduce the anxiety levels of patients within a facility. Research done by The Breast Service concluded that design within the facility provided "tangible improvements and has demonstrated the value of engaging patients and focusing on their experiences" (Boyd et al., 2012, p. 76). This study further proved this by allowing the participants to formulate their own ideas, giving participants an opportunity to engage and be a part of the solution. Cancer treatment facilities can and should be designed with the patient and his/her family in mind. This research has shown that the built environment can help to reduce situational anxiety associated with cancer treatments.

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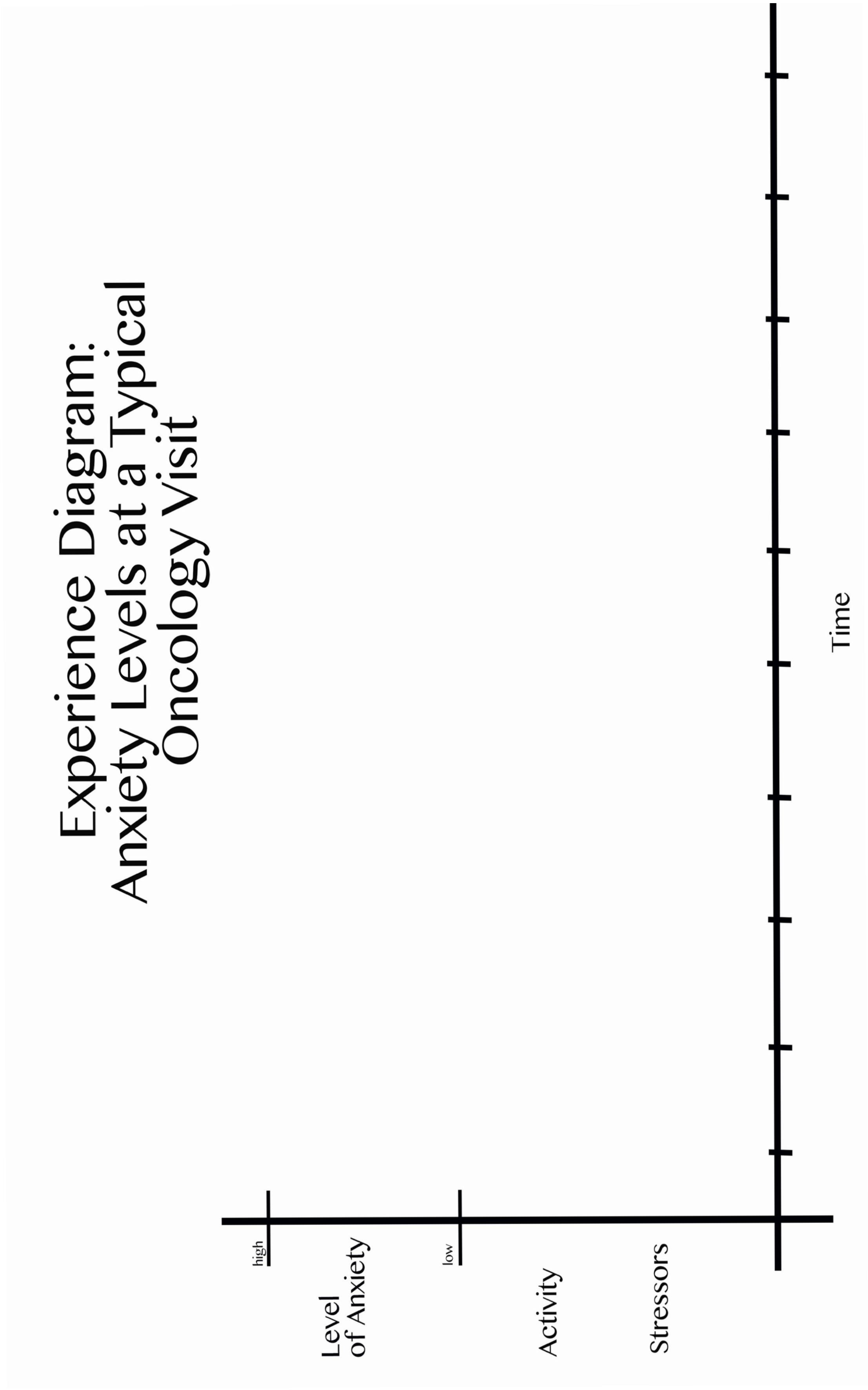
APPENDIX A



Experience Diagram: Anxiety Levels at a Typical Oncology Visit

APPENDIX B

Innovating for People | *Activity Templates* | **Round Robin**

CHALLENGE STATEMENT

FOLD TO DOTTED LINE

PROPOSED SOLUTION

Come up with an unconventional way to address the challenge.

FOLD TO DOTTED LINE

WHY THE SOLUTION WILL FAIL

Review the proposed solution, and find a reason that it will fail.

This is your chance to be the armchair critic!

FOLD TO DOTTED LINE

FINAL CONCEPT

Review the critique. Then, quickly generate an idea that resolves the issues raised.

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