Evaluation of a Veterans Administration Mental and Behavioral Health Patient Room

Design and Mockup

Introduction

The overall objective of this research was to evaluate a physical full-scale, high-fidelity mockup of a mental and behavioral health (MBH) inpatient room and bathroom. To our knowledge, mockups have not been used as tools for research or evaluation in the MBH field. Research on the design of mental and behavioral health (MBH) facilities is sorely lacking (Shepley et al., 2013; Shepley et al., 2016). Recognizing the need for more research, the Institute for Patient Centered Design (IPCD), an organization devoted to patient-centered design and care, hosted the Patient Centered Behavioral Health Design Competition to inspire innovation regarding the possibilities of this space. The final of the evidence-based design product would be a physical full-scale, high-fidelity mockup.

This initiative followed previous mockups by the same organization of patient rooms for general acute care hospitals and in neonatal care intensive care units. MBH inpatient rooms are different from standard inpatient rooms in that that do not require the same infrastructure, the amount of time spent in the room is more limited, family presence is rare, and the level of suicide resistance is amplified. The organization received nine submittals and a jury selected three finalists to present using virtual reality at the 2015 Healthcare Design Conference. Conference attendees voted on the projects, and a winning design was selected.

The Veterans Administration (VA), a large national governmental health organization, was identified as a collaborator and recommended VA NJ Health Care System (VA NJHCS) as one of their healthcare facilities for installation of the mockup. The VA NJHCS has multiple facilities throughout the United States that provide inpatient and outpatient MBH care, patient-

centered focus and a philosophy that supports evidence-based design. The population served by this agency has been identified as having a high number of PTSD patients (Khanade, Rodriguez-Paras, Sasangohar, Lawley, 2018). In this paper, the VA NJHCS will be referred to as "the host site." The host site had a history of creating healing environments as a Planetree affiliate and participation in research projects.

Installation of the mockup was a complex process involving multiple parties and detailed specification of furniture, finishes, and accessories. A variety of individuals collaborated in the specifications for the project including the design team for the winning design, specialists in MBH health design, interior designers, and representatives of the host site. The organization that hosted the initial design competition approached faculty at Cornell University to conduct an assessment of the final *in situ* mockup. The focus of this paper is the researchers' process for evaluation of the completed MBH Patient Room mockup.

While a few researchers have addressed the design of MBH environments in the field and hypothetically, **to our knowledge there have been no published studies on mockups for MBH design, which was the motivation for the project described in this paper. Additionally, there is limited research engaging patient populations. The researchers had three goals: 1) The primary goal was to evaluate an award-winning MBH Patient Room's design, which was represented as a full-scale, high-fidelity mockup built within an existing VA MBH facility.** Similar to Kasali, Nersessian, and Zimring (2013), the mockup for this MBH Patient Room project was used to explore design solutions that addressed research-based qualities such as safety, privacy, and control, while expanding on details such as custom furniture design. The research team used a mixed methods approach to gain feedback about the mockup room's design from the MBH patients, former patients, and staff. 2) During the

evaluation process, the mockup room (patient room and bathroom) served as a "boundary object" (defined by Star, 1989) to facilitate a broader conversation between the project team and the end users (patients and staff) about design for MBH. 3) A third goal was to determine whether such a mockup could be an effective design tool in future MBH design and evaluation applications. Evidence did not suggest that a MBH mockup would be different from any other type of mockup; the research team explored the possibility that there might be differences due to the specific nature of MBH patients' illnesses, the care required, and the spaces needed to fulfill that care.

Literature Review

Previous Research on Mental and Behavioral Health

Three previous studies were used as the conceptual and theoretical foundation for this research: the inventory of mental health design concepts provided by Shepley and colleagues (2017); the safety, competence and personalization model of Chrysikou (2019); and Ulrich, Bogren, Gardiner, and Lundin's model for designing inpatient psychiatric wards to reduce aggression (2018). Previous mental and behavioral health design researchers have addressed the importance of deinstitutionalized environments (e.g., Tapak, 2012), orderly and organized environments (e.g., Eklund & Hansson, 2001), the importance of maintenance (e.g., Christenfeld, Wagner, Pastva, & Acrish, 1989), access to nature (e.g., Bailey, 2002), appropriate furnishings (e.g., Davis, Glick, & Rosow, 1979), daylight (e.g., Gutkowski & Guttmann, 1992), security (e.g., Martin, 1995), staff respite (e.g., Nejati, Rodiek, & Shepley, 2016), shared/private rooms (e.g., Forster, Cavness, & Phelps, 1999), spaces that afford social interaction (e.g., Ulrich, Bogren, & Lundin, 2012), seating arrangements (e.g., MacDonald, Davidowitz, Gimbel, & Foley, 1982), autonomy and spontaneity (e.g., Sorlie, Parniakov, Rezvy, & Ponomarev, 2010), spaces

supporting staff interaction (e.g., Whitehead, Polsky, Crookshand, & Fik, 1984), indoor/outdoor therapy (e.g., Cooper Marcus & Sachs, 2014), smoking rooms (e.g., Salerno, Forcella, Di Fabio, Figà Talamanca, & Boscolo, 2012) and suicide resistant environments (e.g., Carr, 2011). For a detailed literature review on research related to mental and behavioral health environments see Shepley et al., 2013 and Shepley et al., 2016.

Mockups as Research, Design and Evaluation Tools

Healthcare designers seek tools to enhance their ability to provide the best healthcare facilities possible. Simulations are particularly valuable for testing and justifying design elements and solutions. Through the use of simulation tools, either physical or virtual, users and designers are able to experience an idealized or hypothetical setting. Simulations should take into consideration various parts of the environmental experience, including the actors, spaces, activities, and events. These processes can be considered through systems, processes, or agent-based schemes, in which a mix is the most effective (Schaumann Pilosof, Date, & Kalay, 2016). Simulations can also be used to consider issues such as ergonomics and ADA compliance. Being able to measure and model these conditions virtually helps to optimize designs before construction (Alameldin & Shepley, 1994).

Healthcare studies often utilize simulations, which can be single model or multi-model with various levels of accuracy, or fidelity, being tested in the same study (Taylor, Quan, & Joseph, 2015). The most common simulation tools include full scale physical mockups and virtual reality. Physical mockups are favored by many because they fully immerse the designer or client in the proposed environment. Peavey, Zoss and Watkins (2012) note that physical mockups have the benefit of being readily converted into functioning rooms once completed and can be compared to existing rooms for quasi-experimental studies. Virtual simulations are able to

present information in an engaging and immersive fashion, and often lend to various scales of design from small mockups to full scale building simulations (Castronovo, Nikolic, Liu, & Messner, 2013).

Wingler, Machry, Bayramzadeh, Joseph, and Allison (2018) studied the effectiveness of four different types of design representations (simulations) in helping clinical end users to understand and provide feedback on the design of an operating room. They used four different types of design communication media: (a) plan view drawings; (b) 3-D perspective drawings; (c) a physical full-scale cardboard mockup; and (d) a virtual reality full-scale mockup. Participants preferred the physical cardboard mockup, which was also most effective in eliciting feedback.

Engaging stakeholders, including patients and staff, in the mockup process can also facilitate dialog and empower participants to contribute (McCown, 2018). One such study used three forms of mock-ups for comparison, including a meeting format, a low fidelity model, and a high fidelity model (Taylor, Quan, & Joseph, 2015). This study, similar to the project presented here, included surveys and feedback that helped to challenge design assumptions and provide real world experience. Kasali, Nersessian, and Zimring (2013) conducted research on the process of creating a mockup for the purpose of designing healthcare facilities. They specifically addressed patient rooms, corridor spaces, and nurse stations. The authors described the mock-up as a "boundary object" that supports an exchange between designers and staff and patients. This process is often iterative (Marans, 1993), meaning an environment is created, evaluated, and then modified for re-evaluation. A recent study by Bayramzadeh and colleagues (2018) used operating room simulations specifically for engaging users and eliciting feedback for the design process.

Hypotheses

The researchers on this project held several *a priori* hypotheses about the mockup room's design and how participants (patients and staff) would respond to it. The quantitative and qualitative methods for gaining feedback, discussed below, were structured to address the following hypotheses.

H1: *The mockup room's environment will be positively evaluated by patients and staff for each of the design goals.* The MBH Patient Room that was evaluated in this study was the winning design from nine entries. The design utilized evidence-based design (EBD) principles, thus we hypothesized that it would be perceived positively. Prior projects using EBD have resulted in improved satisfaction; this is one the outcomes most highly emphasized in Ulrich, et al.'s 2008 literature review on the impact of EBD.

H2: *Staff and patients will rate the design goals differently*. Researchers have found that when evaluating mental healthcare physical environments, patient and staff may have different perspectives on the impact on quality of life and other factors (e.g., Thapa & Rowland, 1989).

H3: *Overall, patients will rate the mockup room's design more highly than staff*. Kotzer, Zacharakis, Raynolds, and Buenning (2011) and Shepley, Duffy Day, Huffcut and Pasha (2010) found that patients and families rate healthcare environments higher than staff.

H4: *Staff who have worked in the field of MBH for less time will rate the mockup room's design more highly than those who have worked in the field longer*. There is some evidence that people's opinions about design is correlated with the amount of time they have served as caregivers in the MBH field (e.g., Baillon, Scothern, & Vicker, 1999).

Mockup Design

Mockup Design Competition Goals

The Institute for Patient Centered Design (IPCD) used the following narrative in their invitation for the 2015 competition: "The Patient Centered Behavioral Health Environment is one in which patients receiving treatment for mental disorders are allowed to retain their personal dignity, comfort and control of as many aspects of their environment as possible, while limiting opportunities for patients to harm themselves or others. This environment should be welcoming, relaxing, comforting and help the patients to be open to the treatment that will be provided to them." Judging criteria followed the IPCD's ten principles of patient-centered design: 1. Respect privacy; 2. Facilitate communication, collaboration and trust; 3. Accommodate patient and family participation (where appropriate in behavioral health settings); 4. Empower patients; 5. Promote safety and security; 6. Provide accessible accommodations; 7. Create comfortable environments; 8. Support healing; 9. Support staff's goals; 10. Identify design opportunities that respond to unmet needs. The jury scoring form asked for feedback on each design regarding Therapeutic Environment; Patient Safety; Staff Safety; Sustainability; Overall Patient & Family Centered Care. These criteria became the basis for the researchers' evaluation questions.

The Winning Design

The winning design was a single-patient room with private bath. The designers' overarching goal was "To create an uplifting, restorative environment that empowers patients to take active ownership of their behavioral health wellness journey, while ensuring a safe and secure environment for all users" (HDR, 2015). The design concept addressed the IPCD's ten principles of patient-centered design, with emphasis on four primary patient needs: safety; patient empowerment and respect; connection to nature; and access to natural light.

Figures 1 and 2 provide an annotated plan and elevation with the design solutions. To address *safety*, the ADA-compliant patient bedroom and bathroom contain ligature-free furniture

and fixtures throughout, including a patient room door that swings in both directions; a sliding door to the patient bathroom with stainless steel recessed pull and concealed track; and an open shower area to eliminate the need for a potentially harmful shower curtain.

<Insert Figures 1 and 2 about here>

Most of the furniture is architecturally integrated into the room so that it is *safe yet does not feel institutional and provides a maximum amount of control for the patient.* While we are unaware of any research on the perceptions of movable versus built-in furniture, staff perceive flexibility in furniture arrangements to be important (Shepley, et al, 2016). In this regard, the decision to have built-in furniture that can support a variety of activities both embraces the objectives outlined by Monahan (2002) in educational facilities and the need for furniture that could not be thrown. The 18-inch high shelf along the walls serves as a built-in bench over doorless cubbies where clothing and other personal items can be stored. The shelf/bench along one wall slopes up at an angle to become a "chaise longue," then levels out at 2'7" high to become a desk. More doorless cubbies for storage are recessed into the walls in both bedroom and bathroom.

The two moveable furniture items—the bed and the ottoman—were designed to provide patients with a sense of control without sacrificing safety. The bed can be positioned laterally along the headwall so that the patient can choose the location and orientation. The ottoman was designed specifically for MBH environments. It is moveable but weighted heavily enough according to standards to not be deemed a hazard (it cannot be easily picked up and used as a weapon). The low back is ligature-free. One interesting feature of the ottoman is that it rocks slightly. Rocking is considered a therapeutic intervention that facilitates internal control with MBH patients.

For *connection with nature and access to natural light*, the room's two windows provide daylight and views. Integral blinds set within the windows afford patients control of light, views and privacy. Although not implemented in the constructed mockup, the room's design included a Facilities Guidelines Institute-compliant operable portion of the window which opens 4" to safely allow in sounds and smells from the outdoors. Additional access to nature is provided from a recessed, wall-mounted screen that features a range of strategically selected images of nature scenes that the patient can choose from. To curb noise, the design uses a durable sound absorbing plaster finish system for the walls and ceiling, as well as a white noise generator whose volume can be controlled by the patient.

After researching color and materials, the architects chose a warm light grey paint color for three of the walls with an accent wall of cool blue in the bedroom and bathroom. Material finishes resembled wood for the cubbies and doors and white marble for the countertops, bench, and desk surface. Fixtures in the bathroom and on doors were stainless steel.

<Insert Figure 3 here>

Mockup Construction

Materials such as furniture required for the mockup were donated and the room and bathroom were built within an existing room at the host site. The host facility offers a wide range of Behavioral Health programs including treatment of post-traumatic stress disorder, schizophrenia and bipolar illness, depression, and substance abuse (U.S. Department of Veterans Affairs, 2015). A VA patient group participated with the team in space selection and identified a location for the mockup that would be accessible for viewing by patients and staff yet minimize disruptions to clinical activities. The mockup room is not used for clinical activities.

Due to the temporary nature of the mockup and its installation within an existing room, the host site's original tan linoleum floor and white suspended ceiling were not altered. The mockup room windows, aligned with and built to allow in light from the surrounding building's windows, do allow in daylight but do not afford views to the outdoors. At the time of the prescheduled walk-throughs and Listening Sessions, the mockup room was almost but not fully complete as adjustments were still required for lighting fixtures and hardware. These small details turned out to be important in participants' evaluation of the space, as will be discussed subsequently.

Methodology

Evaluation of Mockup Room Design Using "Feedback Forms" and "Listening Sessions"

A multi-methods approach is recommended for design research because it allows for triangulation of the data (Shepley, 2011; Zeisel, 2006). In this study, the two primary methods used for evaluation of the mockup room design were facilitated "Listening Sessions" (akin to focus groups) and "Feedback Forms" (akin to surveys). These terms were used because the host organization determined that the project constituted a "patient centered initiative with a structured process" employed by VA to effectively solicit the "voice" of the patients and staff rather than "research." On the university side, the project was approved by the Cornell University Institutional Review Board.

Feedback Forms

A draft of the Feedback Form was generated by the university researchers based on two previous literature reviews (Shepley et al., 2013 and Shepley et al., 2016); the objectives stated in the IPCD design competition and submission; and specific guidelines stipulated by the host site. The draft was refined in an iterative process amongst members of the mockup team, including the

IPCD, the VA, the designers, and the Cornell University researchers conducting the evaluation. There was debate amongst the team about whether the word "family" should be removed from the item "aids patient and family participation in the treatment process" because the host site does not currently allow family members into patient rooms. The team's final decision was to keep the wording in case this policy changed. The final Feedback Form included closed-ended demographic questions about the participants; Likert scale questions about the room's design; and an open-ended question.

The demographic questions were: (1) "What is your primary relationship to the [host organization]?" (e.g., patient, former patient, staff at the host facility, staff outside of the host facility); (2) For staff only: "How many years of experience do you have working in mental health and behavioral sciences?"; (3) For staff only: "What type(s) of MBH facilities have you worked in or do you work in now?" For the Likert questions, participants were asked to agree or disagree with the following ten statements, referred to in this paper as "items," about the bedroom and bathroom design on a 7-point scale (Strongly disagree, Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Agree, and Strongly agree):

"Please indicate your disagreement or agreement with each statement. This room…

…communicates respect for patients.

…supports a balance of staff supervision and patient privacy.

…promotes staff and patient safety.

…aids patent and family participation in the treatment process.

…facilitates communication, collaboration and trust.

…provides accessible and comfortable accommodations.

…empowers patients and patient control (of lighting, noise, etc.).

…provides connection to nature.

…provides adequate access to daylight.

…provides adequate acoustical control."

The final Feedback Form question was open-ended: "Please provide any additional comments on the mockup."

All questions were positively framed to reduce possible confusion on the part of participants. The four-page double-sided Feedback Form was developed in Microsoft Word and printed out by staff at the host facility for the scheduled mockup tours. Patients and staff toured the mockup room and filled out the Feedback Forms directly after. Once the tours and Feedback Forms were completed, staff gave hard copies to the researchers on the day of the Listening Sessions. To facilitate data analysis, the Feedback Form was recreated in Qualtrics, a survey management tool, for data input.

Validity and Reliability of Feedback Form Likert Scale Items

To determine dimensionality, we conducted an Exploratory Factor Analysis (EFA) of nine usable items with principal axis factoring. All items loaded on one factor, with loadings ranging from .654 (*Promotes staff and patient safety*) to .932 (*Provides adequate acoustical control*). The one factor retained approximately 70% of amount of variation of the nine items, as shown in Table 1. A scree plot is shown in Figure 4. When a survey has not been designed to measure a single psychometric trait such as, for example, empathy or satisfaction, it is difficult to determine what the one factor represents. The primary, overarching goal of the mockup room's design was to facilitate patient health and well-being, and the survey was designed to measure how the physical environment supports specific health-promoting goals. Thus, the factor could be argued

to be the space's support of patient health and well-being. Following EFA, we determined that there was a high level of internal consistency from a Cronbach's alpha of .944.

<center><Insert Table 1 about here></center>

<center><Insert Figure 4 about here></center>

Listening Sessions

Listening Sessions were intended as a qualitative detailed follow-up from the Feedback Forms. All participants had visited the mockup and completed the Feedback Form immediately preceding the Listening Sessions. Each session lasted approximately 50 minutes. The PI facilitated the session using a pre-determined list of questions while another researcher took hand-written notes that were then transcribed to a Word document by the note-taker. Three Listening Sessions, two with staff and one with patients, were held in a group setting in a lounge space at the host site on March 19, 2018.

Participants

Staff and former patients participated in the study. Staff participants were from the host site as well one other nearby facility, recruited through a flyer that was distributed by a staff member via email. Because employees cannot not leave a unit at the same time to participate and because shifts are 24/7, two staff Listening Sessions were needed to allow as many employees to participate as possible. Patients recruited by the host site represented numerous services available including residential, acute and outpatient programs such as CORE (Center of Recovery Empowerment) Residential Post Traumatic Stress Disorder; Substance Abuse Treatment, and Domiciliary/Homeless Services. Patients being who were being treated at the facility and who could leave their units were invited to participate. The facility also invited former patients who

had been discharged. The number of patient and former patient respondents warranted only one patient Listening Session.

Results

Quantitative Analysis from Surveys

Sixty-two paper Feedback Forms were fully completed in March, 2018. Five were omitted due to incompleteness. A research assistant logged all responses into Qualtrics between March 26-April 11, 2018. Data were analyzed using Statistical Package for the Social Sciences (SPSS, v. 24).

Demographics

Thirty-two participants identified as patients at the host site and one participant identified as a former patient, as shown in Table 2. Twenty-five participants identified as staff; of these, 22 identified as clinical staff, 1 as an administrator, and 2 as "other." Four participants identified as staff from outside of the host site; of these, 3 identified as clinical staff and one as an administrator. Due to the low numbers of former patients (n = 1), non-clinical host facility staff (n = 3), and staff outside of the host site (n = 4), the researchers bundled "patients" as one group and "staff" as another for statistical analysis. Responses by patients and staff were examined to determine whether any anomalous responses would preclude grouping.

<Insert Table 2 about here>

Staff participants reported working in the following types of MBH facilities either presently or in the past: 22 in Inpatient, 19 in Outpatient, 10 in Residential, 7 in Homeless, and 5 in "Other." Staff participants reported having worked in the MBH system from less than one year (n = 2) to more than 20 years (n = 6), with the majority of participants reporting between 11-15 years of work in the MBH system (n = 8). (See Table 3.)

Mockup Room Design Rating

In the three Listening Sessions, staff and patient participants revealed that family visitation is not a common practice in acute MBH inpatient rooms. The fourth Feedback Form item, *Aids patient and family participation in the treatment process*, was seen as not applicable to many staff and patient participants. The researchers therefore decided to remove this item from further quantitative analysis. Scores were calculated and statistical analyses were conducted on the remaining nine items.

To calculate scores for the overall mockup room design and each of the nine items, means were calculated for the patient and staff groups individually and for both groups combined, as shown in Table 4. Means and standard deviation will be presented as m (sd). For patients, means ranged from a low score of 4.36 (1.90) for *Facilitates communication, collaboration, and trust* to a high score of 5.03 (1.776) for *Provides adequate acoustical control*. Among staff, the lowest score was 4.79 (1.81) for *Promotes staff and patient safety* and the highest was 6.14 (1.27) for *Empowers patients and patient control*. With both groups combined, the lowest scoring item was *Facilitates communication, collaboration, and trust* at 4.63 (1.78) and the highest was for *Empowers patients and patient control* 5.68 (1.64).

If we were to use the survey to "score" the overall mockup room design, we would take the total of means and divide by the number of items (9). For patients, the room's overall score was 4.77 out of 7, or 68 out of 100; for staff, 5.52, or 79 out of 100, and for both groups combined, 5.12, or 73 out of 100.

<Insert Table 4 about here>

Comparison of Patient and Staff Responses to the Mockup Room Design

Independent sample t-tests were conducted to compare patient and staff scores of the overall mockup room design and the nine individual items, as shown in Table 5. We chose to report the

t-statistics where equal variance is not assumed because this is more conservative. For the overall mockup room design score, a significant difference was found between staff and patients $t(52.65)=2.23$, $p = .03$. For the nine individual items, significant differences between patient and staff were found in four items: *Communicates respect for patients* $t(58.88)=2.69$, p = .009; *Provides adequate access to daylight* $t(58.12)=2.39$, $p = .020$; *Provides adequate acoustical control* $t(60)=2.38$, $p = .020$; and *Empowers patients and patient control* $t(57.23)=2.19$, $p = .033$. *Provides accessible and comfortable accommodations* was slightly above the significance threshold $t(58.34)=1.92$, $p = .06$. This last item would likely become significant with an even a slightly larger sample size.

<center><Insert Table 5 about here></center>

Correlation Between Rating of Mockup Room Design and Staff Tenure in the MBH Field

Results of the Spearman's rho to determine any potential link between amount of time staff had worked in the MBH field and their rating of the mockup room design revealed no significant association $r(27) = .55$, p .55, as shown in the scatterplot, Figure 5.

<center><Insert Figure 5 about here></center>

Qualitative Analysis from Feedback Forms and Listening Sessions

Forty-seven out of 62 participants (24 patients and 23 staff) responded to the open-ended Feedback Form question, "Please provide any additional comments on the mockup." Responses varied from one to 100 words, some in list format, some more narrative. Approximately 16 staff and 14 patients participated in the three Listening Sessions (two for staff, one for patients). The open-ended Feedback Form data and transcripts from the three Listening Session were added to Atlas.ti for qualitative data analysis. Because responses from the two methods were very similar, analyses of both the Listening Sessions and Feedback Forms took place simultaneously.

Following Saldaña's codes-to-theory method of qualitative data analysis (2009), a member of the research team identified codes within the data, beginning with an *a priori* set of codes, based on environmental characteristics previously identified as significant in a behavioral health setting (Shepley et al., 2017). The researcher assigned the codes in Atlas.ti and iteratively adjusted the codes list to better fit the context of the mock-up. *A priori* items like "snack areas" and "outdoor spaces" were considered not applicable, as the focus of the mockup was a single patient room rather than an entire facility. "Suicide resistant" was expanded to "safety/injury resistant" to better represent the range of possible safety concerns within the mockup room.

These codes clustered into a number of categories. From these categories, a set of themes emerged, describing the relationship between features of the mockup room design, patient and staff preferences, and emotional responses to those features. Three distinct themes were identified: Safety, Deinstitutionalization/homeyness, and Positive distraction/nature. Most of the categories fell under the Deinstitutionalization heading as represented in Figure 6.

<Insert Figure 6 about here>

Safety. It was clear from the number of times both patients and staff mentioned safety, and the specificity of their comments, how important an issue safety is for this population. On the Feedback Forms, more than half of the staff participants mentioned safety, and the ratio was similar for patients. As one patient wrote in the Feedback Form, "Safety should be considered first and foremost to ensure the patients well being."

The ottoman, which was designed specifically for MBH settings, was the topic of much discussion on the Feedback Forms and in the Listening Sessions. Staff participants had mixed reactions, from "I loved the chair. Really comfortable" to expressions of concern about elderly and larger patients and those with balance and back problems: "Chairs [are] good for high

functioning, full physically capable. Someone who has cognitive issues or physical disabilities would have difficulty sitting or standing without falling." One staff member was concerned that the low back would still be "loopable" (for ligature). Patients were less enthusiastic about the ottoman, citing lack of comfort and concerns about safety. One patient wrote, "The chairs are unsafe and provident [sic] support for [b]ack. And why do they rock?!!?" In one of the Listening Sessions, the facilitator asked the staff group what the perfect MBH chair would be. One staff member responded that "There is no perfect chair," and that the best solution is built-in furnishings. Staff liked the long countertop as a seat, including the sloped countertop that could double as a chaise longue. They also liked that the bed's headboard was against the wall so that patients could sit up in bed.

While some staff appreciated the clean, modern look of the countertops, and the fact that they could be used as flexible space for seating and placement of personal items, some staff and several patients expressed concern about hard surfaces in general, and especially the countertops. For example, a staff member wrote, "Counter seems be hard surface (r/o banging head)" and a patient wrote, "[The room] is very safe looking besides the countertop that looks dangers [sic]. If a patient slips and falls off medication they may get hurt badly." One patient and one staff member suggested beveling the edges to make them less sharp.

Balancing patient safety and privacy in MBH settings is not a novel challenge to healthcare designers. Items on the Feedback Form allude to the challenge of providing adequate patient privacy while still allowing for staff supervision. Just as the staff participants predicted, patients responded positively to the idea of a private bedroom and bathroom. **All patients agreed that private rooms were preferable, unless they had the opportunity to room with a friend. Staff were less enthusiastic about private bedrooms and bathrooms for MBH**

settings, and identified numerous safety concerns, including—specifically for the mockup room design—the large amount of "hiding space under the sink" and under the countertop. Staff members also felt that private bedrooms might interfere with positive social interaction. One staff member suggested that there is "too much room for isolation, [private rooms] lead to malingering." Ittleson, Proshansky and Rivlin (1970) found that contrary to the above statements by staff, social interaction might be facilitated by providing privacy in rooms and stimulating feelings of choice and control. Other researchers have offered related support for the private room context (e.g., Chou, Lu & Mao, 2002; Wilson, Soth & Robak, 1992; Wolfe,1975).

For similar reasons, the bathroom door was discussed frequently. Both staff and patients were concerned about the privacy lock feature and the fact that the door slid and was heavy. A staff participant reminded those in the Listening Session that most sentinel events occur behind closed doors. Staff provided recommendations to enhance safety such as a magnetic release anti-ligature door or an anti-ligature alarm.

Ensuring both safety and privacy in an MBH setting is an obvious challenge, but the listening sessions also revealed the subtler balance of privacy and social interaction. One patient summarized the spatial needs succinctly, "Sometimes you want to talk to people, sometimes you don't. You need to have the option." A staff member acknowledged this: "We're always trying to push people out into the group milieu but [private rooms] are good for allowing people to decompress." MBH units are different than medical/surgical units because patients are only in their rooms for sleeping and dressing. The rest of their time is spent in other places and programs.

Although evaluations of the mockup room design did not directly address staff areas (beyond a short discussion in one of the Listening Session of open vs. closed nurse stations),

responses indicated the important balance of staff safety responsibilities and respite. In particular, private rooms can be an additional burden to staff; according to one staff member, "as soon as you're done [with safety checks], you have to start all over again."

Deinstitutionalization and homeyness. Contributing to satisfaction with the mockup room design were characteristics that instilled a sense of deinstitutionalization or "homeyness." Consequently, many of the inadequate characteristics were described as "prison-like," the embodiment of institutionalization. Features that fell under the Aesthetics, Comfort, Autonomy, and Choice/Control categories were often associated with Homeyness. One patient (who may not have been aware that the floors of the mockup room could not be changed) shared a desire for different flooring, suggesting "Make it softer, more homelike." A staff member appreciated the bathroom furnishings, saying "The look was nice, modern. It didn't look institutional, like a jail. Just modern."

Some staff members expressed frustration at the lack of resources in the mockup room design, "There is nothing inviting, nothing homelike. We do what we can with paint, with flooring, but if you're doing everything in one room every day, you're going to hate it." Responding to this comment, another staff member indicated that personalization can establish a sense of homeyness, even in a hospital, and suggested that patients be allowed to hang their art therapy work on the walls. Color can also help to create a homelike and less institutional environment. Patient and staff participants generally liked the blue accent wall and did not like the grey walls. Several participants recommended a pattern, or a mural.

Providing control and autonomy can also create a homelike feel. Staff and patients appreciated the storage space provided by the cubbies—although several participants still felt there was not enough storage space. Patient and staff participants also pointed out that the

cubbies were too low for people with mobility issues. Patients and staff responded very positively to the dimmable lighting and acoustical control in the rooms. One patient said, "I like not to have daylight, I like a darker room. But it's good to have the choice."

Positive distraction/nature. A variety of elements can contribute to positive distraction, most notably social interaction, music, art, entertainment, and nature. On the Feedback Forms, five patients specifically recommended the addition of usb outlets, presumably for phones, tablets, or other devices. Entertainment and nature were discussed during the Listening Sessions. One of the younger participants stated, "The only thing that makes a space better is entertainment. Just give me Netflix and I'm happy." Another mentioned, "It would be great if you had a painting/picture of the ocean, or a waterfall, and then the sound were coordinated with that." **Patients agreed that having access to fresh air would be a marked improvement. One patient stated, "It would be nice to have even a *crack* of open window." Staff also noted that windows and views were beneficial and that fresh air would be invaluable.**

Discussion

Comparing Patient-Staff Responses Across Measures

Comparing qualitative responses from the Listening Sessions and Feedback Forms to corresponding quantitative items on the Feedback Forms revealed similar patterns. Overall, staff responded more positively to the mockup room design. Both patients and staff agreed that the lighting control and access to daylight were the most positive characteristics.

In reference to private or shared patient rooms, there was a common theme between patient and staff concerns. While patients responded more positively to private rooms and staff were more ambivalent, both groups expressed that there may be a benefit to having patients "supervise" each other in some situations, particularly in the VA setting. One staff member

described this relationship, saying "In the military, we have 'battle buddies' which is unique to the veteran population. It's important for them to support each other." A patient commented, "We are our own personnel that could help each other out." Nevertheless, staff agreed that "the responsibility in supervision lies on the nurses. I would not leave that responsibility to patients."

Echoing this sentiment, patient participants seemed to express just as much (if not more) concern for the safety of their fellow patients. The importance of deinstitutionalization has been discussed in MBH care settings at length, supported most recently in Shepley et al. (2017) and Ulrich, Bogren, Gardiner, and Lundin (2018). A significant body of literature supports the stress reducing impact of access to nature (e.g., Alvarsson, Wiens, & Nilsson, 2010; Cooper Marcus & Sachs, 2014).

Hypotheses

In looking at our original *a priori* hypotheses, there were some expected results as well as some surprises.

H1: The mockup room's design will be positively evaluated by clients and staff overall, and for each of the design goals. We determined "positive" to be anything over 4.0, which was "neither agree nor disagree" on the 1–7 Likert scale. The mean total and individual patient and staff scores were all over 4.0 for the entire room design as well as for each individual item (not including the fourth item, *Aids patient and family participation in the treatment process*, which had been removed from quantitative analysis). Nevertheless, the scores were perhaps not as high as one might expect for an "ideal patient room." For the combined patient and staff means, scores ranged from 4.66–5.68; patient means ranged from 4.33–5.27; and staff means ranged from 4.93–6.14. **The most successfully rated Feedback Form item of the mockup by all participants (patients and staff combined and as individual groups) was *Empowers patients***

***and patient control*, 5.68 (1.64). This is most likely the result of the provision of a private room and bathroom. It is possible that even involving patients and staff in this particular mockup evaluation exercise had an empowering effect.** The least effective item for both groups combined was for *Facilitates communication, collaboration, and trust*, at 4.63 (1.78) which may be the flip side of the coin. If individuals have private spaces, they might not be interacting with other patients as often. For patients, means ranged from a low score of 4.33 (1.73) for *Provides connection to nature* to a high score of 5.27 (1.83) for *Empowers patients and patient control*. Among staff, the lowest score was 4.79 (1.81) for *Promotes staff and patient safety* and the high was 6.14 (1.27) for *Empowers patients and patient control*.

The luke-warm reviews may have been at least in part the result of the room not being totally "finished." At the time of the walk-throughs, the mockup room was almost but not fully complete as adjustments were still required for lighting fixtures in the ceiling, screws and hardware, and caulking. From qualitative analysis of the Feedback Forms and Listening Sessions, it was clear that patients and staff were distracted by some of these incomplete elements. As one staff Listening Session participant said, "People were focused on all the little things [that were problematic] instead of the overall room." These distracting details may have reduced the evaluation scores, particularly as they related to safety.

Spatial limitations of the mockup room, built within an existing room, precluded alteration of the floor and ceiling and providing actual views of nature; this may have also negatively impacted participants' assessment of the space. It is also possible that desired features (such as a true nature view or other distraction) were either not present or did not live up the participants' expectations. **Finally, it should be acknowledged that the room's design and actual mockup construction still represents a MBH inpatient room within a MBH facility**

where many patients are admitted against their will. One might expect that patients, especially, would be aware of this limitation.

H2: Staff and patients will rate the design goals differently. **Independent sample t-tests revealed a significant difference of approximately one point between patients and staff for the overall mockup room design score $t(52.65)=2.23$, $p = .03$ and with four out of the nine items:** *Communicates respect for patients $t(58.88)=2.69$, p = .009; Provides adequate access to daylight $t(58.12)=2.39$, p = .020; Provides adequate acoustical control $t(60)=2.38$, p = .020; and Empowers patients and patient control $t(57.23)=2.19$, p = .033. Provides accessible and comfortable accommodations* was slightly above the significance threshold $t(58.34)=1.92$, $p = .06$. A fifth item, *Provides accessible and comfortable accommodations,* was close to statistical significance ($p = .06$) and would likely have been so with a larger sample size. The difference in evaluation may be due to the psychological impact of "incarceration," the emotional state of the patients, or the fact that the patients were not prejudiced by the need to have the study result in positive outcomes.

H3: Overall, patients will rate the mockup room's design more highly than staff. Previous studies have found that patients/families rate environments higher than staff. (e.g., Kotzer, Zacharakis, Raynolds, & Buenning, 2011; Shepley, Duffy Day, Huffcut & Pasha, 2010). However, these responses were all in non-psychiatric settings and it has been suggested that this finding is the result of patients feeling grateful for the care that is provided them. For the mockup, the opposite was the case. With each item, patients rated the mockup lower than staff, ranging between 0.21 and 1.10 points out of 7. It may be that staff took pride in the mockup design project and wanted it to succeed. Alternatively, as a large number of the staff participants have served in the profession for over 10 years, it may be that they have seen a wider range of

facilities to use as comparison. It also possible that, as discussed above with H1 and H2, patients simply cannot have positive feelings about a space-- regardless of its design features--where they are being treated, sometimes involuntarily, for mental illness.

H4: Staff who have worked in the field of MBH for less time will rate the mockup room's design more highly than those who have worked in the field longer. Differences in attitudes between various levels of experience in psychiatric facility relocation studies have been unclear (e.g., Baillon, Scothern, & Vicker, 1999). In this study, we found no significant correlation between the amount of time a staff member had worked in the MBH field and their rating of the mockup room. This finding may be due to a relatively small samples size; the variety, or lack thereof, of MBH facilities where the staff have worked; or something specific about the host site organization.

Conclusion

The researchers had three goals with this project: 1) Our primary goal was to evaluate the MBH Patient Room's design, which was represented as a full-scale, high-fidelity mockup built within the existing VA MBH facility; 2) to facilitate a broader conversation with VA patients and staff about design for MBH; 3) to explore whether such a mockup could be an effective tool for future MBH design and evaluation applications.

Evaluation of the Mockup Room's Design. Overall, evaluations of the mockup room's design were very mixed; some participants (staff and patients) expressed that the room felt institutional while others indicated that it felt modern and homelike. Patients consistently rated the mockup room design lower than staff; with statistically significant differences in four out of the nine Feedback Form items. The VA Central Office of Construction and Facilities Management

participated in the project and will consider feedback from the mockup evaluation project for their revision to the VA Behavioral Health Design Guidelines.

Broader Themes for MBH Design. In the Feedback Forms and Listening Sessions, safety was clearly paramount for both patients and staff. These findings are consistent with past research on MBH environments. Other salient themes were deinstitutionalization/homeyness and positive distraction. The design features in the mockup that best addressed these themes were the most successful.

Mockups as a Tool for MBH Design and Research. Minimally, mockup simulation gives staff and patients something to look at and discuss with the designers. Multiple researchers have used mockups as tools for investigating design options and for evaluating the effectiveness of those options (e.g., Bayramzadeh et al., 2018; Kasali, Nersessian, & Zimring, 2013; Watkins, Lorenz, & Naos, 2010; Wingler, Machry, Bayramzadeh, Joseph, & Allison, 2018). Although the fidelity of the mockup in this project was not as effective as we would have liked, we believe mockups are a viable tool for future MBH research.

Limitations with the Research

This study had a relatively small sample size (33 patients and 29 staff with the Feedback Forms and 14 patients and 16 staff in the Listening Sessions). A greater number of Listening Sessions would likely have enabled the researchers to obtain content saturation. Because this was one mockup at one facility that serves US veteran patients, the results are not necessarily generalizable to other types of MBH facilities or even to other VA MBH facilities. Most of the patient participants were male; although this roughly represents the percentage of gender served by the host organization, a more balanced ratio of male and female would have been ideal.

Limitations with the Mockup Room Design. As is the case with most *in situ* mockups, there were limitations to construction modifications. For example, the ceiling and floor could not be changed and real views of nature from the room were not possible. Additionally, the evaluation outcomes might have been impacted by the fact that this was a single room, devoid of the context of a whole MBH environment. Participants still brought up the influence of private rooms on activity and interaction in the rest of the facility. One patient suggested that the dining room needed to be close to the patient rooms. Another patient mentioned activities in the day room, saying it was "important to have cohesiveness, play cards together." A staff member cited the current long hallways as a barrier to social interaction.

Limitations with the Evaluation Research Tools. The fact that this was not a pre- and post-evaluation makes the results difficult to interpret. Factors that were not measured (such as type of bed and chair, color of walls, and color of lighting) may have impacted the overall response to the room, and/or to individual items on the Feedback Form. Additionally, the attitudes of the tour guides, who also handed out the Feedback Forms, and/or the attitudes and comments from others on the tours, might have influenced the outcomes; one staff participant wrote, "Very well presented the presenter was nice & informative."

With the Feedback Forms, there was some confusion on the part of patients because two demographic questions were for staff only. Two surveys had to be excluded because the participants filled all questions, making it impossible to determine whether they were patients and staff. In the future, to eliminate confusion, we would recommend having separate surveys for patients and staff. We would also recommend removing the word "family" from Item 4 of the Feedback Form unless family members are explicitly allowed in the patient rooms of the study

site. Feedback Forms were not tested for readability prior to dissemination. Future research should include this step.

Future Research

Several topics associated with patient rooms have been of pressing interest. There is significant debate around whether patient rooms should be shared or private and whether they should have a private bathroom. Future researchers may investigate the role of peer responsibility in MBH, as facilitated by shared patient rooms. Perhaps sharing a sense of purpose in cooperative care plays a significant role, particularly for a military or veteran population.

Additional discussion revolves around the interior design of these rooms, fueled by the desire to make them homelike and comfortable while maintaining a safe environment. The appropriate specification of furniture, art, colors, and materials may have a significant impact on the safety, well-being, and health outcomes of patients as well as on staff and are important topics for future research as well.

Future research on the use of mockups for MBH might explore the potential differences between low vs. high fidelity and physical vs. virtual reality in effectiveness in conveying design ideas, eliciting feedback from users, and evaluating design solutions.

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