AN INVESTIGATION OF NURSING STAFF INPUT FOR THE CO-DESIGN OF AN OUTPATIENT DEPARTMENT

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Abstract. Sriphat hospital, Chiang Mai, Thailand, outpatient department (OPD) is under pressure as a consequence of high patient demand. The hospital administration has, therefore, approved the construction of a new building to cater for out-patients. Research has shown that the architectural features of a hospital building can affect therapeutic outcomes. Much of the support for this effect comes from research in evidence-based design (EBD) which aims to show a strong scientific link between environment and healthcare outcomes. An alternative view, the experience-based co-design process (EBCD), does not disagree with EBD per se, but argues for design input from those who will be the ultimate users (stakeholders) of a construct. Nursing Staff have a wealth of experience regarding building features that support their goal of an effective, efficient, and safe hospital working environment. This study involves an EBCD strategy model that considers the input from intended users of a new OPD. Input from current OPD nursing staff was gathered using survey and focus group discussion. Results indicated valuable insights from nurses. The adopted strategy is considered beneficial in determining user input to the design process.

Key words: healing environment, experience-based co-design, satisfaction, nursing staff

1. Introduction

Sriphat Hospital forms part of the Maharaj Nakorn Chiang Mai Hospital complex. The hospital complex (as a government hospital) is administered by the Faculty of Medicine at Chiang Mai University. The Outpatient Department (OPD) caters to some 500 patients per day. The original Sriphat building was constructed in 1997. Since that time the number of patients treated by the hospital has grown substantially. The main reason for this influx was the registration of the hospital as a 'nominated hospital' under the Thai government health scheme. As a consequence, the OPD now is experiencing severe overcrowding and impediments (Prugsiganont and Jensen, 2019).

Aware of the problems in the OPD, the Faculty of Medicine has approved the construction of a new wing that will cater to the needs of outpatients (both walk-in and by appointment). The University has instructed a design team to present plans for this new building.

An underlying concept of hospital design is the focus on the 'healing environment'. Based on the early work of Ulrich (Ulrich, 1984, 1991) the importance of a hospital's

physical (built) environment for the welfare of patients and staff, is now accepted as an essential aspect of design excellence. Research has focused on establishing a causal link between aspects of the built environment and their influence on therapeutic outcomes. This line of research is termed Evidence Based Design (Ulrich, 2006).

There is, however, a current perception that EBD needs to be adapted to a more localized perspective. This view has given rise to the concept of Experience Based Co-Design (EBCD). This model argues that the experiences of those who will use a facility should be considered important to the design process. In the case of hospitals this 'experience' is sourced from patients, nursing staff, and doctors. The argument is presented that these 'stakeholders' will have a better idea of what 'works' and thus their input will result in a more 'user-friendly' and functional design.

Members of the nursing staff at the current Sriphat OPD are critical stakeholders in the new facility. They can provide valuable insights regarding features of the OPD built environment that they consider important to patient wellness and their own welfare and working conditions. These insights will then become further input to the co-design of the new outpatient building at Sriphat hospital.

This study aims to establish the utility of an experienced-based co-design model for the design of a new hospital unit. Experience-based co-design (EBCD) differs from other design models in that it allows input to the design process by those who will be the end-users of the facility. The objective is to assess the contributions of nursing staff to the final design of an outpatient department using the EBCD model. The model is not restricted to hospital design, but has application in the design of any built environment meant for human use.

2. Background

Florence Nightingale (Nightingale, 1859) argued that architectural characteristics of a hospital building (provision of fresh air, sunlight, warmth) can have a positive effect on patient welfare. Over the years this theme has been taken up by healthcare researchers, thus there is now a considerable body of knowledge regarding the effect of the built environment and its influence on patient and hospital staff wellbeing and safety. Ulrich (2006) and others (Hamilton, 2003; Ulrich *et al.*, 2008; Malkin, 2008) have called for research that matches environmental design features with specific, measurable therapeutic outcomes (Ulrich *et al.*, 2010). Such research has provided a body of knowledge that is the corpus of "Evidence Based Design" (EBD). 'Evidence based' suggests that there is 'scientific evidence' for the relationship between architectural features and health outcomes, thus brining scientific rigor to the study of the environment (Carr *et al.*, 2011). EBD uses information from research and project evaluation to guide designers and stakeholders in providing architectural features that are most likely to achieve design goals (Hamilton, 2003; McCullough, 2010; Elf *et al.*, 2015).

According to EBD research (Ulrich *et al.*, 2008, 2010; Huisman *et al.*, 2012) various environmental features provide for patient and staff welfare in hospitals. A hospital's physical environment can promote better clinical outcomes, ensure safety, and reduce stress for both patients and staff. Studies proposing specific

research questions or providing a meta-analyses of the extant literature, have provided support for the healing value of certain architectural features.

Harris *et al.* (2002) assessed patient satisfaction with aspects of the hospital physical environment. They classified design features contributing to "physical comfort" as 'ambient features', 'architectural features', and 'interior design features'. A similar classification was adopted by Dijkstra *et al.* (2006). Ambient features include temperature, lighting, noise level, air quality and smells. Architectural features are those factors that relate to the actual physical structure of the environment: entrance, layout, windows, floor materials, toilet elements. Interior design features are those factors in the environment that can enhance a sense of ease and comfort for the hospital user. Interior design features include: art works, plants (nature), television, color scheme, furniture, and signage. This model was also used by Waroonkun (2018), when investigating patient satisfaction with a hospital out-patient department, with the addition of a further category: 'outdoor environment features'. Outdoor environment features are those services and activities that are not part of the actual OPD but are considered to have an impact on OPD users' level of anxiety/comfort. Included in this category are physical surroundings and view, rest areas, and additional services (cafe, convenience store, facilities for children).

These environmental features can be considered elements of the functional quality of the building. The functional quality of a hospital environment may be described as how well the building meets its desired purpose. Van der Voordt and Van Wegen (2005) suggest nine criteria pertaining to functional quality. As a measure of this concept, this study uses a subset of these criteria that is considered relevant to the hospital out-patient department. A similar subset was also used by Prugsiganont and Jensen (2019). These criteria of functional quality inter alia included:

- efficiency; layout and space to perform requisite functions.
- safety; features that prevent or eliminate the cause of accidents or mishaps.
- spatial orientation; access and wayfinding, ease of navigating spaces.
- privacy; separation between private and public space.
- health & physical well-being; light and noise levels.

There has been some issue with EBD as the sole basis for hospital design. Carr *et al.* (2011: 14) have argued strongly that EBD is "in danger of being overused" and that it is "functioning as a demand for recognition of the validity of a policy, protocol, or procedure". Becker and Parsons (2007) suggest that relying on a single source of "quantitative academic research" [EBD] is a potentially limiting strategy for design. It has been argued that the limitation of available evidence reduces the potential of EBD to explain the relationships between design features and therapeutic outcomes (Stankos and Schwartz, 2007; Pati, 2011). The solution to this problem lies in evidence gathering within the local context (Carr *et al.*, 2011). The concept of local context implies retrieving evidence from those who are potential users of the final construct. Becker and Parsons (2007) have suggested a "collective problem-solving approach" wherein scientific evidence is coupled with user experience. The requirements of the hospital environment should not rely on the personal opinion

of the architect (or administrator) but should reflect user behavior as a guiding principle (Sommer, 1969). Hospital design has moved from an emphasis on 'functional' design alone to a focus on 'user friendliness' in terms of patient and staff needs. As Bate and Robert (2007: 184) note, "The traditional view of the user as a passive recipient of a product or service gives way to a new view of users as co-designers of that product or service, and integral to the improvement of the innovation process".

The focus on input into the design process by users of the final construct is known as Experience Based Co-design (EBCD). Co-design is an approach to design that aims to actively involve all stakeholders in the design process to help ensure the result meets their needs and is usable. Recent research suggests that designers are more creative and innovative when working within a co-design environment than when creating ideas on their own (Trischler *et al.*, 2018).

EBCD usually involves a multi stage process wherein information is gleaned from the various stakeholders as separate groups. The information may come from surveys, interviews (filmed), and/or observations of each group. The separate stakeholder groups then meet to share experiences and emotional 'touch points' in order to establish critical issues for design input. The final stage is a series of co-design focus groups to work on identified priorities (Tollyfield, 2014; Robert *et al.*, 2015).

Drawing on the work of Bate and Robert (2007), Tollyfield (2014) has provided a six-step model that shows how the EBCD process can be applied. In summary the stages include assessing personal experiences from patients and nursing staff, then bringing the groups together to share experiences. The final stage has representatives from the shared groups working together to incorporate patient/staff insights to make quality improvements.

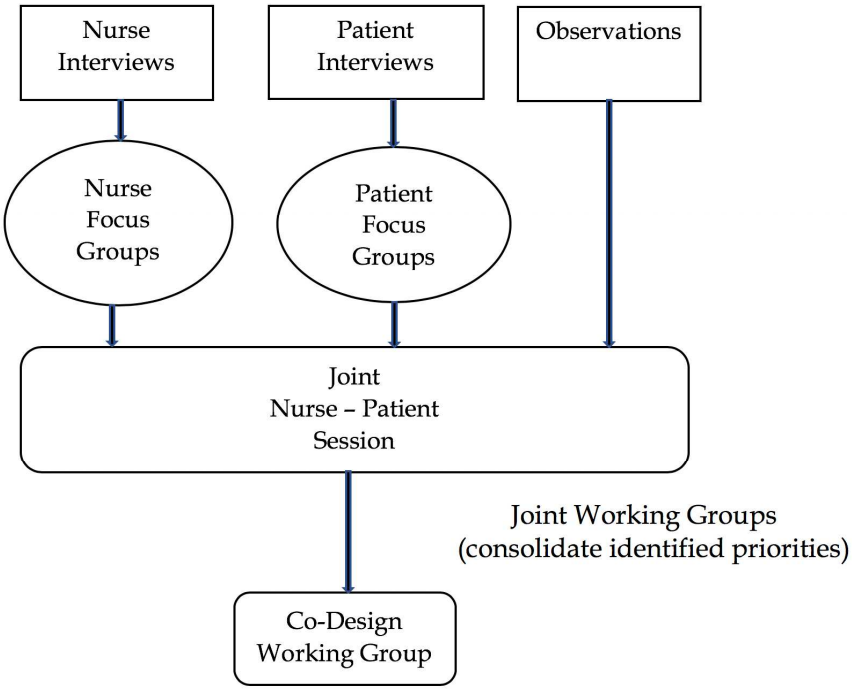

Fig. 1. Experience-based co-design process model (after Tollyfield, 2014)

The impact of the above model appears to focus on the re-design of procedures rather than building design issues. Tollyfield (2014) reports outcomes of the EBCD that are related to inpatient ward function (e.g. enhancing basic care, reducing noise and sleep deprivation). In this current study a modification of the model described above is suggested. An extra stage is inserted prior to celebratory activities. The goal of EBCD process is for stakeholders to have input into the final design decisions for a built environment (OPD). Therefore, it is essential for stakeholder representatives to meet the design team to discuss what have been selected as identified priorities by the stakeholder focus groups. This meeting is represented by the extra stage 'Co-Design Working Group' (Fig. 1).

The users/stakeholders of the hospital environment will include patients, nurses, doctors, and support personnel. An EBCD approach to design requires that each of these 'stakeholders' has input to the design process. Their experience on how a service works in reality provides a practical balance in the design process.

The role of nursing staff as contributors to the design of hospital facilities is not new. Nightingale (1858) actively argued the value of nurse input to the healthcare environment. Miller (1983) noted that nurses have the potential to participate in the design of their workplace much more than just advising what colors look nice for the furnishings. Hospital administrators, generally, have not looked to their own nurses to come up with solutions to problems in the healthcare environment. This, despite very strong evidence that nurse-designed innovations in hospital care, have been immensely successful (Aiken *et al.*, 2001). Nursing staff experience a hospital's built environment on a daily basis. Their working knowledge of the design features that support their goal of optimal patient care in a safe environment for all, can provide valuable insight for the design process (Hardesty, 1988; Munn and Saulsbery, 1992; Stichler and Cesario, 2007; Tolleyfield, 2014).

This particular paper reports on the process for nursing staff involvement as stakeholders in the design of the new outpatient department building at Sriphat hospital. The study is limited to the first two stages of the EBCD model presented above (Fig. 1): staff interview, staff focus group. The aim is to determine those issues that nursing staff consider critical to the design of a new outpatient department at Sriphat hospital.

3. Materials and Methods

In the initial stage of this study nurses were asked to complete a questionnaire that assessed their level of satisfaction with a number of features of their physical work environment at Sriphat Hospital outpatient department. The survey item categories were derived from the EBD research reported in the literature. Major categories in the questionnaire covered 1) workplace layout 2) safety 3) general ambience 4) privacy 5) [convenience] facilities. Each of these categories contained a number of question items that constituted the contributing elements to the overall category score. The survey was a Likert style questionnaire where respondents score 1 for very dissatisfied through 5 for very satisfied. A score of 3 represented a 'neutral' response. A mean score for each item was calculated and these, in turn, contributed to an overall mean for each major category. Results of this survey indicated issues

that were of concern to nurses based on their work experience.

The second phase of the data collection was a series of focus groups. The focus groups (8-10 people, all previous respondents to the survey) met in a hospital meeting room. No management or senior personnel were present. The focus group facilitators were members of the research team who had undertaken a short course on focus group management. The focus group facilitator welcomed the participants, explained the purpose of the focus group and then worked through the results of the survey. Each of the focus groups was given the overall survey results and asked to comment. The results of the initial staff survey were used as a basis for discussion and amplification. Discussion was initiated within each focus group according to a script. The group leader asked, "What seems to be the main problem with [factor]?" Where there was a lull in later discussion, the facilitator used the prompt question: "Any other issues/areas we have overlooked in our discussion?" After these questions, the group was encouraged to free flow with their thoughts, comments, and ideas. It was made clear that there were no 'pre-determined' correct comments and that all the ideas and comments of the respondents were valuable and worthwhile. The research team kept an audio recording of each focus group. The information presented by each group was distilled into common core themes that related to and amplified the issues for each of the major categories.

Hospital administration approval for the study was granted. Nursing staff were invited to participate in both the survey and focus group. They were informed they could opt out at any stage. All staff keenly accepted to be involved.

4. Results

Respondents to the survey, and who were also involved in the focus groups, were nursing staff at the OPD in Sriphat Hospital. The total number was 38, of which 34 were female and four were male. All respondents had two or more years of service in the OPD.

Results of the Lickert style questionnaire are shown in Table. 1. The results shown are the overall mean score from the contributing items to each factor. The Likert scale responses available were 1: very dissatisfied, 2: dissatisfied, 3: neutral, 4: satisfied, 5: very satisfied.

Table 1. Nurses mean level of satisfaction for major characteristics of their work environment.

	Factor	Mean	SD
1.	Lay out & Work Environment	3.59	0.59
2.	Safety	3.36	0.36
3.	General Ambience	3.40	0.40
4.	Privacy	3.23	0.24
5.	Convenience/ Facilities	1.57	1.43

Resulting form the focus group discussion, the core issues that were raised by nursing staff in terms of their work environment and chosen as critical concerns were as follows:

1. Layout & Work Environment

- Crowding: difficult to maneuver around people and get to their destination.
- No clear demarcation between public and staff space.
- Inadequate signage, time wasted directing patients.

- Exam rooms cramped: equipment, limited space for the patient and family.
- Poor lighting (inadequate, not working).
- Workflow: too many functional units in small space (registration, assessment, pre-med, waiting area, exam room).

2. Safety
- Poor building maintenance and overall cleanliness.
- Flooring: slippery, poor maintenance (ad hoc).
- Furniture: uncomfortable, inappropriate for some patients (elderly).
- No defined space for wheelchair, gurneys – become obstacles.

3. General Ambience
- Noise level: difficult to be heard when calling the patient.
- Furniture: dated, insufficient (patient and staff).
- Air quality: better circulation needed, affects the temperature.
- Sad lack of positive distractions (art, greenery, color).
- No outside views.

4. Privacy
- Difficult to have private communication with the patient (space).
- Better soundproofing for exam rooms.

5. Convenience/ Facilities
- Small shared space for staff relaxation.
- No staff restrooms.
- No suitable co-working space (Dr./ nurses).
- No alternative waiting space for patients (e.g. coffee shop, nearby kids play area) resulting in crowding in the waiting area.

5. Discussion

Results of the survey show scores clustered around the neutral (3) response for all items and categories, except for the Factor 5 *Convenience/facilities* (Mean=1.57, S.D. = 1.43). The interpretation of the results for Factor 1-4 may be that the criteria are not so important and that they enjoy a reasonable level of satisfaction. An alternative view is that respondents are hesitant to make a commitment in their response to the survey. The research team, aware of the possibility of these issues, decided on the prompt question "What seems to be the main problem with [factor]?" in order to initiate the focus group discussion. This question acknowledges that there may be problems, and it "gave permission" to the focus group members to freely express their views – positive or negative.

From the content of the focus group discussion, it was apparent the nurses were expressing their grievances and suggestions for improvement. Interestingly, the nurses also seemed to be commenting on areas that reflect their patients' perspective (e.g. comfortable furniture, artwork, greenery, alternative waiting areas). This reinforces the suggestion that the physical environment has an influence on both patients and staff well-being (Ulrich *et al.*, 2004).

Elements from the focus group discussion suggest that an important design consideration for nurses is the provision of sufficient and organized space (layout) so that they can carry out their duties effectively and efficiently. A strong view expressed was the need for adequate cleaning and maintenance of established structures (e.g. walls, ceilings, floors) in the OPD (Factors 1 and 2). Secondly, the nurses were impacted by the large

number of patients and the consequent problems associated therewith. Many of the nurses' suggestions for improvement were related to systems rather than the built environment (e.g. queue numbers, digital display for patient calls, public address system).

As with patients in other reported literature, nurses were also concerned with the overall ambience of their work environment (OPD). This included ambient temperature, air quality, lighting, availability of natural light and exterior views. Positive feel from color schemes, artwork, and greenery were also considered important (Factor 3). Reflecting the nurses concern for patients was the consideration of privacy issues; particularly confidential discussions with patients (Factor 4). However, the issues most strongly held by the group were in the area of convenience facilities (Factor 5). All respondents agreed on the importance of a designated area where nursing staff could escape the pressures of the crowded, chaotic waiting area of the OPD. There was also an expressed need for co-working space where doctors and nursing staff could work together and where nursing staff could perform necessary (paper) work without interruption.

An obvious limitation for this study is the representative outcomes of the focus groups. As with any communal conversation each participant has their own 'style': reticent, withdrawn, vociferous, dominating, etc. Add to this that Thai culture scores high on Hofstede's dimension of power distance (Hofstede *et al.*, 2010). This effectively means that "minors" will defer to their "seniors" in most matters. This status difference can depend on age, education level, professional experience, perceived wealth. For the focus group discussions in this study facilitators were made aware of this issue. As the facilitators themselves were Thai, they developed strategies to encourage members to express their feelings/opinions in a 'respectful manner' in order to minimaize any potential bias.

Although nurses' information and perspectives were available, the value of this information to the design team needs to be determined. Nurses, generally, do not have knowledge of design concepts and may not be fully cognizant with what is possible (Stichler *et al.*, 2007). For example, they would not appreciate the effect of government regulations, budget restrictions, engineering codes. However, in the EBCD model proposed in this study (Fig. 1) these issues would be addressed in the later joint sessions with design team members. Further research regarding the processes and outcomes of these joint sessions would be beneficial.

This study has focused on a single unit (OPD) in the hospital complex. The totality of the hospital is made of a myriad of units that must integrate to form an effective and efficient hospital complex. What is not known, and requires further study, is how to integrate the result of this single unit outcome with the total hospital complex (Carr *et al.*, 2011). The question arises: Is Experience Based Co-design workable when planning and designing a complex organizational structure such as a hospital?

6. Conclusion

This study related to the design of an Out-Patient Department at a major Thai hospital. The investigation followed an Evidenced Based Co-Design model wherein the users of a facility have an

input into its renovation or new construction. In this case the nursing staff were the selected participants based on their work experience. Nursing participants opinions were collected using a survey, items of which were based on reported Evidence Based Design research. Resulting from the EBCD process a number of critical issues were identified. These issues became input for joint stakeholder-design team action. The information gained from this research demonstrates the value of EBCD as a source of advice for facility design. In particular, the information acquired has potential as an essential contribution to the design of an effective and efficient out-patient department. As part of the overall EBCD strategy for an OPD, the views of nursing staff have a valuable contribution to make. Such inputs should not be limited: the views of all stakeholders (patient, nurses, and doctors) need to be taken into account. Design specialist would be well advised to seek input from all users to ensure a construct that is both functionally efficient and user-friendly.

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