

### 1. Introduction

#### *Post-Occupancy Evaluation*

Evaluation and feedback are key components of the continuous improvement of the built environment. Post-occupancy evaluation (POE) is the process of systematically and rigorously evaluating buildings after construction and occupancy and providing feedbacks for improvement (Preiser, Rabinowitz, & White, 1988). Originated in late 1960s, POE has been widely used in evaluation efforts in almost all building types owned by government agencies as well as the private sector.

An organization can gain significant benefits from a POE in several ways (Gilby, Blyth, & Barlex, 2006; Preiser, 2001):

#### Short-term benefits

- Identify and solve problems in the built environment
- Fine-tune the building (including space utilization) in response to user needs and feedback
- Verify the design functionality and the conformance with design requirements

#### Medium-term benefits

- Inform ongoing building adaption due to changing organization needs
- Adjust the repetitive design solution that can be used on recurring basis
- Test innovative design solutions

#### Long-term benefits

- Facilitate decision making or justification about future actions and expenditures
- Generate knowledge about effects of building design on occupants and organizations
- Improve the overall design quality of similar types of facilities

The benefits of POE's can be expanded when the results of POE's are shared with a larger community as opposed to limiting the dissemination within individual organizations that conduct the evaluations. This more transparent approach of information sharing may enable shared learning through benchmarking individual facilities with other similar facilities (Gilby et al., 2006).

#### *Clinic Design POE*

In recent years, there has been unprecedented growth in community health center (CHC) renovation and construction, owing partially to the trend of healthcare moving towards outpatient and home-based care. Many CHCs have recognized the importance of clinic design in improving healthcare outcomes and have been eager to seek knowledge resources around clinic design. However, there is very little empirical information specific to clinic design that can be used to inform decision-making. Further, the lack of standardized evaluation tools and platforms for sharing the results of design evaluation has limited the generalizability and usability of the existing post-occupancy evaluations conducted in community health center.

With support from the California HealthCare Foundation and the Kresge Foundation, The Center for Health Design (CHD) developed a standardized Clinic Design Post-Occupancy Evaluation (POE) toolkit. The purpose is to support the ongoing cycle of evidence-based clinic design and construction by developing resources that enable the evaluation of built projects for their effectiveness in meeting design and performance goals.

#### *The Guide*

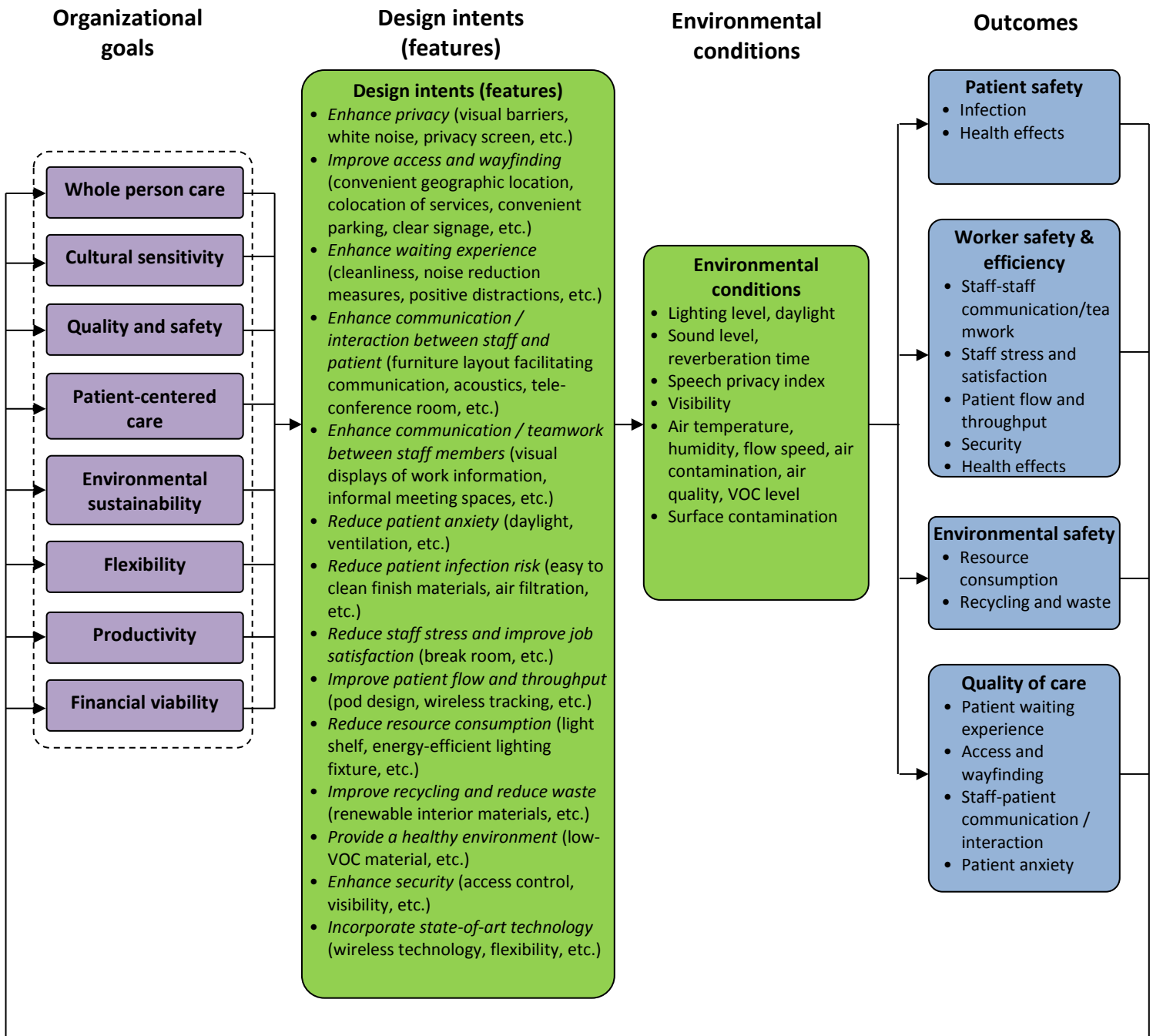
There is a two-fold purpose to this guide:

- 1) to provide an overview of the background, the conceptual framework, and the structure of the toolkit;
- 2) to provide a recommended process for using the toolkit to conduct a post-occupancy evaluation (POE).

The recommendations included in this guide are intended to be general directions, not prescriptive instructions. This is because every facility or building project is unique and the appropriate process for conducting POEs may vary significantly among facilities and building projects.

## 2. Conceptual framework of clinic design POE

Below is a conceptual framework based on research literature review and expert opinions to illustrate the relationships between the major factors around clinic design evaluation. Clinic design POE at one specific facility should focus on how the environmental design supports the achievement of organizational goals relevant to this particular facility. During the design process, these organizational goals are translated into a set of specific design intents/principles and design features. The design decisions lead to a set of environmental conditions (e.g., lighting level, window views of nature) presented in the building after construction. The environmental conditions impact healthcare outcomes (e.g., patient satisfaction) after occupancy. The POE results will be used to confirm whether the design intents are realized and to adjust organizational goals in future renovation or construction.



### 3. The Toolkit

The toolkit includes five tools for collecting a variety of data on the physical environment, subjective perception of users, and objective healthcare outcomes. The following is a brief description of each tool:

*Tool 1. General Information, Organizational Goals & Design Principles*

This is used to collect two main types of information. The first type focuses on the essential information about the organization, the CHC, and the building project, including the address, contact information, major factors that may impact building design such as service types, number of physicians, and so on. The second part focuses on model of care, organizational challenges and goals as well as the design intents or principles in support of the organizational goals.

*Tool 2. Audit of Physical Environment*

This is an audit tool including rating items for a set of design features. The tool is organized by major CHC spaces and is intended for an interdisciplinary team including a CHC representative who is familiar with the facility design and operation as well as front-line staff representatives and designers to walk through various spaces (with paper and pen or a laptop), conduct observation, mark whether the design features are implemented, and rate how well the design features meet certain criteria.

*Tool 3. Patient Questionnaire*

This is a simple, anonymous paper format questionnaire (2 pages) to gather patient perceptions of clinic environment and service quality. A Spanish version is also available for those facilities with a significant Spanish-speaking patient population.

*Tool 4. Staff Questionnaire*

This is an anonymous questionnaire (3 pages) focusing on staff perception of environmental design and work experience. It is intended to be self-administrated by individual staff members.

*Tool 5. Outcome Data Collection Form*

This form is intended to facilitate the data collection on outcomes related to the selected goals and design intents. It includes outcomes that are typically collected in clinic operation (but probably for other purposes) such as staff turnover rate and clinic cycle time as well as technical measurements such as lighting and sound levels.

The pdf version of the POE toolkit is publicly accessible through the CHD website ([www.healthdesign.org](http://www.healthdesign.org)). The toolkit is designed to be self-administrated so that individual CHCs can download and use the POE toolkit by themselves. An Excel version of the toolkit with more robust functions in automatic score calculation and so on is available with CHD's Affiliate Plus membership. The CHD research team also provides advisory services ranging from toolkit customization to better fit other outpatient facility types, assistance in conducting the POE, to unbiased analysis, review, and interpretation of results.

### 4. Team composition and participants

*Core team*

Both leadership support and staff participation are important for the success of the clinic design POE. From the beginning, a core team should be organized to include at least one member or representative of the leadership team of the organization and one or more individuals who have working knowledge about the facility design, daily operation of the clinic, and various data collected in the clinic and the organization (see Tool 5). One member of the core team should be assigned as the main responsible person who takes ownership and serves as the representative of the CHC, gathers all data from different staff members, and verifies the consistency of the data.

*Other staff participants*

Every staff member in the clinic can participate by providing feedback about the building design in the staff survey (Tool 4). In addition, selected front-line staff members may participate in the environmental audit (Tool 2) to make the evaluation more balanced and objective. Staff members in charge of certain data collection at the CHC or organization level such as the human resources manager who collects data around

staff absenteeism and turnover will provide the relevant data to the main responsible person for the completion of the Outcome Data Collection Form (Tool 5). One or two staff members may also take technical measurements if so decided. When there are patients who have difficulty in filling out the patient survey (Tool 3), the CHC administrator may choose to identify one or two research assistants (e.g., students from outside, or CHC staff members, although this may introduce biases) to read the survey questions to patients and mark the responses on the paper questionnaire.

#### *Consultants/contractors*

External consultants and contractors (including someone with research expertise and background) may be hired to help with the technical measurements (e.g., air temperature, lighting level, sound level) and patient surveys as well as assist with analyzing and interpreting data collected.

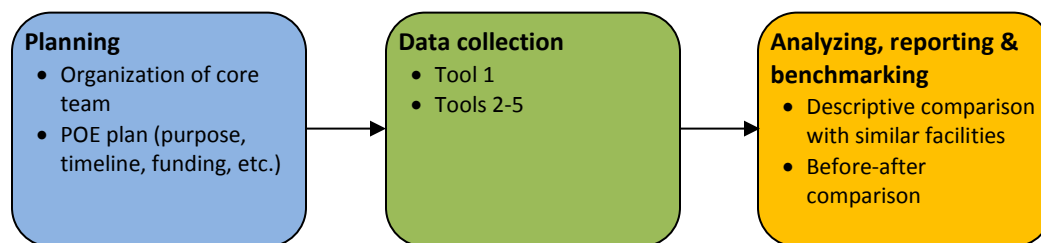
#### *Patients*

A selected group of patients will participate by filling out and returning the patient questionnaires (Tool 3).

## **5. Process**

Below is a brief description of the typical process of using the toolkit. Although the process is intended to be widely applicable, individual facilities may make adjustments based on their specific situations. A more thorough overview of the evidence-based design research process can be found in other publications such as the EDAC Study Guide 2 (Quan, Geboy, Ginsberg, Bosch, 2014).

There are three main steps of clinic design POE: planning the POE, data collection, and reporting and benchmarking the results.



#### *Planning*

In the planning stage, an organization needs to make the following key decisions around the POE:

- The main purposes of conducting POE
- The facilities or buildings to be included in the POE
- The core team composition
- The available resources (both internal and external) including staff time and funding for external consultants and contractors if needed, and the timeline including major milestones.
- The data to be collected. Depending on the availability of resources and purposes of conducting the POE, a facility may opt to complete only some of the tools. However, we strongly recommend completing as many tools as possible to produce relatively more comprehensive and credible findings.

The organization of the core team and the completion of a detailed POE plan are the two major results of this stage. The POE plan should document all the above decisions.

#### *Data collection*

Tool 1 is designed for documenting essential background information around a construction project as well as the goals and intents of the project, against which the built environment should be evaluated. A staff representative should use the tool to collect relevant information at the beginning of the POE process, probably through reviewing construction documents, and interviewing with organizational leadership, facility manager, and designers. This step can occur before or after occupancy.

Tools 2-5 should be completed in a new facility at least six months after occupancy to avoid biases due to any “honeymoon” effects. In cases of replacement or renovation, the tools can also be used in the old facilities to collect baseline data so that comparisons can be made to examine the relationships between building design and outcomes. Because Tools 2-5 involve human participants, it is recommended that the

project team examine ethics requirements before data collection (e.g., consulting with an affiliated ethics review board). If needed, ethics approval should be obtained before data collection.

Tool 2 (environmental audit), is intended to be used by an interdisciplinary team including a facility manager or another individual who is familiar with the facility design operation as well as designers and selected front-line staff members. It is recommended that the auditors bring an easy-to-carry laptop to record the ratings on the Excel file (or a printout of the tool and a pen in the case of using the pdf version) and a digital camera. The auditors will walk through various spaces from building exterior (e.g., gardens and parking lot), waiting areas, patient-clinician interaction space, staff workspace, exit/checkout). The tool lists a set of design features in each type of space that are supportive of the design intents and organizational goals identified earlier in Tool 1. Each auditor independently verifies whether each design feature is implemented and how well it meets one or more criteria listed in the tool on a 5-point scale. In addition, photos of each type of space should be taken according to the photo checklists included in the tool. After the completion of the environmental audit, the scores for individual design features and spaces will be automatically calculated and summarized in the “Results” tab if the audit is completed using the Excel version on computer. Or, if paper and pen were used during the walk-through, then the auditors or other staff member will need to calculate the score for a specific design feature (as an average of all criteria for the feature) and the score for a specific type of clinic space (as an average of all design features implemented in the space). Photos taken during the walk-through as well as floor plans should also be stored with other POE documents.

Tool 3 - The patient surveys require voluntary participation from patients. The survey administration method may vary among different CHCs. Typically, during the data collection period (about 2-3 weeks), CHC staff members invite patients to participate in the survey during their visits (e.g., check in, waiting, or check out). If a patient agrees to participate, the patient can independently complete the questionnaire, put it in an enclosed envelope, seal the envelope, and deposit into a locked box conveniently located, for example, at the checkout desk. At the end of the data collection period, a POE team representative collects the completed questionnaires. The desirable sample size is 50 respondents per CHC.

Tool 4 – The staff survey requires voluntarily participation from staff members. Notifications should be sent through email or other methods to all staff members working in the particular facility to inform them about the opportunity of providing feedback regarding the clinic design. Additional emails and paper notes in staff workspaces can be used as reminders. Staff members should be instructed to complete the anonymous questionnaire during work time. The desirable sample size is at least 50% of the staff members or 50 respondents per facility.

Tool 5 - In order to complete outcome data collection form, the POE team needs to work with various departments in the clinic or organization to gather relevant information. An important step is to identify the individuals within an organization or a CHC who are responsible for routinely collecting the relevant data. Another important factor is the unit of data collection. For example, some routinely collect data for the whole organization instead of an individual CHC or building. In this case, extra efforts are needed to separate out the data specific to the clinic or building to be evaluated. Technical measurements can be obtained using approximate tools such as lighting or noise level apps on tablets or smartphones by the CHC representative. If resources are available, more accurate measurements can be made by the clinic representative with assistance from external consultants using the instruments that meet the standards recommended by ASHRAE (ASHRAE, 2010) or other industry standards.

#### *Analyzing, reporting and benchmarking*

After the data collection is completed, the POE team should double-check to verify the completion and consistency of data before conducting descriptive or more in-depth analyses. It is recommended that an experienced researcher lead the data analysis and result interpretation process. The data analysis process should be determined according to the purpose of POE. Several examples of data analysis include:

- Evaluation of the design features relevant to the project goals and intents to identify the weak points (e.g., the lowest rated design features or aspects, or the negatively perceived environmental aspects [rated lower than 3 on surveys]). Further actions can be taken to remedy the weaknesses in the built environment based on lessons learned from POE.
- Descriptive comparisons between similar facilities within a same healthcare organization to identify the differences in the physical environment design and how they impact healthcare outcomes and user satisfaction.
- If data has been collected for both the old and new facilities, descriptive comparisons can be made to verify whether the design intents have been realized (i.e., whether the relevant ratings have improved).

The findings from the POE can be written up and shared internally with facility administrators, staff, and patients in a variety of formats (e.g., full report, summary) and externally to contribute to the industry knowledge base (e.g., article, presentation).

## 6. References

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