



7 8

Housing, Health and Environment

"Application of Environmental Evaluation by Hospital Users in Health Care Facility Management"
Kato, A. and Komatsu, H.

**"Capability of Daily Living of the Elderly and Their Accident Experiences:
Implications to Design of Safer, Easier-To-Use Dwellings"**
Kose, S.

"Searching for a Real Home"
Liu, S.

"Better Than a Mexican Jail"
McNamara, M.

"Hot Spots" of Fear of Crime at the Micro and Macro Scale"
Nasar, J. and Fisher, B.

"Assessing Designers' Perceptions in the Provision of Shelter for the Homeless"
Refuerzo, B. and Verderber, S.

APPLICATION OF ENVIRONMENTAL EVALUATION BY HOSPITAL USERS IN HEALTH CARE FACILITY MANAGEMENT

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Abstract

Hospitals in Japan take the leading role in health care services with commitments in the fields of secondary care mainly inpatient services as well as primary care mainly out patient services. The study focuses on surgical operating departments, inpatient wards, and out patient waiting area to conduct an extensive survey of environmental evaluations by hospital users, namely patients, nurses, surgeons, and anesthetists. The application of Post-Occupancy Evaluation (POE) and our trial of the methodology are discussed in the following for the development of a comprehensive tool for Health Care Facility Management.

1. Objectives

Buildings are evaluated in many aspects. The act of evaluation is based on the belief in some values. There are various values believed in and sought for in architecture. For the evaluation of a building, some of the decisive values needed for the building are taken as the criteria. W.F.E. Preiser, H.Z. Robinowitz, E.T. White in "Post-occupancy Evaluation," emphasize the importance of the comprehensive evaluation of the following three elements; 1) technical elements concerning structure and security, 2) functional elements concerning human factors and efficiency in usage, and 3) behavioral elements concerning territoriality and environmental perception. The last elements are recently being highlighted in the environmental design research and by the practicing architects as essential feature of Post-Occupancy Evaluation (POE). Here, the criteria of building evaluation focus on the degree of users' satisfactions about the building environment.

A.F. van Wagenberg addressed POE as a tool in Facility Management in his presentation as a delegate from the Netherlands Facility Management Association, NEFMA, during the First International Symposium on Facility Management held at Washington D.C. in 1989. Here, POE was defined as "the measurement of the functioning of a building in use in respect to the goals, stated in the formal program (brief) as well as in respect to the goals of architects and other advisors involved in the design of a building".

This study aims at analyzing the influence of the physical environment included in design proposals on the users, and discovering the guidelines of how we can understand and utilize the users' evaluations for the purpose of designing physical environment.

2. Methods

Extensive questionnaire surveys were conducted in various hospitals as shown in Tables 1 to 3. In the surveys respondents were asked to evaluate basic performances of target settings.

The classifications of basic performances as "space", "lighting", "acoustics", "temperature", "odor", "appeal", "security" followed those recommended by Preiser. However, "usage" replace "flexibility." Terms "independence" and "openness" are added in ward surveys, and also "cleanliness" in operating department surveys. The term "total impression" is added in all of the cases. Five-point rating scales are used in these questionnaires and the scores are reduced to three points in analysis, namely satisfactory - neutral - dissatisfactory.

In the waiting area questionnaire the terms "number of seats" and "distance from others" are added to further define "space." Replacements of "chatter" for "acoustics", "dirt" for "appeal" are conducted to pinpoint the issue. And the term "waiting time" is added in relation to service performance. Also, four point rating scales are used with evaluation terms of "bearable for a hospital" and "natural as a hospital" to differentiate the mediocre evaluations. The former term, meant for the negative side of mediocre evaluation, was proposed by Takayasu KAWAGUCHI of Chiba University of Architectural Planning Symposium during 1989 General Assembly of Architectural Institute of Japan. The latter term is for the affirmative side of mediocre evaluation. Each analysis is carried out among the user group to clarify the general trends, and Quantification Theory III in SPSS used to refer to the connotative structure of evaluation. In out-patient waiting areas with a large number of respondents, a comparison between the specific facilities is carried out.

3. Design Descriptions

3.1 Operating Departments

In plan-design, the zoning of environments by the degree of cleanliness is the focal issue. Based on the required degrees of cleanliness, the target operating departments are designed by segregating the interior environment into 4 zones; "sterile", "clean", "semi-clean", and "ordinary". The "sterile" zone is defined as a zone implemented within the "clean" zone in limited space and time by the intricate air-conditioning system using HEPA (High Efficiency Particles Absorption) filters, as well as regulations on movements of people and goods and cleaning methods.

Hekinan Municipal Hospital (HMH): Programmed for 330 beds, and 200 beds committed at the time of survey, the operating department has six operating rooms (OR). With the exception of infectious and out-patient operating room, 5 ORs are linearly located being attached to the common clean hall. According to the zoning of cleanliness, "sterile" zones are defined as areas surrounding operating table, the entire BCR (Bio-Clean Room), and layup corners in clean hall under designated usage. And the "clean" zone are defined as operating rooms excluding BCR, the remaining area of clean hall, and the pre room to BCR. (Figure 1)

Chubu Rosai Hospital (CRH): Among the total of 10 ORs, eight are attached to lean hall in parallel rows. After the scrub-up the staff enters the operating room through the sub-area of clean hall, where those required are gowned. To implement this movement of staff the zoning of clean hall is divided into two, the main portion of "sterile" mainly for handling of sterile materials and the sub portion of "clean". (Figure 2)

Ichinomiya City Hospital (ICH): All 8 ORs are attached to clean hall in parallel rows. The entire clean hall is defined as "sterile" zone for the most strict management. (Figure 3)

Table 1 Profile of Surveyed Hospital & Number of Respondents

	HMH	ICH_N	ICH_M	CRH	TCH
Number of Beds	235	156	210	670	743
Completion	1988	1988	1973	1987	1960
Ward					
Patients	60	68	47		
Nurses	60	43	51		
Operating Dept.					
Surgeons	12	26		18	
Nurses	9	16		24	
Waiting Area in OPD					
Out-Patients	469				899

Table 2 Questionnaire on Performances with 5-point Scale Rating

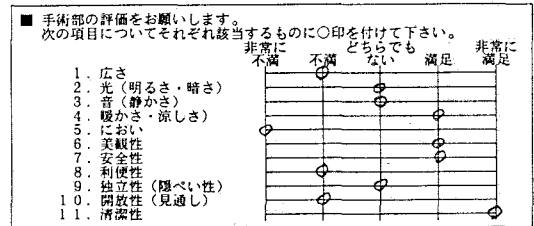


Table 3 Questionnaire on Performances with 4-point Scale Rating

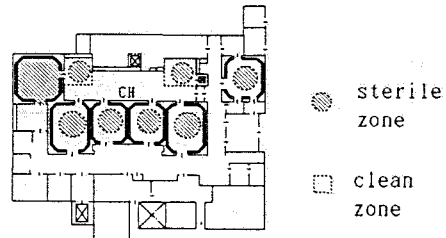
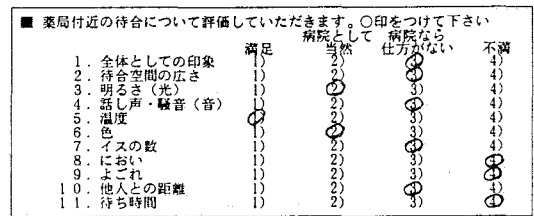


Figure 1 HMH Operating Department Clean Hall is defined as clean zone.

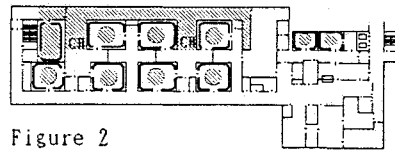


Figure 2 CRH Operating Department Clean Hall is divided in two zones of sterile and clean.

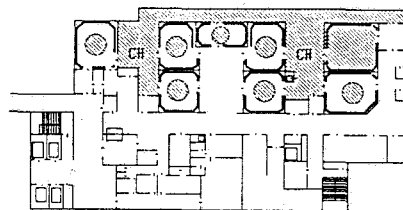


Figure 3 ICH_N Operating Department Clean Hall is restricted for distinction of sterile zone.

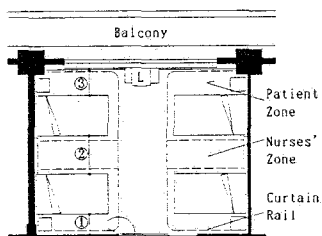


Figure 4 : HMH 4-Beds Room
width 6.0 m x depth 4.75 m
distance bet. beds (marked as ②)
in design: 100cm in survey: 97cm

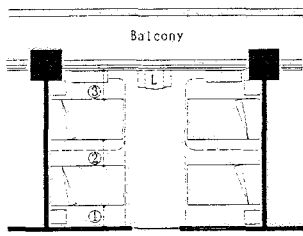


Figure 5 : ICH_N 4-Beds Room
width 6.0 m x depth 4.5 m
distance bet. beds (marked as ②)
in design: 120cm in survey: 34cm

3.2. Ward Bed Rooms

In a 4-bed room of Hekinan Municipal Hospital (HMH4), a zone between beds is provided for nursing, separated by the cubicle curtains over the bed-sides. At the time of nursing care treatment, clothing, and such, patients' partial privacy is provided by closing the curtain of the neighboring bedside. Patients can also close/open the curtains by their own wills in daily activities. The reported movements of beds coming close in seek to secure the private side of patient bedside is prevented and thus the treatment space is always assured, shown as distance (2) in Figure 4. There is a sink placed in the room, and indirect lighting on the ceiling.

In a 4-bed room of Ichinomiya City Hospital New Block (ICHN4), beds are separated by a single-line cubicle curtain. There is a sink in the room, and the ceiling light is an indirect lighting using louvers. (Figure 5)

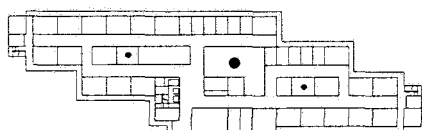


Figure 6 : HMH Ward Plan with Decentralized Nursing Bases (marked as ●)

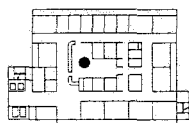


Figure 7 : ICH Ward Plan with Centralized Nursing Base (marked as ●)

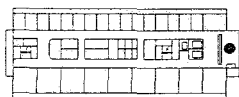


Figure 8 : ICH Main Block Ward Plan Nursing Base is located at the end of Nursing Unit.

3.3. Ward Floor Plans

Hekinan Municipal Hospital (HMH): The ward of this hospital is a Decentralized Nursing Base Type with the Nurses' Center (NS) in the center and the Nurses' Corners (NC) in the east and the west. The NC has an open counter facing the corridor, providing more ease in communications. (Figure 6)

Ichinomiya City Hospital, New Building (ICHN): The Nurses' Station (NS) is in the center of the ward and bedrooms are located around the NS. The NS has an open counter which enforces both visual and physical relations with the bedroom area in the north-west corner, and which makes the checking of visitors easy. (Figure 7)

Ichinomiya City Hospital, Old Building (ICHM): Because there is a Nurses' Station in the end of the ward, many bedrooms (MAX 9 spans) are far from the NS. The NS has an open counter making it easy to check the people using the elevators, while it is difficult to check the people using the stairs located in two places in the ward. (Figure 8)

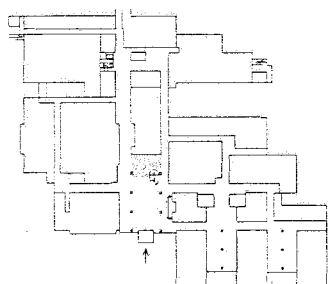
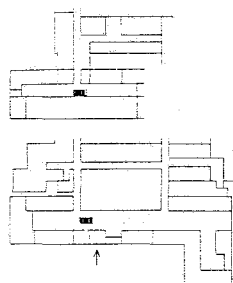


Figure 9 : HMH Out-Patient Waiting Area. Flexible Seating Was Taken in Dispensary Hall.



2 F

1 F

- Clinic
- Waiting Hall
- Dispensary
- Waiting Hall

Figure 10 : TCH Out-Patient Waiting Area

3.4. Out-patient Waiting Areas

Hekinan Municipal Hospital (HMH): All out-patient consultation rooms are gathered on the ground floor. The waiting space is largely divided into two sections, each of which, independent from passing traffics, is a

bright and comfortable space facing outdoors and with ceiling windows. The waiting chairs are linked in the unit of four. At the back from the front entrance, there is a garden and the pharmacy waiting space is located next to the garden. It is a comfortable space and independent from passing traffics. (Figure 9)

Toyohashi City Hospital (TCH): The out-patient department is divided on two floors. The ground floor consists of cashier, pharmacy, surgical clinics and X-ray Department, and the upper floor consists of medical clinics and clinical laboratory. The rooms occupy the entire periphery of the building and the inner space is the waiting space. Inevitably, the waiting space is dark and lacks openness. On the ground floor, the waiting space for cashier and pharmacy and that for clinics are linked together, and very noisy mixed with passing traffics. Benches are place in the waiting space. (Figure 10)

4. Evaluation Structure

Surgeons evaluating the performances of operating rooms "dissatisfactory" are clearly the minority as shown in Figure 11-1. Although those dissatisfied share around 30% in "space", "temperature" and "usage", the percentages are smaller than those satisfied. In the plot figure of category quantum by Quantification Theory III (Figure 12-1), the axis I is considered to represent the ranking of evaluation score and the axis II the degree of actuality. The three groups of evaluations are clearly distinguished. In contrast to the concentrations of "satisfactory" and "neutral" evaluations, the "dissatisfactory" evaluations are considered to be clearly deliberated by surgeons over the classifications of performances.

In nurses' evaluations of operating rooms the shares of "dissatisfactory" are larger than those of "satisfactory" in performances classified as "total impression", "space", "temperature", and "usage" (Figure 11-2). Then, it should be noted that shares of "neutral" amount to largest percentages in most of performances. In the Quantification Analysis axes are considered to be the same in contrast to surgeons' evaluations, however, "satisfactory" evaluations are considered to be more deliberated by nurses as well as "unsatisfactory" (Figure 12-2).

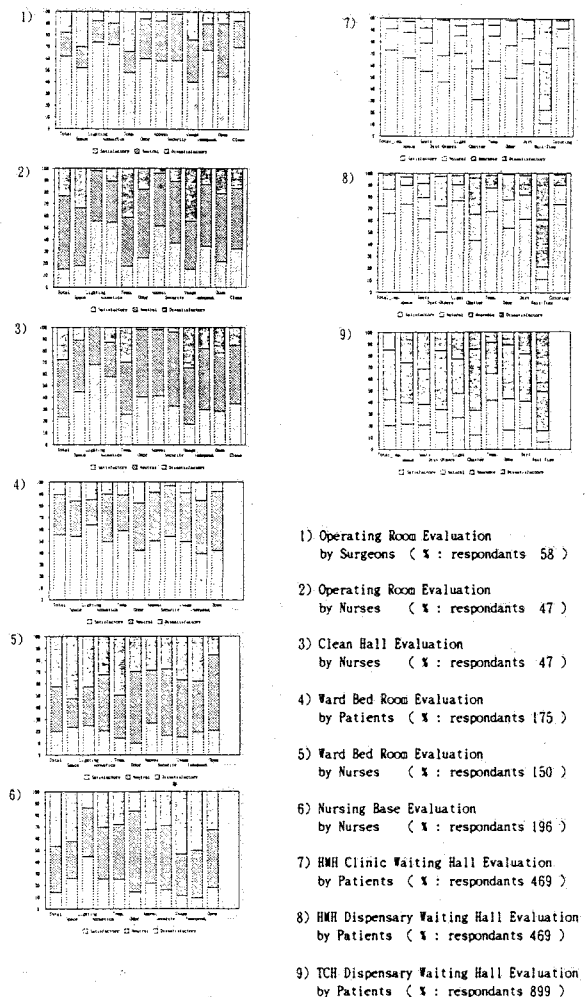


Figure 11 Percentages of Each Evaluation

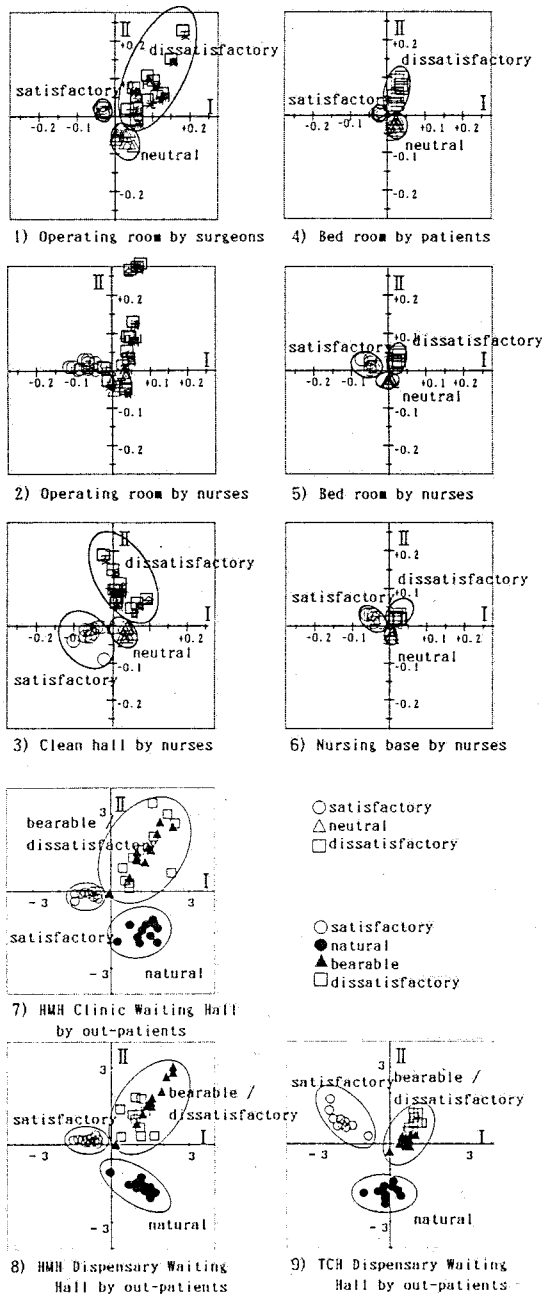


Figure 12 Category Quantum by Quantification Theory III

In nurses' evaluations of clean hall "dissatisfactory" prevalences in "total impression", "temperature" and "usage" are pointed out (Figure 11-3). Then, the overwhelming tendency of "neutral". In the Quantification the pattern is similar to the evaluation structure of operating rooms (Figure 12-3).

Patients evaluating the performances of ward bed rooms "dissatisfactory" are more the minority than the case of surgeons evaluating operating rooms (Figure 11-4). However, the Quantification Analysis reveal that evaluation structure is quite similar to that in surgeons (Figure 12-4).

In nurses' evaluations of ward bed rooms and nursing bases, "dissatisfactory" percentages prevail those of "satisfactory" in most of the performance classifications. Then the percentages of "neutral" share considerable portions as in the evaluations in operating departments (Figures 11-5 & 11-6). In the Quantification the evaluation structures are quite similar for ward bed rooms and nursing bases (Figures 12-5 & 12-6).

In the evaluation of clinic waiting halls of newly built HMH, the negative responses are the minority, especially those "dissatisfactory". The term "bearable for a hospital" marked distinctions in "distance from others" and "chatter", which shows environmental evaluations in the context of human relationships. The negative evaluations for "waiting time" are found prevailing (Figure 11-7). In the Quantification the negative evaluations are deliberated by out-patients over the performances (Figure 12-7).

In the evaluation of dispensary waiting hall of HMH the above tendencies on negative evaluations, "bearable" evaluations, and "waiting time" are quite similar (Figures 11-8 & 12-8).

In the evaluations of dispensary waiting hall of TCH built 30 years ago, negative evaluations are found overwhelming to affirmative evaluations (Figure 11-9). In the Quantification four evaluation scores rank along the axis I showing the deliberate evaluations of performances by out-patients (Figure 12-9).

5. Conclusion

The design descriptions of various hospital departments and the responses from variety of hospital users in the designed environment in this study explain and form a common ground for the introduction of Facility Management in Japanese Health Care field.

As an inevitable consequence of the study, one of nursing professional perspectives as an agent of patients' and surgeons' demands for concerned

specific physical setting is tested and verified. However, the considerable portions of "neutral" evaluations poses the final conclusion. Then, the clarification of mediocre evaluations is signified as major issue in the user participation of environmental evaluations. The "bearable" evaluations are considered as representing negative evaluations by the patients in the said weak positions of being "treated".

In newly established environment the affirmative evaluations prevailed. These results recognize POE as "a political tool" in FM. Yet, the focal point to view the negative evaluations should receive the utmost attention as to explore causal relations of the negatives and to continue the dialogues with actual users over the issues, which constitute essential core area in the progress of Facility Management.

The out-patients' response to "waiting time", representing service performance, should not merely be concluded as the importance of functional approach to enhance efficiency of services thus to reduce waiting time. This does not mean the denial of efficiency approach. However, in the present Japanese health context waiting cannot be terminated. The study on "Front Line Hospitals", jointly carried out by a team of physicians, hospital administrators, and architectural researchers, is committed to present a comprehensive and internationally accessible model of "a referral hospital at the front-line, most close-by the region, to respond to basic clinical medical service needs and to support effective developments of Primary Health Care." The findings in this paper will form a part of referral database for the above approach. Under this model of "Front Line Hospital", we would endeavor for the global cooperations in fields of health care facility management toward the "Equitable and Sustainable Habitats".

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