Physical Features for Way-Finding and Orientation in Specialized Dementia Units

— 치매노인 특별요양시설내의 길찾기와 방향/현실적응을 위한 물리적 특성 —

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〈 CONTENT 〉

〈Abstract〉

From the findings of an exploratory study describing the living environments of segregated Alzheimer/Dementia Units (ADUs), the results relative to environmental cueing features, reality orientation aids, and communication/noise control methods are highlighted. Data were collected from a nonrandom, purposive sample of 99 ADUs and their parent long term care facilities in 34 states. Specific recommendations are made about physical features that may assist confused and disoriented residents and contribute to way-finding and orientation in specialized dementia units.

I. INTRODUCTION

Problem Statement

Alzheimer's disease, as the most prevalent type of dementia, is a significant cause of cognitive impairment in the 20th century. Alzheimer disease is an organic brain disease leading to progressive loss of brain function and eventual death. Symptoms of the disease include memory loss, loss of language function, inability to think abstractly, inability to care for oneself, judgement and orientation impairment, personality change, emotional inability, and violent behavior. Alzheimer's disease is estimated to be the fourth leading cause of death of old Americans. However, the cause of the disease is unknown and there is no effective standard medical treatment (Committee on Nursing Home Regulation, 1986).

At least two million Americans suffer from the disease (Katzman, 1986). From five to six percent of persons over age 65 have diagnosable forms of dementia, and 20 percent over age 85 have Alzheimer's disease. Two-thirds of dementia patients are cared for by institutions (Eastman, 1986). The course of disease and certain uncontrollable behaviors (e.g., persistent wandering and aggressive or assaultive behavior) eventually lead many families to seek nursing home placement for Alzheimer's victims. About half of all nursing home residents have a dementia, with senile dementia of the Alzheimer's predominating (Terry & Katzman, 1983).

The segregated specialized unit for elderly patients with significant cognitive impairment or behavioral problems is a new phenomenon in U.S. long term care facilities. Alzheimer and dementia patients pose special problems for caregivers and nursing homes. Wandering, confusion, disorientation, agitation, aggression, suspiciousness, irregular sleep patterns, incontinence, and poor personal hygiene are among the behaviors and symptoms that make it difficult to care for Alzheimer's patients who are housed with other nursing home residents. Also other patients (or other families) often object to the presence of dementia patients among the facility's general population.

Many long term care facilities have renovated wings or designed new additions to provide a separate, protective living environment for some of their Alzheimer patients. The unique program and physical features of segregated, specialized dementia unit can provide an important housing-service package for managing the behaviors and symptoms of Alzheimer's and dementia patients who must be institutionalized. Yet the optimum therapeutic milieu for the Alzheimer/Dementia Unit(ADU) has not been defined and a description of the state of the art in existing U.S. facilities is unavailable.

Rationale of the Study

Physical living environment can play an important role in managing the unique needs and behaviors of Alzheimer's patients in order to improve the emotional well-being, and ultimately to improve the quality of life (Brown, 1988; Calkins, 1988; Shroyer et al., 1989). Some empirical studies (Bell & Smith, 1979; Kromm & Kromm, 1985; Peppard, 1986) available suggest that the environment may be the single most important factor affecting the behavior and functional level of Alzheimer's patients who live in institutional settings. Older persons who experience institutionalization (as the relocation to new and unfamiliar setting) must need additional time to adapt their way around a new environment. It is believed that this relocation causes increased morbidity and mortality rates (Calkins, 1988; Roll,

1986; Weisman, 1987). Therefore, a variety of cues and means for way-finding and orientation in physical living environment may be a practical and beneficial solution to help assist them in order to reduce confusion and to increase independence and interaction between residents and staff. However, the current research literature on way-finding and orientation, although limited in its extent, points to considerable problems in long term care facilities and suppoirts the necessity of enhancing the legibility of these settings.

Purpose of the Study

The purpose of this exploratory study was to describe living environments of existing Alzheimer/Dementia Units (ADUs) in long term care facilities. Specially, the units specific features that may contribute to way-finding and orientation were described and compared to those of the remainder of the facility.

Objectives of the Study

The objectives of this study were:

1) To describe the ADUs and the remainder of the long term care facility and describe and their residents.

2) To describe physical features relative to way-finding and orientation of ADU living environments, and

3) To determine how physical features relative to way-finding and orientation of ADUS differ from those of the remainder of the long term care facility.

Ⅱ. THE LITERATURE

The ability to navigate through the environment (knowing where you are and how to get to your desired destination) is an important determinant of a person's feelings of autonomy, independence, and self-sufficiency (Calkins, 1988). Changes in cognitive functioning, however, make negotiating the environment an increasingly difficult task for Alzheimer's and other dementia patients.

Dementia patients may be confused and disoriented with respect to both time and place and become cognitively reliant on others for assistance in mobility (Weisman, 1987). Until recently, other than works by Lawton (1981) and Liebowitz et al. (1979), research-based information relevant to segregated, institutional living environments such as specialized demantia units had to be extrapolated from studies of (gero)psychiatric settings. But literature specifically describing disorientation and dementia in relation to environmental legibility and way-finding performance has begun to appear.

Disorientation and Dementia

"Due to cognitive impairment, residents with dementia do not see or understand the environment in the same way as cognitively intact persons do" (Calkins, 1988, p. 37). Shroyer and Hutton (1988) outline three factors of particular relevance to the way-finding and orientation challenge faced by Alzheimer's victims: 1) Orientation impairment: patients lack critical judgment and have varying degrees of memory dysfunction; 2) Visual disturbance: experiencing decreased depth perception, increased sensitivity to glare, reduced ability to distinguish between similar color intensities, blurred vision, and shrinkage of the visual field; 3) Memory impairment: confusion in interpreting visual and auditory information and in understanding complexity in the environment. As a result, cognitively-impaired residents not only have difficulty perceiving or "reading" the environment (American Association of Homes for the Aging [hereafter

AAHA], 1985), but their ability to form mental maps is also severely limited. Schultz (1987) concluded that the effects of age-related visual and auditory problems are compounded for older adults who suffer from dementia, causing them to respond on a sensory rather than an intellectual level.

Wandering behavior is one type of way-finding dysfunction that can be caused by lack of way-finding/orientation cues and inability to find one's way within a setting. It may also be elicited by environments with too much or too little sensory stimulation (including excessive noise), or can be a consequence of inadequate opportunities for ambulation and freedom to explore the environment. But wandering can be a purposeful activity that serves important functions such as physical exercise or an emotional outlet (Calkins, 1988; Cohen & Weisman, 1988; Hiatt, 1980). In the evening, the absence of light as an environmental cue may cause disorientation and confusion that leads to sundowning and night wandering (Schultz, 1987).

In persons suffering from senile demantia of the Alzheimer's type, the degree of environmental awareness and understanding varies with the stage of the disease. Consequently, environmental interventions that benefit some patients may harm others (Mace, 1987). Preliminary findings cited by Pynoos and Stacey (1986) suggest that with appropriate environmental cues and stimulation, improvements can occur in patients in the early stages. But the optimal level of stimulation may depend, to some extent, on the severity of the dementing illness. Pynoos and Stacey concluded that dementia patients require highly discriminative stimuli to orient them to their environment. Specifically, they recommend large, salient stimuli that involve multiple sensory capacities where possible. Multiple (redundant) cueing that consistently presents the same information via several sensory modalities can provide pertinent information to a greater number of Alzheimer's patients than would a single orientation cue--in the hope that at least one of the cues will work for each resident (AAHA, 1985; Calkins, 1988).

Environmental Legibility and Way-finding Performance

Weisman(1987) asserts that way-finding within the architectural environment is a perceptual as well as a cognitive task--contingent upon what one sees and what one knows about it. He theorized that the way-finding process and spatial orientation involve alternate strategies including the use of landmarks or goals for guidance, following trails or pathways, using signs/landmarks to update and clarify choices, and developing mental images or cognitive maps. Weisman recommends that environments for elderly persons be more therapeutic (applied continuously to maintain behavior at existing levels [Lawton, 1981]). For dementia patients, the therapeutic objective would be formation of a cognitive representation.

For Alzheimer's victims, Calkins (1988) promotes a prosthetic environment that includes added information about some aspects and decreased (or camouflaged) information about others. She notes that prosthetic features are especially important to the cognitively impaired, who have diminished ability to remember even the most basic things--finding the dining room can be as difficult months later as the first day the resident arrives. Prosthetics can allow all but the most severely impaired more control, therefore more functional independence. For example, indoor and outdoor landmarks allow a person to become oriented within the environment by providing both guidance and a measure of reassurance during the way-finding process.

Several environmental cues can help dementia patients find their way to or be guided away from specific areas in a long term care setting (Hiatt, 1980). Weisman (1987) categorizes the environmental variables or architectural features that assist (often in conjunction with one another) in way-finding and orientation as: signs and numbers (cues along the path and at key identification or decision points), perceptual access (a visible goal), architectural differentiation (landmarks and key reference or anchor points), and plan configuration He concludes that manifest cues such as signs and numbers are not the most salient source of environmental information. Latent cues (not explicitly intended for orientation and way-finding) such as architectural features, furnishings, plants, or colors, may be more effective. Color alone as a means of architectural differentiation is limited, however, because of age-related changes in the eye. Furthermore, Hiatt (1980) states that the elderly typically do not perceive color as the primary distinguishing feature of a room. Calkins (1988) suggests that to be effective, the placement of cues must accommodate the resident's eye level and visual patterns.

In addition to reiterating recommendations for redundant cueing, Cohen and Weisman (1988) offer these design concepts for creating more negotiable environments for dementia patients: 1) contrast (e. g., amplify the desired message and dampen extraneous/background stimuli, including noise); 2) anthropometric fit; and 3) self-correcting design (to guide and correct patients' movements). Research by Shroyer et al. (1989) and Shroyer and Hutton (1988) identified limiting and facilitating factors that may help mitigate levels of confusion and disorientation in dementia patients. These factors include background elements (including lighting and noise control), spatial arrangement, and design of furniture components.

Specialized dementia units need to provide for a secure but least restrictive range of movement for residents of varying abilities. With residents who may not obey a fire alarm or safety instructions, safety provisions must weigh the need for freedom, mobility, and maintenance of function against risk of injury (Mace, 1987). The segregated unit is one method to control the risks associated with wandering, as are secured site perimeters-neither of which should emphasize confinement. For controlled wandering, recommendations range from circular walking patterns and continuous paths or "endless" corridors to making "dead-ends" into meaningful activity areas (Calkins, 1988). Another "guidance" strategy, tested by Hussian and Brown (1987), is placing colored stripes on the floor in front of "off-limits" doors. Schultz (1987) notes the importance of keeping the pacers in full view of staff whenever possible.

Familiarity is another important aspect of orientation. Literature recommends that ADU rooms be furnished with patients' own furnishings and personal possessions to reduce confusion and disorientation (Calkins, 1988; Liebowitz et al., 1979). Allowing residents to have as much control over the decor of their rooms as they are capable of exercising assists them to develop or maintain an orientation to place and helps them identify their rooms. Familiar items from the past will provide an important link between the past and present and help anchor residents to their present situation (AAHA, 1985). Nonidentical rooms can also discourage rummaging behavior (Schultz, 1987).

Relative to bathroom arrangements, some experts recommend one toilet between two rooms, while others believe that this arrangement can create confusion for residents who may enter one door, get turned around, and leave by the other (Schultz,

1987). Key factors seem to be visibility, proximity, and visual distinctiveness. Facilities in full view of the bedroom remind residents to use the toilet and encourage independent use of personal hygiene items. Distinctive color, pattern, and/or graphic symbolism used outside a shared bathroom door and carried inside the room can increase identification. Clear distinction between (adjacent) men's and women's bathrooms will help residents to avoid entering the wrong room. A line on the wall from the dining room to the toilet rooms can help residents locate facilities after meals (Calkins, 1988).

Finally, reality orientation is not a separate program but rather a general approach to providing care (AAHA, 1985). In specialized dementia units, its purpose is to orient an individual in time and space while compensating for the progressive loss of mental faculties associated with the disease (Schwenk, 1979). Just as staff should reinforce reality orientation concepts, so too should the environment, which can actively assist residents via clearly and easily distinguished space uses. In addition, administrators should minimize ways that the environment can undermine the resident's sense of reality.

A visually and physically accessible reality orientation center in sleeping rooms or in common areas may enable residents to refresh their memories and function more independently (Liebowitz, et al., 1979). Hiatt (1980) suggests that reality orientation programs include way-finding training and alternate strategies that best fit individual patients' way-finding styles. Goodman (1986), however, recommends that reality orientation aids not be used with Alzheimer patients because they can cause anxiety, frustration, and subsequent undesirable behaviors. Coons (1983) prefers the "natural" reality orientation that occurs as a result of involvement in a complex environment (vs. visual cues and printed reminders of the date, location, season, etc.).

Ⅲ. METHODOLOGY

Based on the literature and visits to specialized dementia units, the researchers developed a mail questionnaire to obtain data about ADUs and their parent facilities. Questions elicited data on physical aspects of the ADU and the remainder of the facility, demographic data on ADU residents, and the ADU program. Specific items addressed here are those about physical features that may contribute to way-finding and orientation.

To identify nursing homes known to have ADUs, the researchers contacted four national long term care organizations, the U.S. Office of Technology Assessment Alzheimer study staff, and selected major health care providers. In mid-1987, they mailed questionnaires to 143 facilities that were assumed to have specialized dementia units. A total of 113 surveys were returned (79% response rate), 14 of which were ineligible because they did not have a segregated ADU. The final samples consisted of 99 facilities with ADUs, located in 34 states. Procedures used to analyze the data included descriptive statistics and the nonparametric McNemar test.

Ⅳ. RESULTS

Following a description of the sample facilities and the ADUs and their residents, the results relative to physical features that may assist confused, disoriented residents to find their way and maintain a sense of place and time are organized as follows: residents' rooms and bathrooms, environmental cueing features, reality orientation aids, and communication/noise control methods.

Sample Facilities, ADUs, and ADU Residents

Of the 99 nursing homes with ADUs, two-thirds were proprietary, and one-third were private, nonprofit institutions. One-third of the facilities were located in central cities, with the remainder almost evenly divided among suburban, small city, and rural or small town areas. The mean total number of beds in the sample facilities was 169.9, with a mean number of 31.6 ADU beds. Over one-half of the sample ADUs were created by remodeling an existing wing or section, and about one-fifth were converted from an existing area with no special design or structural changes. Less than 10 percent were newly constructed or designed units.

In most of the ADUs, the rooms were located together in one section or wing and on the ground floor; median unit size was 7,741 square feet. While nearly one-half of the respondents indicated that their ADUs had the same square footage per patient as the remainder of the facility, over one-third reported more space per resident within the specialized unit. The majority of the sample ADUs had their own nursing station or staff work area, own dining area, own dayroom or lounge area, and/or their own combined dining/dayroom/lounge area. To provide these exclusive ADU activity areas, respondents recorded losses of from 0 to 20 bed spaces, with a mean decrease of 3.12 beds. Other areas that were converted to these uses included staff lounges and offices, closets and storage rooms, and former dayrooms or small lounges. Restrooms were located near the dayroom or dining area in 70.7 percent of the sample ADUs.

While over one-third of the sample ADUs were locked at all times, over one-half were not locked. In response to a separate question, however, the vast majority (83.8%) of the respondents reported the use of exit alarm systems. More than one-half of the sample reported the following outdoor facilities available exclusively for ADU residents: enclosed patio, courtyard, porch, balcony or terrace; wander garden, path, or loop, gardening areas or planting beds; fenced or alarmed perimeter; and sheltered outdoor areas. The most frequent and "most successful" changes made to create the sample ADUs (provided via responses to open-ended questions) were security systems or locked units and safe, secure outdoor facilities. Third "most successful" was the self-contained, separate unit with freedom of movement for residents.

The mean number of female residents (18.7) per unit was more than double the mean number of male residents (8.4) in the sample ADUs. The highest mean number (8.2) of ADU residents was in the 81-85 year age range, followed by age 86 and older (mean = 7.7), and age 76-80 (mean = 7.5). The highest mean percentage of ADU residents (22.1%) entered the ADU from their own home, followed by "elsewhere in the nursing home" (20.0%), the hospital (17.4%), or the home of a relative (15.9%).

The highest mean percentages describing ADU residents' functional levels were "able to feed themselves" (54.7%), "urinary incontinence" (54.2%), and "fecal incontinecne" (40.6%). On average, nearly 40 percent (38.9%) could manage some self care with help; 33.1 percent were able to eat with assistance; and 18.4 percent were able to perform self care. Over one-half (mean = 57.6%) of the ADU residents were usually ambulatory without assistance, while 18.2 percent were ambulatory with personal assistance. Only 1.44 percent of the patients were bedridden most of the time.

ADU Residents' Rooms and Bathrooms

Some of the residents' room furnishings listed in

the survey--specifically personalized, familiar objects--relate indirectly to way-finding and orientation. The features receiving the highest ADU frequencies were, "Residents allowed to bring one or two large pieces of furniture other than their beds from home"(92.9%) and nightlights (81.8%) (Table 1). In one-third of the sample ADUs, residents could bring their own beds. Although only about one-third (36.4%) of the respondents indicated that the ADU rooms were obviously different with recognizable objects, nearly two-thirds identified "other" methods to personalize residents' rooms or make them homelike. The examples given most frequently were family or own photos, personal bedding, personal items, or own furniture. A private toilet and lavatory in each ADU resident's room was more common (61.6%) than toilet/lavatory shared by two ADU rooms (44.4%). Proportions of the above furnishings were not found to differ significantly between ADU residents' rooms and other patients' rooms in the facility(Table 2). The McNemar test revealed a significat difference, however, on "two residents' rooms share toilet/lavatory": frequencies were higher in the parent facilities.

Environmental Cueing Features

Among 12 environmental cueing features presented by the survey, the personal marker (including a nameplate) or resident's photo near the room door was the only device indicated by more than one-half (69.8%) of the sample ADUs. At least one-third of the sample reported landmarks such as picture groups or large objects (41.4%),staff uniform color or style (including using street clothing instead) (39.4%), bathrooms labelled with pictures or colors (37.4%), and signs (34.3%). Examples of other "cues" written in by respondents included signs, color contrasts, and physical and verbal cues. Statistically significant differences between the ADUs and their parent facilities were found for eight environmental cueing devices(Table 3): personal marker or resident's photo near door; landmarks; bathrooms labelled with pictures or colors; signs; pictograph symbols; matching photos or symbols; large murals; and color-coded activity areas. Although the ADU frequencies were higher for all eight features, the latter four were reported by well under one-third of the respondents.

Reality Orientation Aids

Although the questionnaire addressed environmental cueing and reality orientation features separately, the responses clearly overlapped. Reality orientation items were reported far more frequently than environmental cueing devices. The majority of the sample ADUs used most of the reality orientation devices included in the survey, including large print calendars (92.9%), clocks with large faces/numbers (89.9%), (daily) schedules or activity boards (83.8%), and orientation boards (73.7%).

Communication/Noise Control Methods

The only communiation/noise reduction methods reported by more than one-half of the sample ADUs were individual television or radio allowed in residents' rooms (76.8%) and the acoustical or sound-absorbent ceiling (59.6%). But almost one-half (48.5%) of the ADUs had modified their public address (PA) systems to cut extraneous noise. A few respondents used stereo systems to play soft, therapeutic music in the ADU. Although floor and wall surfaces in approximately three-foruths of the ADUs were the same or similar to those in the parent facility, where respondents described physical

changes made to create the ADUs, new or changed wall the floor surfaces were third and fifth most frequent, respectively. Sound-absorbent wall surfaces were more common in the ADUs (41.4%) than (sound-absorbent) carpeted floors (29.3%).

Significant differences between the ADUs and the remainder of the sample facilities were found on seven communication/noise control features, with the ADU frequencies higher for the following six (Table 4): acoustical ceiling, modified PA systems, sound-absorbent wall surfaces; no television in dayroom/lounge; PA systems used only in emergency; and PA systems disconnected or not used. ADU frequencies for the latter two, however, were 20 percent or lower. The proportions of individual entertainment equipment (television, radio, etc.) were significantly different, but the parent facilities showed higher frequencies than the ADUs. Other noise control methods reported by respondents included fabric or soft artwork; a separate unit (closed off by doors); and ADU staff levels and efforts.

V. SUMMARY AND RECOMMENDATIONS

The survey described here gathered the "really low-level descriptive data to form a basis for more interesting hypothesis generation" proposed by Lawton (1981) in reference to community-based dementia patients. Because the study was exploratory and did not test relationships, the researchers did not draw conclusions. With the caveat that these findings may not be generalizable to all ADUs or long term care facilities because the data were not collected from a random sample, the following summary describing the way-finding and orientation features of existing Alzheimer/Dementia units is offered with cautious recommendations.

The typical samfple ADU was a 32-bed retrofitted wing or section on the ground floor of a proprietary nursing home. The majority of these units had their own nursing station or staff work area, their own dining area, and own dayroom or lounge (or a combined dining/dayroom/lounge area). Over one-half provided outdoor areas and facilities that were enclosed, secured, or fenced, as well as sheltered--for exclusive use by ADU residents. The majority of the special units were not locked but most had exit alarm systems. Of the remodeling changes or additions reported by respondents, secured units and safe, secure outdoor facilities were the most frequent and "most successful."

The majority of ADU residents in the sample were females over age 75 who could feed themselves and perform self care independently or with assistance. They were usually ambulatory with or without assistance, but were likely to be incontinent. Personalization of residents' rooms, with one or two large pieces of furniture (other than the bed) or other familiar objects brought from home, was prevalent in both the ADUs and the parent faciliteis. ADU patients were less likely, however, than other residents of these facilities to share a toilet and lavatory with occupants of another room.

Although reported by relatively few respondents, frequencies for several environmental cueing devices were found to be significantly different between the ADUs and their parent facilities. Personal markers or residents' photos, landmarks, bathrooms identified by pictures or colors, signs, pictograph symbols, matching photos/symbols, large murals, and color-coded activity areas were more likely to be found in the ADU wing. The reality orientation devices listed in the survey were cited far more frequently for the sample ADUs than were environmental cueing features. The only item that was significantly

different was the autobiographical display of residents' backgrounds (higher in the ADUs but reported by only slightly more than one-third of the respondents).

Other than acoustical ceilings, the communication and noise contral methods listed in the survey were not reported by large numbers of the sample ADUs. But the frequencies for modified public address (PA) systems, sound-absorbent wall surfaces, no television in the dayroom or lounge, and curtailed use of PA systems were significantly higher in the dementia units than in the remainder of the samples, the individual television or radio in the resident's room was found sighificantly more often in non-ADU rooms.

To help Alzheimer's patients find their way and maximize freedom of movement, an uncluttered, hazard-free environment with secured exits and outdoor facilities may be one of the self-evident, inalienable environmental rights described by Lawton(1981). As in the remainder of the facility, ADU residents' rooms should provide familiar, personalized furnishings and objects. But to help dementia patients locate their rooms and distinguish between theirs and others, ADU sleeping rooms should be further identified via redundant cues such as personal markers, photographs, or autobiographical residents' displays located outside/near the entry door.

Although significantly different between this study's subsamples, the relatively low ADU frequencies for environmental cueing devices and communication or noise control methods raise questions about their individual contribution or detriment to way-finding and orientation in the dementia unit. Do comparatively small ADU unit size and simplicity negate the need for environmental cueing devices? Even in a single wing of the facility, landmarks, clearly identified bathrooms, signs, pictograph symbols, large murals, and color-coded activity areas may be needed to provide the multiple cues that help the cognitively impaired patient avoid confusion and disorientation. In the same vein, how can the relatively low usage of features that reduce noise levels (and perhaps lower the incidence of catastrophic reactions caused by confusing, disembodied sounds) be explained? Can the behavioral effects and economic costs and benefits of incorporating various enviornmental effects and economic costs and benefits of incorporating various environmental cueing, noise control features, and reality orientation aids be isolated and measured in ADUs?

These findings and recommendations constitute only a limited beginning in describing the physical aspects of the therapeutic milieu in segregated, specialized units for Alzheimer's and dementia patients. The limitations of such "global evaluations" are recognized in that, "the experimental variable was not a redecorated ward or a new building, but an entire system composed of countless physical and staff changes, sometimes a new resident mix, different treatment programs, and not least, changed expectations by staff, residents, and administrators" (Lawton, 1981, p. 242). Moreover, Mace (1987, p. 13) notes that, "Behavior is notoriously susceptible to environmental variation, making it difficult to separate the effects of intended change from other factors."

Despite difficulties in designing experiments, future researchers must approach the single independent variable experiment and test the magnitude of improvement that can be expected in response to specific innovations (Lawton, 1981). Research methods will need to accommodate the fact that the

very impaired may be more vulnerable to their environment, and therefore more responsive to even slight improvements (Lawton, Fulcomer & Kliban, 1984). In addition to behavior-mapping and participant observation, researchers must identify other methods for user needs' and post-occupancy studies in which the user cannot respond in the traditional sense. If applied to environmental cueing, reality orientation, and communication/noise control features, the results could be a flexible mix of physical features most appropriate to assist dementia patients of varying abilities to find their way and maintain their sense of place and time in specialized units.

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〈Table 1〉 Physical features that contribute to way-finding and orientation in Alzheimer/dementia units and their parent facilities

Variable[a]	ADU		Remainder	
	N	%	N	%
Residents' Rooms//Bath Arrangements				
Bring 1-2 other large pieces (an easy chair or chest of drawers)	92	92.9	90	90.9
Nightlight in each resident's room	81	81.8	77	77.8
Private toilet and lavatory	61	61.6	57	57.6
Two residents' rooms share toilet/lav	44	44.4	50	50.5
Rooms significantly different with recognizable objects	36	36.4	31	31.3
Residents may bring own bed	33	33.3	32	32.3
More than two rooms share toilet/lav	7	7.1	6	6.1
Other personalization methods (open-ended question)	65	65.7	56	56.5
Environmental Cueing Devices				
Personal marker/resident's photo near room door	69	69.8	31	31.3
"Landmarks" (picture groups, objects)	41	41.4	27	27.3
Staff uniform color or style	39	39.4	34	34.3
Bathrooms labelled with pictures/colors	37	37.4	9	9.1
Signs	34	34.3	13	13.1
Units/floors color-keyed or "themed"	28	28.3	26	26.3
Pictograph symbols ("signs without words")	27	27.3	13	13.1
Matching photos or symbols in patients' rooms	20	20.2	11	11.1
Residents' rooms color-coded(walls, furniture, doors)	20	20.2	13	13.1
Large murals	19	19.2	11	11.1
Activity areas color-coded(dining, dayroom)	15	15.2	8	8.1
Supergraphics or patterns on walls/floors	12	12.1	8	8.1
Other cues	12	12.1	5	5.1

〈Table 1 continued〉

Variable[a]	ADU		Remainder	
	N	%	N	%
Reality Orientation Aids				
Large print calendar	92	92.9	89	89.9
Clock(s) with large face/numbers	89	89.9	86	86.9
(Daily) schedule/activity board	83	83.8	88	88.9
Orientation board	73	73.7	77	77.8
Autobiographical/display of residents' backgrounds	34	34.3	18	18.2
Other physical devices	24	24.3	16	16.2
Communication/Noise Control Methods				
Each resident may have TV, radio, etc.	76	76.8	89	89.2
Acoustical/sound-absorbent ceiling	59	59.6	50	50.5
PA systems modified to cut noise	48	48.5	22	22.2
Sound-absorbent wall surfaces	41	41.4	24	24.2
No television in dayroom/lounge	36	36.4	12	12.1
Carpeted floors	29	29.3	36	36.4
Each room may have TV, radio, etc.	29	29.3	38	38.4
PA systems used only in emergency	20	20.2	14	14.1
Residents' rooms monitored by intercom/video system	19	19.2	21	21.2
PA systems disconnected or not used	15	15.2	3	3.0
Walkie-talkie/beeper devices used	4	4.0	5	5.1
Other communication/noise methods	14	14.1	4	4.0

[a] : Respondents could select more than one choice.

〈Table 2〉 McNemar test for comparison of prequency of selected furnishings of residents' rooms

(N = 99)

Variable	ADU N	Remainder N	Statistical significance
Bring 1-2 other large pieces	87	89	.6250
Nightlight in each resident's room	79	76	.3750
Each resident may have TV, radio, etc.	73	88	.0015**
Individual privacy arrangements	66	66	1.0000
Window treatments secured	51	45	.0703
Full/half-length wall mirrors	41	46	.6875
Lockable hanging storage/closet	43	21	.0001***
Rooms significantly different	32	31	1.0000
Residents may bring own bed	30	32	.7539
Lockable/latched drawers	31	19	.0169*
Each room may have TV, radio, etc.	27	34	.0923

* Significance level $p<.05$

** Significance level $P<.01$

*** Significance level $P<.001$

〈Table 3〉 McNemar test for comparison of frequency of environmental cueing devices

(N = 99)

Variable	ADU N	Remainder N	Statistical significance
Personal marker/residents' photo near door	64	31	.0000***
"Landmarks" (Picture groups, objects)	40	27	.0023**
Staff uniform color or style	36	32	.3438
Bathrooms labelled with pictures/colors	33	9	.0000***
Signs	32	13	.0000***
Units/Floors color-keyed or "Themed"	27	23	.4807
Pictograph symbols	27	12	.0003***
Matching photos or symbols	18	10	.0386*
Large murals	18	11	.0391*
Residents' rooms color-coded	18	13	.1250
Activity areas color-coded	15	8	.0156*
Supergraphics or patterns on walls/floors	10	8	.6875

* Significance level p<.05

** Significance level P<.01

*** Significance level P<.001

〈Table 4〉 McNemar test for comparison of frequency of communication/noise reduction methods

(N = 99)

Variable	ADU N	Remainder N	Statistical significance
Acoustical/sound-absorbent ceiling	57	49	.0078**
PA systems modified to cut noise	47	22	.0000***
Sound-absorbent wall surfaces	40	23	.0000***
No television in dayroom/lounge	34	12	.0003***
Carpeted floors	27	36	.0636
PA systems used only in emergency	20	14	.0313*
Residents' rooms monitored by inter-com/video system	18	21	.4531
PA systems disconnected or not used	13	3	.0020**
Walkie-talkie/beeper devices used	4	5	1.0000

* Significance level p<.05

** Significance level P<.01

*** Significance level P<.001