

## Commentary

# The Therapeutic Design of Environments for People With Dementia: Further Reflections and Recent Findings From the National Institute on Aging Collaborative Studies of Dementia Special Care Units

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The article by Day, Carreon, and Stump (2000) in the current issue provides an excellent, comprehensive review of findings related to environments for individuals with cognitive impairment. It is timely in that the environment was an area identified by experts as critical to specialized dementia care and was one focus of the ten National Institute on Aging (NIA) collaborative studies of Dementia Special Care Units (DSCUs). In addition to reflecting on the major conclusions in the article by Day and colleagues (2000), this commentary elaborates on the conceptualization and measurement of physical and social environments in long-term care settings, drawing heavily on the experiences and recent findings of the NIA DSCU studies.

### *Conceptual Orientation to Study of Environments*

Day and colleagues (2000) provide a conceptual orientation to the study of the environment, discussing the need to consider individual characteristics in the design of environments. This is reminiscent of the concept of person-environment fit proposed 25 years

ago by Kahana (1975; which provided a context for the study of human factors) that examines the relationship between task demands and person components. The environment is important because it is closely linked to quality of life, defined by Lawton (1991) as "the multidimensional evaluation, by both intrapersonal and social-normative criteria, of the person-environment system of the individual" (Lawton, 1991, p. 6). Additional research is needed to examine more fully the fit of social and physical environment to individual needs. Despite decades of research regarding person-environment fit, it is still unclear how best to individualize care environments (given the constraints implicit in the need to serve many individuals, with varying needs) in a single congregate setting.

### *Interaction Between the Environment and Characteristics of the Functionally Impaired Person*

Day and colleagues (2000) emphasize that targeting and tailoring to the stage of dementing illness is an important aspect of environmental design. They show that some environmental modifications work best for people at moderate stages of impairment, whereas others work better for people at later stages. This point cannot be overemphasized, as the prevalence of cognitive impairment in chronic care settings is high. For example, the NIA DSCU studies found that almost 90% of nursing home residents were cognitively impaired, about half severely so (Teresi, Morris, Mattis, & Reisberg, 2000).

Confusion and disorientation can alternatively be exacerbated or helped by environmental interven-

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tions. Moreover, elderly persons in chronic care settings are likely to suffer from comorbid conditions that may affect muscle, knee and ankle strength, gait, balance, vision, and blood pressure; they may be using medications that cause orthostatic hypotension or other side effects that exacerbate risk factors for falls. Such risk can be exacerbated additionally by environmental features such as dim light, glare, slippery and or uneven floor surfaces, absence of grab bars and guard rails, improper furniture, and presence of obstacles. Taking lighting as an example of the importance of environmental factors, it has been found that by the age of 60 there is a 66% reduction of light reaching the retina; even those older adults with good visual acuity experience diminished ability to discriminate edges and contrasts due to increased density or haziness of the eye lens and resulting loss of light received through the pupil (Hughes & Neer, 1981). Thus, it is harder for older adults to identify faces and objects. However, aged persons are exposed to less light than are their younger counterparts. Using 2,000 lux as a criterion level, researchers have found that younger people in the community typically sustain 1.5 h exposure per day, elderly community residents sustain 1 h of exposure per day, community residents with dementia sustain only 30 min (Campbell, Kripke, Gillin, & Hrubovcak, 1988), and nursing home residents with dementia sustain only 1.6 min per day (Ancoli-Israel & Kripke, 1989).

Glare combined with low light can compound difficulties in seeing signs and cues, and uneven lighting (very bright to very dim) can further compound the problem. A recent study by Sloane, Mitchell, Calkins, and Zimmerman (2000) documents the lower than recommended levels of lighting found in both activity areas and in residents' rooms in SCUs, together with uneven lighting and glare. New evidence is emerging that supports the value of light therapy for the treatment of sleep disorder and, in very preliminary fashion, for behavior disorder (e.g., Lovell, Ancoli-Israel & Gevirtz, 1995); this increases the importance of light as an environmental intervention.

Paralleling growing knowledge about the importance of light is audiological research. For example, the study by Sloane and colleagues (2000) found decibel levels in the 60s (a level equivalent to loud talking) in the dining room during lunch and outside the nursing station. Given the association between low light, circadian rhythms, sleep disorder, and agitation observed in several studies and the relationship between noise and negative outcomes observed in others, this situation is less than ideal and deserves attention. An example of both the importance of considering the environment in the context of the people (residents and staff) and the difficulty associated with attempted remediation can be found in Schnelle, Alessi, Al-Samarrai, Fricker, and Ouslander's (1999) study of the impact of an intervention on reducing noise and light at night, which they had shown to be associated with awakenings. Staff members were so resistant to the intervention that Schnelle and colleagues never achieved a noise reduction character-

ized by no episodes above 50 dBs. These findings, showing the difficulty in implementing the most basic of interventions, highlight the need for sharpened awareness on the part of administrators and regulators regarding the importance of the environment.

### *Contributions of the NIA Collaborative Studies*

One form of therapeutic environment reviewed by Day and colleagues (2000) is the Special Care Unit. The prevalence of this form of environmental intervention is increasing rapidly. Leon, Cheng, and Alvarez (1997) showed that the number of SCUs in nursing homes doubled from 1991 to 1995 so that about 22% now have at least one SCU. The goals of the NIA DSCU studies were to understand the nature and impact of SCUs in nursing home settings. (Because of the importance of both the social and physical environment, the NIA collaborative studies included two environmental consultants, Margaret Calkins and Gerald Weisman.) In their review, Day and colleagues (2000) discuss global versus discrete interventions and call for more studies of discrete elements of the environment. This need is underscored in the analyses by Van Haitsma, Lawton, and Kleban (2000) that showed that environmental segregation, alone, can have a negative effect on the cognitively impaired. The implications are that global environmental changes in the absence of other features that should accompany SCU status, such as extra staffing, activities, and targeting and tailoring of residents to programs, may actually have a detrimental effect on residents. This is cause for alarm because some self-designated SCUs provide only global environmental modifications.

### *Taxonomy of SCUs and Instruments*

Day and colleagues (2000) call for therapeutic environments that include individual design interventions. In order to document the presence of such design features, it is necessary to measure their implementation. Several NIA investigators focused on defining the environment; for example, Grant (1998) developed an environmental taxonomy based on programmatic and staffing characteristics. Compared to non-SCUs, SCUs provided more *separation* (i.e., more separate activities, dining arrangements, and physical space for cognitively impaired and intact residents), and more *stability* (more consistent staff assignment to residents). SCUs had less *stimulation* (less noxious auditory stimulation) and less *complexity* (less complex programs and more simplified task environments). SCU staff had less *behavioral intolerance* (there was more tolerance for problem behaviors among dementia residents).

### *New Assessment Measures for Examining the Physical Environment*

As illustrated in a recent review of environmental measures (Lawton, Weisman, Sloane, & Calkins, 1997), prior to the NIA DSCU studies there were few measures that could be used to assess environments

for elderly chronic care populations. The NIA DSCU studies stimulated the development of a modified Therapeutic Environment Screening Scale (TESS) for use in nursing homes. The measure, originally developed by Sloane and Mathew (1990), was modified by Sloane and the NIA investigators to include 12 domains: unit autonomy, exit control, maintenance, cleanliness, safety, lighting, space/seating, physical appearance/homelikeness, access to outdoors, orientation and cueing, privacy, and noise. An Environmental Quality scale (composed of 18 items with good psychometric properties and convergence with a "gold-standard" measure also was developed as a result of the SCU studies. This latter "gold-standard" measure, the Professional Environmental Assessment Protocol (PEAP; Lawton et al., in press), was developed in collaboration with the environmental consultants to the NIA projects. The PEAP consists of a standardized evaluation completed during a several hour walk-through conducted by environmental design specialists. Eight domains are assessed: 1) maximization of safety and security; 2) maximization of awareness and orientation; 3) support of functional abilities; 4) facilitation of social contact; 5) provision of privacy; 6) provision of opportunities for personal control; 7) regulation and quality of stimulation; and 8) encouragement of continuity of self. The measure has good interrater reliability. However, the PEAP requires administration by environmental specialists, whereas the TESS requires only minimal training using a manual and accompanying slides and can be used by research as well as facility staff for self-evaluation. The TESS is also useful in other forms of congregate residential settings.

#### *New Methodologies Developed for Studying Social Environment*

Physical environmental modifications are usually the minimal requirement for those claiming to offer therapeutic settings for individuals with Alzheimer's disease. The NIA DSCU studies resulted in the development and use of new technologies for studying the ecology of long-term care settings. Grant (1996) developed an instrument addressing individual elements of the social environment: the Nursing Unit Rating Scale (NURS), in which individual environmental dimensions were combined using cluster analyses to measure "staff training," "functional promotion activities," and "structured group activities."

Sloane and colleagues (1998) developed a protocol, the Resident and Staff Observation Checklist (RSOC), for behavior observation and mapping. During a walk-through on a unit, each resident (without identifying information) is observed. Each resident's location, grouping, mobility, restraint status, interactions with staff or other residents, and selected behaviors are recorded. The measure of agitation, which had good interrater agreement, was found to relate significantly to specific environmental features: lack of cleanliness, odors of urine or stool, poor maintenance of public areas, absence of nonglare floors, low

light intensity, and large unit size. In the multivariate context, scales measuring environmental quality and staff treatment quality were uniquely and equally associated with agitation. (Low levels of physical restraint use and allowing daytime napping was also related to reduced agitation.)

Holmes and colleagues developed a software system based on a bar code methodology (Holmes & Teresi, 1998) for measuring staff inputs and costs of care; this was used in two of the NIA sites (Holmes, Teresi, Lindeman, & Glandon, 1997). The method was also used to study the ecology of the unit through capturing resident locations, positions, and interactions. The method, InfoAide, uses a portable barcode reader to record events, which are automatically time and date stamped; the software package cleans and processes the data for use in subsequent analyses. Using this method, no significant differences in overall service inputs were observed between SCUs and non-SCUs; however, SCUs provided significantly more nurse aide service.

McCann, Gilley, Hebert, Beckett, and Evans (1997) developed an observation methodology through which the frequency of 12 behaviors (e.g., talking/listening, repetitive actions, pacing/constant walking, swearing/cursing, and physical aggression) were recorded over 5 min intervals; the interrater reliability was good. The authors found that the convergence of the behavior observations with staff ratings was low to moderate, and staff underreported the frequency of occurrence of most behaviors.

Van Haitsma, Lawton, Kleban, Klapper, and Corn (1997) used a hand-held event recorder to study the ecological model of adaptation, in which some individuals would benefit from enhanced levels of stimulation, whereas others would retreat from stimulation. The methodology, which had good interrater reliability showed that the majority (63%) of behaviors occurred in large, multipurpose rooms and that most behaviors could be characterized as involving active participation (although 40% of the active behaviors were "interested gaze"), 24% as passive, and 6% as pathological. Residents were observed to be sitting or lying down 90% of the time, and in 83% of the observed time no interpersonal interactions were observed.

#### *Recommendations for Future Research*

*Move Away From Observational to Intervention Studies.*—Day and colleagues (2000) discuss the fact that most studies use nonequivalent comparison group designs. Although a randomized controlled trial is usually the design of choice, this is difficult to achieve in a nursing home setting; thus, there is a need to control for selection bias. The NIA collaborative studies have shown that SCU residents are demographically different from residents of non-SCUs and that SCU residents are also much more severely cognitively impaired than are non-SCU residents. Although there is a need to move away from observational studies to intervention studies, random assignment of res-

idents may not be possible. Future intervention studies require control of differences in characteristics of individuals in different settings.

*Target Discrete Interventions.*—Day and colleagues (2000) point out the need for examination of discrete interventions. Findings at the global level, particularly from studies that treated SCUs as a monolithic entity, have been mixed. The investigators involved in these studies have concluded that it might be more fruitful to discuss discrete features of SCUs; this can be achieved by including individual SCU characteristics as variables in analyses. Such work requires complex statistical models that can account for the correlation due to presence in the same unit with the same characteristics. These analyses are beginning to appear in the literature (see Liu, Teresi, & Waternaux, in press), and the NIA data set provides an opportunity to explore such relationships.

*Target Research for Stage of Dementing Illness.*—Day and colleagues (2000) discuss the need to target and tailor interventions to the stage of illness. There are varying levels of dementia represented across the long-term care continuum, from personal care community settings to assisted living to nursing homes. Moreover, individuals progress to more severe stages of dementia through the course of illness. Accompanying this progression, individual needs change, and environmental interventions must change with them. Maximizing functional independence by organizing a closet so that undergarments are placed before outergarments is useful in earlier stages; however, such interventions will not be of much help as the disease progresses. A major challenge is to help formal and informal caregivers to adapt the environment to the stage of illness.

*Move to Practice in the Context of Theory.*—Environmental design experts are frequently asked questions such as, “What color should we paint the walls?” In part such questions point to a broader problem—the failure to consider the environment as a part of a big picture that includes both the physical and social environment in a model of person–environment fit. While there is no answer as to what color to paint the walls, there appears to be some evidence that neutral colors may be best, with contrasting colors used to highlight thresholds. Objects should be well-defined, for example, black on white or navy blue with yellow (Cooper, 1985); patterned and floral designs may not be best. Extra light and contrasting colors can be used to underline the presence of obstacles, thresholds, cues, and grab bars. Yellow rather than blue fluorescent or incandescent lighting may result in less glare (Tideiksaar, 1995). Also, difficulty distinguishing colors such as blue and green would argue against their use together if the goal is contrast. But the main message is that such a consideration as painting the walls the right color is only one of many steps that must be taken in order to achieve an adequate physical and social environment for individuals with dementing illness. Critical

to such achievement is the involvement and support of senior-level management. As concluded by Lawton (1999), in the end it is unlikely that the color of the walls or selection of wall-coverings, or any other discrete intervention, will in itself have much impact on outcomes. Rather it is the accumulation of such considerations in the larger context of the fit of the physical and social environment to the person that will have lasting effects on resident outcomes.

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