ABSTRACT

Objectives

The aim of this paper is to examine associations between specific dimensions of nursing home environments and the functional ability (walking and eating) of residents with dementia, and to contribute to the ongoing psychometric development of the Professional Environmental Assessment Protocol (PEAP).

Design

One-year prospective cohort study

Setting

15 nursing homes in a western Canadian province

Participants

Convenience sample of 120 nursing home residents with middle-stage dementia

Measurements

Every two weeks we observed residents' abilities to walk to the dining room and to feed themselves. At the end of a year of observation and immediately following a brief interview with the unit managers we used the PEAP to measure the extent to which nine specific dimensions of nursing home environments support the ability of residents with dementia to walk and to eat. Cox proportional hazards models were used to evaluate the effect of specific environmental features on residents' walking and eating disability.

Results

'Support of functional ability' was associated with a reduced hazard of both walking and eating disability. The environmental dimensions of 'maximizing awareness and orientation' and better 'quality of stimulation' were associated specifically with reduced hazard of walking disability; whereas the dimensions of the nursing home environment specifically associated with a reduced hazard of eating disability included improved 'safety and security', 'opportunities for personal control' and 'regulation of stimulation'. The Cox proportional hazard models using the 13-point PEAP scale were not significantly different from nested models using the 5-point PEAP scale, indicating that the two scales did not differ in their ability to discriminate between more and less supportive environments for residents with dementia.

Conclusions

Specific dimensions of the nursing home environment reduced the hazard of walking disability while others reduced the hazard of eating disability. Modifying specific features of nursing home environments may reduce disability in nursing home residents with dementia. The 5-point PEAP scale is able to discriminate between nursing home environments as well as the 13-point scale.

Key Words: dementia, environment, physical disability, Professional Environmental Assessment Protocol

Running Head: Environmental features influencing disability

INTRODUCTION

There is increasing evidence that the physical and social environments have an impact on the behaviour, function, and quality of life of nursing home residents with dementia.[1] Early work on environment-behavior relationships focused on conceptualizing the environmental dimensions of residential settings for older people in general, and evolved to focus on nursing home residents with dementia in particular.[2] Lawton et al.[3] noted that as the target group became more focused on dementia units, more dementia-specific dimensions have been proposed. Identifying the key attributes or components of the environment is a critical first step in the development of measures that can be used to evaluate dementia care settings.

Earlier literature reviews of long-term care environments for persons with dementia published between 2000 and 2002[4,5,6] analyzed advances in the field. More recent reviews have updated these earlier works and outlined the environmental features aimed at supporting positive resident outcomes for which the evidence is most robust.[1,7] Calkins' 2009 review[1] examined research on nine environmental features and concluded that the strongest evidence supports the benefits of private bedrooms and smaller groupings of residents. Fleming and Purandare[7] reviewed research on seven environmental components and concluded that the evidence is strongest with respect to providing unobtrusive safety measures; variation in the ambience, size, and shape of spaces; single bedrooms; visual access to key features; and control of unhelpful stimulation while optimizing helpful stimuli, with periodic access to high illumination levels. Both reviews stated that although the significant growth in studies examining the impact of the environment on nursing home residents with dementia has resulted in some strong evidence, more well-designed

studies are needed to provide evidence to support specific design features and their impact on resident outcomes. Central to this goal of linking components of the environment to resident outcomes is the need for reliable, valid and sensitive measures of the environment.

The interaction between the environment and behaviour has been conceptualized in the Competence Press Model which postulates that an individual's level of competence and the demands or press of the physical and social environment meet to determine the well-being of the individual.[8] If the competence of the individual, such as the person with dementia, is reduced, then the environment assumes an increased importance in determining well-being.[9] One of the goals of designing environments for people with dementia has been to reduce the environmental press and thereby promote functional ability and well-being.[4,10,11,12]

There is evidence from prospective longitudinal studies[13,14,15,16] and cross-sectional studies[17] that specialized environments for people with dementia may reduce the rate of functional loss; although other evidence suggests that residents with dementia exhibit a similar decline in function over time regardless of the care setting.[18,19, 20, 21, 22] One reason for the inconsistent findings may be differing definitions of what constitutes a supportive environment for people with dementia. For example a special care unit for people with dementia is composed of multiple design features. The presence or absence of specific therapeutic features in the environment might account for the differing outcomes. Day et al.[4] called for research to examine which particular elements of an environment lead to improved resident outcomes, because the unit of analysis in most research to date has been the special care unit overall rather than the specific environmental features.

The inconsistent findings regarding the impact of the environment on resident outcomes may also reflect a measurement issue. Instruments used to measure the physical environment may lack the necessary sensitivity and specificity to be able to discriminate between environments.[23] Measures have been developed to assess the nursing home environments including the Professional Environmental Assessment Protocol,[3] the Nursing Unit Rating Scale,[24] various versions of the Therapeutic Environment Screening Scale,[25, 26, 27] and the Models of Care Instrument.[28, 29] Studies typically measure the features of specialized dementia units however few have compared specialized dementia environments with traditional nursing home environments to assess the discriminant validity of the instruments.[29]

The Professional Environmental Assessment Protocol (PEAP) was developed to provide a standardized method for the expert evaluation of special care units in nursing homes for people with dementia.[30] The tool has undergone significant psychometric testing over time (e.g., Lawton et al.,)[3] and is one of the mostly widely used environmental measures. The PEAP provides a global assessment of the quality of dementia care environments on nine dimensions deemed to be therapeutic for people with dementia: awareness and orientation, safety and security, provision of privacy, regulation of stimulation, quality of stimulation, support of functional abilities, opportunities for personal control, facilitation of social contact, and continuity of the self with the past through personal and familiar objects. Assessment involves subjective evaluation of the physical and social environment on a 5-point scale for each dimension.[31] To assist with scoring, detailed descriptions are provided for each of five anchors (unusually limited support, low support, moderate support, high support, and exceptionally high support). Although the original

scoring[30] was based on the 5-point scale only, intermediate points are indicated as + or – on the scoring sheet, thereby creating a possible continuum from 1 to 13.[31] PEAP scores range from low to high, with higher scores indicating a more supportive environment for each dimension.

Inter-rater reliability for the PEAP was assessed in 20 special care units using three methods.[30] Percentage agreement ranged from 91.7% for safety and security to 58.3% for facilitation of social contact. Spearman's rho ranged from 0.88 for continuity of self to 0.69 for provision of privacy. Kappas ranged from 0.85 for continuity of self to 0.69 for facilitation of social contact. Thus all PEAP dimensions have demonstrated good or very good potential for inter-rater reliability. The authors reported a lack of variability among the 20 units and speculated that this may have resulted from the particular sample of units included or may indicate a limitation of the PEAP evaluation criteria or scaling.[30]

Validity of the PEAP was demonstrated in two studies.[3,32] A correlation (0.89) of PEAP total scores with the more established Therapeutic Environment Screening Scale[33] provided evidence for criterion-related validity.[3] Correlations among the PEAP dimensions ranged from 0.45 to 0.85 (median, 0.64) suggesting that quality seems to have been defined by the raters as a general feature of the environment rather than a collection of distinct features.[3] This conclusion was also supported with a principal components analysis which generated a single factor structure for the nine PEAP dimension ratings accounting for 67% of the total variance.[3] In a comparison of rural Canadian nursing homes the PEAP discriminated between special care units and integrated facilities.[32] Using the 13-point scoring, eight special care units had a significantly higher mean

summary score on the PEAP compared with eight integrated facility units, suggesting that the special care units were more supportive environments.

The aims of this study are: 1) to examine the hazards of walking and eating disability associated with specific dimensions of the nursing home environment for residents with dementia, and 2) to contribute to the ongoing psychometric development of the PEAP instrument. We hypothesize that the 13-point scale will be better able to discriminate between the supportiveness of nursing home environments than the 5-point scale. The study reported here is part of a larger prospective cohort study that investigated the incidence and predictors of walking and eating disability and excess disability in nursing home residents with dementia. [34,35]

METHODS

Design

In this one-year prospective cohort study the ability of nursing home residents with dementia to walk and to eat was observed every two weeks. Nursing home environments were scored using the PEAP after semi-structured interviews with the unit managers and one year of unstructured observations.

Inclusion and Exclusion Criteria

A convenience sample of 120 residents living in 15 nursing homes in a Western Canadian city were eligible to participate in the study if they had been diagnosed with Alzheimer disease, vascular dementia, or mixed dementia; were able to walk with or without a walking aid; were

able to put food into their mouths and swallow; and were in the middle stage of dementia as measured by the Global Deterioration Scale.[36] Residents were excluded if they had a diagnosis of Lewy body dementia (which progresses unpredictably with episodes of functional decline and functional improvement); had a diagnosis of frontotemporal dementia (which does not have a well described pattern of functional decline); lacked an authorized representative to provide informed consent on their behalf; or dissented to participate in an interview to score the Global Deterioration Scale.

Recruitment

Recruitment of research participants was influenced by the ethical requirements for conducting research with a vulnerable population. Nursing staff identified residents who met the inclusion criteria. Staff then contacted the authorized representatives of the eligible residents for permission to be contacted by the lead investigator. Informed consent was then obtained from the authorized representative and assent from the resident participant.

Given the frequency of data collection, nursing homes were approached to participate in the study based on their proximity to the university. Only two facilities, operated by the same organization, declined to participate in the study when they were approached. All participating facilities were located within half an hour drive from the university.

Procedure

The ability of nursing home residents to walk and to eat was observed fortnightly by one of the authors (blinded). Observations were integrated into the usual context of mealtime rather than

framing the observations as a testing situation. When residents were no longer able to walk or required physical assistance to eat then walking disability or eating disability was coded on an observational flowsheet. The complete protocol is described elsewhere.[34,35]

The first author assessed the environment using the PEAP measure, based on the 13-point scale and the 5-point scale. Scoring was based on data collected from her bi-weekly unstructured observations of the social and physical environment over the course of the year, and on the data elicited during her interviews with nursing unit managers at the end of the year. The semi-structured interviews with managers focused on the policies and practices pertaining to the use of the environment that are not easily observable.[30] Each of the nine dimensions of the PEAP was scored immediately following each interview. The PEAP manual[31] describes the environmental features to be assessed for each dimension: **Orientation and Awareness**: signage, spatial predictability, visual differentiation of key areas, visual access to frequent destinations, and structural characteristics such as corridor length, views, and directionality. **Safety and Security**: ease of monitoring residents, control of unauthorized exiting and provision of specialized equipment to ensure safety. **Privacy**: policy regarding privacy, mechanisms to regulate noise in residents' rooms and allow for confidential conversations, and access to alternative private spaces outside their rooms. **Regulation of Stimulation**: control of acoustic, visual, olfactory, and tactile stimulation, acknowledging that a balance is needed to avoid sensory deprivation and over-stimulation, even with positive stimuli. **Quality of Stimulation**: quality of stimulation in the four categories described under regulation of stimulation. These include meaningfulness of sounds and visual stimuli, positive smells (including aromas of cooking food), variation in tactile stimulation, and availability of activity programs. **Support of Functional Abilities**: degree of

support for independence in self-care (e.g., toilets and bathing facilities available in each room, color contrasts in the bathroom), meals and eating (e.g., meals served in a way that maximizes residents' ability to eat independently, table height adjustable), and instrumental activities of daily living such as cleaning and gardening (e.g., access to tools and supplies). Traffic paths blocked by equipment would downgrade scores. The assessment of support of functional abilities includes both the environment and the rules regarding its use. **Opportunities for Personal Control**: extent to which the physical environment and the rules about how it can be used provide residents with opportunities to exercise choice regarding use of space, schedules, activities, and food (e.g., menu choice and flexibility in meal times). Control may be limited by use of restraints and policies that regiment schedules and use of space. **Continuity of the Self**: preservation of continuity between the present and past environments, and the self of the past and present. Assessment questions are directed toward extent of personalization with residents' own furniture and personal items, non-institutional environment in public spaces, and ability to participate in familiar activities. **Facilitation of Social Contact**: provision of a range of social spaces in terms of size and location on the unit, placement of furnishings and props to promote interaction, and policies and programs intended to facilitate social contact.

Data Analysis

The characteristics of the sample of residents and nursing homes were summarized using descriptive statistics.

To determine whether the 13-point PEAP scale yielded significantly different results from the 5-point scale we used the following analytic strategy. 1) Using survival analysis with Cox

regression models to assess time to walking disability and time to eating disability, we visually

inspected the Cox proportional hazards ratios which were plotted against the 5-point PEAP scale

scores for each of the nine PEAP dimensions. In this way we verified that the PEAP data were

linear and not categorical. 2) Then we generated a variable that differentiates the 13-point scale

from the 5-point PEAP scale. 3) Finally we used the likelihood ratio test to compare the Cox

proportional hazards models using the 13-point scale with nested models using the 5-point scale.

To identify specific features of nursing home environments that affect the hazard of walking

disability and the hazard of eating disability in residents with dementia, we assessed walking and

eating disability outcomes separately for each of the nine dimensions of the PEAP instrument

using bivariate Cox proportional hazard regression.

There was no loss to follow-up. If a resident participant relocated to another nursing home, then

the first author continued observations in the new nursing home environment where the resident

moved. Most residents who died during the study were observed by the first author to lose their

inability to walk and eat prior to death however six residents died suddenly before they were

observed. After completing a sensitivity analysis to assess the difference in coding these six

residents as experiencing disability or being censored (usual procedure for loss to follow-up with

survival analysis), we decided that conceptually it was preferable to code all residents who died

as experiencing a walking and eating disability.

All statistical analyses were completed using STATA 10 (StataCorp, 2007, College Station, TX: Stata Corporation). The Conjoint Health Research Ethics Board at the University of (blinded) approved the study. Further details about this dataset are reported in Author (blinded) et al.[34,35]

RESULTS

Characteristics of the 120 nursing home resident participants are reported in Table 1.

Insert Table 1 about here.

Of the 15 nursing homes participating in the study, 3 (20%) were publicly operated (not-for-profit), 7 (47%) were operated by voluntary agencies (not-for-profit) and 5 (33%) were privately operated (for-profit). All nursing homes in Canada are publicly funded. Other nursing home characteristics are reported in Table 2 including the total PEAP scores, number of beds and age of the nursing homes. Two newer facilities that were purpose-built for dementia care scored higher on the PEAP than any of the other facilities.

Insert Table 2 about here.

The results of the likelihood ratio tests for most of the nine PEAP dimensions show that the hazard ratios derived from Cox proportional hazards models using the 13-point PEAP scale were not significantly different from the hazard ratios derived from the nested models using the 5-point PEAP scale (Table 3). In only two PEAP dimensions in relation to eating disability (privacy and personal control) did the 13-point scale perform differently from the 5-point scale.

Thus we do not have sufficient evidence to support the hypothesis that the 13-point scale was better than the 5-point scale in detecting the supportive effects of nursing home environments.

Insert Table 3 about here.

In view of the finding that there was no advantage to using the 13-point scale, we report the Cox proportional hazard regression results using the simpler 5-point scale. The associations between specific environmental features, as measured by the 5-point PEAP scale, and the hazards of walking and eating disability are reported in Table 4.

We assessed the influence of four classes of psychotropic drugs (cognitive enhancers, neuroleptics, benzodiazepines and antidepressants) on the hazard ratios for both walking and eating disability. The hazard ratios for walking and eating disability did not reach statistical significance when including each of these drug classes in the Cox regression models.

Environmental features that supported functional ability (e.g. extensive grab-bars; finger food availability) reduced the hazard of walking disability (HR = 0.64; p = 0.02) and reduced the hazard of eating disability (HR = 0.61; p = 0.01). Likewise, maximizing awareness and orientation and better quality of stimulation were significantly associated with a reduced hazard of walking disability; whereas improved safety, opportunities for personal control and better regulation of stimulation were significantly associated with a reduced hazard of eating disability (Table 4).

Insert Table 4 about here.

DISCUSSION

Implications for Practice and Policy

Orientation and Awareness: The finding that better scores on the Orientation and Awareness dimension were associated with a decreased hazard of walking disability (HR = 0.75; p = 0.04) suggests that environmental design features supporting orientation and awareness do impact resident mobility. A 2011 review of the role of architectural design in wayfinding for people with dementia identified two categories of environmental interventions that promoted orientation and wayfinding: features of the floor plan (e.g., small scale, direct visual access to relevant places) and features of environmental design (e.g., signage).[17] Marquardt and Schmieg[37] found that straight circulation systems providing clear visual access improved wayfinding. The PEAP assesses all of these features, as well as stability in daily activity patterns and use of specific rooms for specific activities, with furnishings or props associated with the activity. It is logical to assume that environments that support orientation and wayfinding will improve mobility by encouraging residents to leave their rooms and move about the setting, thus maintaining walking ability, but not influencing eating ability.

Safety and Security: The association between the 'Safety and Security' dimension and walking disability did not quite reach significance (HR = 0.74; p = 0.06) but eating disability was significant (HR = 0.69; p = 0.02). How aspects of safety and security as assessed by the PEAP (ease of monitoring, control of unauthorized exiting, support of functional ability, provision of

specialized equipment) could contribute to a reduced hazard of eating disability is not clear. It may be that an environment that facilitates monitoring of residents will enable the staff to extend more independence to residents. For example, staff can intervene with verbal prompts in a timely way when they are easily able to monitor residents eating. This would avert the necessity to feed residents. Also, if exits are effectively controlled or disguised, then staff are more likely to allow residents to freely roam in their living space.

Privacy: Earlier research with residents with dementia has found positive outcomes of private rooms, including improved sleep, reduction in interventions to promote sleep, reduced resident-to-resident conflict,[38] and decreased anxiety and aggression.[12] In the current study privacy was not associated with walking or eating ability, perhaps because these activities tend to occur in public spaces.

Regulation of Stimulation: The PEAP assesses factors such as noise levels, glare, and presence of pleasant and unpleasant odours. Noise in particular has the potential for greater negative impact on individuals with dementia.[31] The significant association between regulation of stimulation and maintenance of eating ability (HR = 0.66; p = 0.03) may be related to reduced distractions in the environment during mealtimes, particularly noise levels. A relaxed, low or controlled-stimulus dining environment is recommended for dementia care settings.[39,40,41] An intervention to improve staff-resident interactions and create a calmer, homelike environment resulted in weight gain in nursing home residents with dementia.[40] Strategies such as closing dining rooms doors, turning off televisions, radios, and intercom systems, reducing traffic,

eliminating equipment noise, and creating smaller dining areas, can help to reduce competing

auditory stimuli.[7,41]

Quality of Stimulation: While reducing unhelpful stimulation, care must be taken to enhance

meaningful stimulation, including acoustic, visual, olfactory, and tactile sources.[31] In the current

study, quality of environmental stimulation was significantly associated with a reduced hazard of

walking disability (HR = 0.70; p = 0.02) but not of eating disability (HR = 0.76; p = 0.08). The

link between quality of stimulation and preservation of walking ability could be due to increased

interest in the environment and therefore increased motivation to mobilize and engage with the

environment. Although not focussed on residents with dementia specifically, Lu et al.[42] found

that lack of things to see was a deterrent to corridor walking by residents in assisted living, who

reported that adding more artwork, window views, and plants would add to the pleasure of

walking.

Support of Functional Abilities: This PEAP dimension addresses competence-inducing

features that support independence in activities such as toileting, bathing, grooming, dressing,

and eating. Examples include easy access to needed objects and equipment (towels, toiletries,

closets, toilets, grab bars).[31] Although there is limited research on the relationship between

specific features of the environment and functional abilities, improved functionality in residents

with dementia has been associated with "non-institutional" environments.[5] The finding that better

scores on this dimension were associated with reducing hazards of both walking (HR = 0.64; p =

0.02) and eating (HR = 0.61; p = 0.01) disability provides support for the importance of

prosthetic features of the environment that compensate for loss of abilities resulting from dementia.

Opportunities for Personal Control: This PEAP dimension examines the extent to which the environment and the rules about its use provide opportunity for exercise of personal preferences and independence. We are not aware of any research directly examining the relationship between control and resident outcomes of eating and walking. In the current study, opportunities for personal control were associated more with improved eating disability outcomes (HR = 0.64; p = 0.03) than walking disability outcomes (HR = 0.67; p = 0.058). Organizational norms of the mealtime experience relate directly to this dimension of the PEAP scale. For example encouraging residents to feed themselves using verbal cues rather than feeding residents will make a big difference in eating disability outcomes. In terms of walking, avoiding use of physical restraints would support control and independence, thereby enhancing mobility and reducing walking disability.

Continuity of the Self: The PEAP assesses the extent of personalization and home-like qualities of the setting, and polices that support continuity of familiar activities (vs. environmental features that support the ability to participate, which are rated under Support of Functional Abilities). The continuity dimension was not associated with walking or eating ability in the current study.

Facilitation of Social Contact: It was surprising that the facilitation of social contact was not helpful for walking or eating outcomes in the current study. Environments and programs aimed

at engaging residents in social interaction might be expected to induce more walking and have been reported to enhance food intake.[43]

Psychometric Properties of the PEAP

We have reported evidence that resident outcomes vary in relation to environmental dimensions in a way that makes sense and can be explained in relation to the literature. This contributes to the construct validity of the PEAP scale.

For the most part the 13-point PEAP scale did not differ from the 5-point PEAP scale in its associations between the environmental dimensions and resident functional outcomes. Compared with the 13-point scale this simpler scale is easier to use and therefore is more likely to lead to better test-retest and inter-rater reliability. There is an opportunity for future research to build on the work of Norris-Baker et al.[30] who assessed the inter-rater reliability of the 5-point PEAP scale.

Implications for Education and Research

The PEAP measures both physical and social aspects of long-term care environments. Staff may not understand the therapeutic potential of an environment and the extent of their discretion in how space is used. Designers and architects make assumptions about the use of space but these assumptions may not be understood by health workers.[1] Administrative policy combined with staff education could make explicit the assumptions regarding the use of space in relation to each of the PEAP domains: 'maximizing safety and security' (e.g. monitoring exits or securing potentially hazardous equipment such as stoves so that residents can move about freely), the

'regulation of stimulation' (e.g. using the television/radio sparingly and intentionally in public spaces), the 'quality of stimulation' (e.g. orienting conversation towards the interests of the residents; staff not calling out to each other), making 'provision for privacy' (e.g. respecting private visits; knocking on bedroom doors) and 'facilitating social contact' (e.g. strategic placement of chairs in activity areas). The environment could be more supportive for residents with dementia depending on the policies governing the use of space and how staff members are expected to use the space.

There is also an opportunity to understand how and why long-term care staff members use space in the ways that they do (e.g. such as restricting access to gardens or to dining areas between meals). It may be that staff members do not perceive the environment as a tool at their disposal to optimize the well-being of residents.

Further research is needed to understand how specific elements of the environment captured by the dimensions of the PEAP instrument can influence resident outcomes other than functional ability. In particular dimensions such preserving the 'continuity of the self' (e.g. encouraging interaction with personal items) and 'regulation of stimulation' (e.g. reducing glare and noise) may be key to enabling residents to engage with their environments. For example, Cohen-Mansfield et al.[44] found that setting characteristics (light and noise levels, number of people in the room) influenced the activity engagement of nursing home residents with dementia.

Strengths and Limitations

This study contributes to an understanding of the ways in which specific dimensions of the environment are associated with specific functional outcomes for residents with dementia. Particular strengths of this study include the prospective, longitudinal data collection of the resident outcomes; the relatively homogeneous sample of residents with middle to late-stage Alzheimer disease, vascular or mixed dementia; and the intermediate sample size. A limitation of the study is that the person collecting the outcome data was not blind to the environment and in fact also collected the PEAP data.

CONCLUSION

Specific features of the nursing home environment reduced the hazard of walking disability while others reduced the hazard of eating disability. Modifying these features of nursing home environments may reduce disability in nursing home residents with dementia. The 5-point PEAP scale is able to discriminate between nursing home environments as well as the 13-point scale.

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Table 1.   Resident Characteristics n = 120

Characteristic	mean (SD)	median	range
Age (years)	86 (6.5)		71 - 98
Charlson comorbidity Index		1.5	0 - 9
Mini-Mental State Examination score	15.9 (4.5)		4 - 25
Global Deterioration Score		5.6	4.8 – 6.4
Duration of admission (days)		211	7 - 4497

	n (%)		
Female	94 (78)		
Grade 12 education	44 (37)		
Dementia diagnosis			
Alzheimer disease	57 (47)		
Vascular dementia	10 (8)		
Mixed dementia	38 (32)		
Dementia unspecified	15 (13)		
Cognitive Enhancer use	47 (39)		
Neuroleptic use	50 (42)		
Benzodiazepine use	21 (18)		
Antidepressant use	36 (30)		
Psychotropic use	78 (65)		

Table 2. Total Professional Environmental Assessment Protocol scores and other facility characteristics

Facility	Total PEAP Score 13 – point scale‡	Total PEAP Score 5 – point scale†	Facility Size*	Nursing Home Ownership	Facility < 10 Years Old
1	101	39	large	public	Yes
2	85	34	medium-small	voluntary	Yes
3	71	29	medium-large	private	No
4	109	43	small	public	Yes
5	90	35	large	public	No
6	70	29	medium-large	private	No
7	80	32	medium-large	voluntary	No
8	68	29	medium-large	private	Yes
9	106	42	small	voluntary	Yes
10	85	34	medium-small	private	Yes
11**	47 - 66	22 - 29	large	voluntary	No
12	79	34	small	voluntary	No
13	63	27	medium-small	voluntary	No
14	55	24	medium-small	private	No
15	96	38	medium-small	voluntary	Yes

PEAP = Professional Environmental Assessment Protocol

‡ Possible range of 13-point PEAP scale: 9 to 117

† Possible range of 5-point PEAP scale: 9 to 45

* small size < 100 beds; medium-small 100 to 149 beds; medium-large = 150 to 200 beds; large > 200 beds

** This facility had multiple units with varying PEAP scores

Table 3. Comparison of the 13-point scale with the nested 5-point scale using the likelihood ratio test

PEAP Domain	Walking Disability		Eating Disability	
	χ^2	*p* value	χ^2	*p* value
Maximize awareness & orientation	0.72	0.698	0.45	0.800
Maximize safety & security	0.32	0.854	0.66	0.720
Provision of privacy	5.62	0.060	7.85	0.020
Regulation of stimulation	2.22	0.330	5.27	0.065
Quality of stimulation	0.10	0.953	2.62	0.270
Support of functional abilities	0.56	0.757	4.94	0.084
Opportunities for personal control	0.93	0.629	6.59	0.037
Continuity of the self	1.43	0.488	2.14	0.344
Facilitation of social contact	1.21	0.545	0.10	0.951

χ^2 = Likelihood Ratio Statistic

Table 4. Cox proportional hazard regression outcomes for walking and eating disability adjusting for each of the PEAP dimensions using the 5-point scale

PEAP Dimensions	Walking Disability Outcome		Eating Disability Outcome	
	HR	*p*	HR	*p*
Maximize awareness & orientation	.751	0.039	.832	0.174
Maximize safety & security	.744	0.060	.685	0.018
Provision of privacy	.812	0.167	.789	0.126
Regulation of stimulation	.719	0.062	.660	0.027
Quality of stimulation	.701	0.021	.760	0.077
Support of functional abilities	.640	0.019	.610	0.011
Opportunities for personal control	.674	0.058	.642	0.033
Continuity of the self	.664	0.058	.685	0.092
Facilitation of social contact	.808	0.204	.863	0.385

PEAP = Professional Environmental Assessment Protocol

HR = hazard ratio

p = p value