Post-Occupancy Evaluation of a Transformed Nursing Home:

The First Four Green Houses

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Abstract

Purpose.   To study how well the physical environments of 4 Green Houses served the residents, staff, and visitors, and to develop recommendations for similar small-house nursing home projects. *Design and Methods*. Longitudinal post-occupancy evaluation of four houses using mixed-methods, including behavioral mapping, checklist ratings of individual bedrooms and bathrooms, place-centered time scans, environmental tracers, and questionnaires and interviews. *Results.* The small residential environments achieved the desired functional results for residents and staff. Some components of the environment proved problematic, especially bathroom designs, lighting/fixtures, and storage spaces. Certain areas of the buildings were under-utilized, particularly a den. Space was used differently in the 2 houses dedicated to residents with dementia compared to the 2 other houses. In the latter, residents tended to use their own rooms for a variety of activities, including visits, and often kept their doors closed, whereas in the former the central hearth area was used more frequently. *Implications.* The physical design of a nursing home shapes behavior and outcomes, and post-occupancy evaluation methods are useful to elicit detailed information about the environment.

Key words. Green House nursing home, culture change, privacy, living environments.

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This article presents a Post-Occupancy Evaluation (POE) of a radically transformed model of

nursing homes, the Green House ® (GHs) of Tupelo, Mississippi.

Background

<u>Setting</u>

<u>GHs as a model</u>. A GH is a trademarked small-house nursing home (NH) (Rabig & Rabig,

2008; Rabig, Thomas, Kane, Cutler, & McAllily, 2006). Each GH is a self-contained purposely-

built residence that provides a NH-level of care; a group of GHs hold a NH license either alone

or in combination with more traditional NH units. The GH also dramatically changes NH

organizational structure and reporting relationships. Nurse-aide level resident assistants function

within a single GH only, where they report to an administrator rather than a nurse, and perform a

broadened range of functions, including: the regular duties of a certified nursing assistant (CNA);

planning, preparing and serving meals; light housekeeping; and personal laundry. All other

professionals—nurses, physicians, therapists, social workers, activities personnel—comprise a

visiting clinical support team.

The environmental elements in the model include: scale of no more than 10 residents per

GH; private rooms and bathrooms with showers; use of assistive technology; and inviting shared

space, including a dining area with a table large enough to seat all residents plus guests and a

living room with a fireplace (called "the hearth"). Furnishings and décor were to be residential

in nature and the buildings were to blend into their surroundings. Institutional features such as

long hallways, medication carts, nursing stations, and public address systems were eliminated.

The vision of the GHs is antithetical to NH regulations and customary routines. For example,

GH residents are expected to have access to the kitchens, yet established guidelines for food handling make that difficult. Frontline staff members are expected to fill multiple roles, yet infection control rules discourage staff members to simultaneously work with food, laundry, and resident care. In traditional NHs many spaces are "off line" for residents (e.g. office spaces, industrial kitchens, laundries), whereas in the GH only a few "mechanical areas" were out-of-bounds to residents.

Specific setting. This POE was conducted in the first GH project in the United States, specifically, in four 10-person GHs that replaced 40 beds from a traditional 140-bed NH located in a multi-level retirement community. The GHs were located in a residential part of the campus, and operated under the license of the original NH. Houses 1 and 2 were occupied by the residents who had formerly populated an outdated locked special dementia care unit of the parent NH. House 3 and 4 were initially occupied by residents who chose to move to the GHs, prioritized based on length of time that he/she resided in the retirement community.

Theoretical Framework

The normalcy of the setting and the hallmarks of home were expected to foster meaningful activity and interactions. The Ecological model (Lawton & Nahemow, 1973) theorizes that behaviors are a result of the interaction of personal factors with their environment. Behavior and affect are outcomes of a person's level of competence interacting with an environment's level of press. Physical settings fashioned like the GHs should also reinforce Maslow's 5-level hierarchy of needs (1970) (Cutler, Kane, Degenholtz, Miller, & Grant, 2006), namely: 1) physiological needs; 2) safety needs; 3) social needs (love, acceptance, affiliation, being needs); 4) self-esteem needs (competence and recognition from others); and 5) self-actualization. Finally, the GHs embody cultural norms for living spaces (Morris and Winter, 1991). For

example, privacy is a strong cultural norm that has had great impact on design and ultimately on housing satisfaction. The sharing of sleeping and bathroom spaces tends to be governed by strong norms. The specific GH studied here also meant the environment to enhance opportunities for a good quality of life, measured by 11 quality-of-life domains for which measures had been recently developed and tested: privacy; individuality; autonomy; spiritual well-being; sense of security and order; comfort; enjoyment; meaningful activity; reciprocal relationships; individual dignity; and functional competence (Kane, et al, 2003).

Method

Post-Occupancy Evaluation (POE) Framework

A POE is a systematic and rigorous mixed-method assessment of a building after it is in use. It can be conducted immediately after a space is occupied to discern how the designed spaces are actually utilized, and at later intervals to explore how the building adapts to changing user and the extent of wear and tear (Preiser, Rabinowitz, & White, 1988).   The heart of any POE is the Performance Analysis, which examines technical, functional, and behavioral aspects of the environment (see Table 1). A POE typically draws from all information sources to provide insights into consequences of past design decisions and provides design directives for adapting the particular building or for development of similar projects in the future.

This POE was part of a 2-year multi-method longitudinal quasi-experimental study comparing the Mississippi GHs to two comparison sites using data collected at baseline and three 6-month follow-up intervals. The main evaluation compared outcomes of the GH residents, their family members, and the CNA-level resident assistants to those of residents, family and CNA's at the sponsoring NH, and a retirement campus owned by the same firm about 80 miles away;

positive results for resident quality of life, satisfaction, and functioning are published elsewhere

(Kane, et al, 2007).

(Table 1 about Here)

Research Questions

Listed below are the research questions guiding the POE:

- How have the GH private physical environments changed the experience of a NH for residents and other users?

- How have the shared GH spaces changed the NH experience for residents and other users?

- How well does the environment achieve its aim of being a home?

- How well does the environment function as a workspace for staff?

- Were cross-GH differences found in the use of the environments, initially or over time?

- How does the environment support specific care tasks and life functions: e.g., bathing, meals, interactions with other residents and those outside GH, and outdoor activity?

- What environmental changes are recommended for the next generation of GH's on the Tupelo campus or elsewhere?

Data Collection

Floor & site plan analysis. A richly detailed description of the actual physical setting is a

component of the POE. We undertook a systematic study of floor & site plans detailing each

room by size, configuration, furnishings and design features.

Administrative data analysis. We developed cost calculation worksheets to capture the costs

of construction and of operations during start-up and when a steady state was achieved. Data for

the construction costs were gathered from the architectural firm that designed and built the GHs.

Environmental checklists. Data on the private rooms were gathered using a 112-item

checklist for assessing resident room and bath areas that is part of the Environmental Quality

Assessment for Living (EQUAL) checklists (Cutler, et al, 2006). The first author completed the

checklist assessments for each of the 40 residents at the beginning of the study and for each new

resident who had moved in during subsequent data collection intervals.

Behavioral mapping. An observational behavioral mapping schedule was developed to

systematically chart the location and movement of residents, staff and visitors during specific

time periods, organized to map much the same time period for the same length of time in each

GH during morning, afternoon and evening hours. For example, lunch was served at some time

between 11:00 am and 1:00pm in each house. For four subsequent days, that time period was

observed in each house, giving information about whether residents were sitting at the table prior

to the meal and how long they lingered afterwards. During the observation period, notes were

made about who was in each space and what they did there. For each follow-up period, mapping

included a minimum of 6 hours per house for each of the 4 houses. Alternating between houses,

the mapping was done in two hour sessions throughout the day, including weekends.

Interviews with users. During observation periods throughout the study, the first author

conducted unstructured interviews with elders, staff and family and compiled field notes for the

interviews after each visit. These interviews dealt with what informants liked or disliked about

the specific spaces, and their perceptions of difference from previous NH experiences. Also, as

part of the overall evaluation, data collectors interviewed each GH resident, family member and

CNA-level staff member. At each of four time intervals, 6 months apart, the interviews

included ratings of satisfaction with the physical environment and open-ended questions seeking

reactions to the private and shared space from residents and family and the working environment

from staff with 100% response rates from the GH sample. We incorporated these qualitative

responses from GH users into the POE.

Place-centered time scan. During each wave of data collection, a systematic observational scan was conducted in each house within a 30 minute time frame by swiftly moving between houses and documenting how the shared spaces were being used in each house during those 30 minutes. Time scans were conducted four times throughout the day for a minimum of two scans per time slot per GH during each data collection wave, using beginning times of 9:30am, 12:30 pm, 3:00 pm and 5:30 pm. This scheduling allowed for the 2 hour sessions of behavioral mapping to be conducted in between the time scans.

Physical tracers. Observing physical tracers after users have left a space is an unobtrusive way to explore patterns of space use. The selection of tracers used in this study included placement and use of dining room chairs, use of bookshelves in the hearth area, placement and use of shared television sets (e.g. whether they were on or off, and whether any watchers were in reasonable visual distance of a television set that was turned on) and wear and tear on furniture and appliances. The results of tracers were annotated in a detailed journal.

Photographs. We used photographs of a location or space taken systematically (e.g., a picture of each hearth bookcase at intervals; a picture of each kitchen counter) or taken to document a specific observed phenomenon, which might be construed either positively or negatively. This technique helped identify how the GHs were maintained; whether the interiors, including placement of furniture, accorded with the intent of the model; and resident activities. The informed consent included securing permission of residents and/or their agents for taking photos for educational and research purposes.

Time periods and long-range follow-up. Intensive data collection for the POEs took place from May 2003 through December 2004. In 2006, as part of a study of expanded GHs on the

same campus, both authors made 4-day visits to the campus and systematically visited each of

the original GHs and talked to residents and staff there.

Findings

Analysis of Floor and Site Plan

The architectural firm designed the GHs to be consistent with the idealized GH model. The

design is comprised of 10 private rooms enclosing common spaces, with service areas located

below the common spaces (Figure 1). The gross square footage (GSF) of each Green House is

6440 GSF with each bedroom at 210 net square feet (NSF) and bathroom at 50 NSF.   The

kitchen and dining area (#3) are 288 and 357 NSF respectively. The open kitchen design is

surrounded by counter space, including a counter at wheelchair height. The kitchen area can be

entered on both sides with no doors or gates obstructing entry. A metal shield is located on a

shelf adjacent to each stove that can cover the cook top if a staff member needs to leave the

kitchen in the midst of food preparation. A pantry is located behind the kitchen and is not

accessible directly from it. The hearth area (#2) encompasses 704 NSF. A den, (#4) is located

behind the kitchen and out of view of the central shared space. A double door to the patio is

located in the den area with an additional door off the kitchen. Each bedroom (#5) is private with

a window, wide window sill, small closet, and built-in medication storage unit. A shower is

located in the bathroom with a fold-down shower-chair attached to the wall between the lavatory

and sink. No door separates the bedroom from the bathroom.

The office (# 6) fulfils many functions including storage of drugs needing refrigeration;

location of medical records, computer, and fax; office space for professionals on the clinical

support team; and occasional break space for staff. A beauty salon (#7), spa with whirlpool bath

(#8) and utility room, where storage and the washer and dryer are located, (#9) completes the

plan. Although not numbered on the plan, an additional bathroom is located in this service area,

fulfilling the requirement for a staff and visitor bathroom. A service door is located off the

utility area.

Insert Figure 1 about here

The GH sponsor sought to meet the intent of each federal and Mississippi NH regulation

while avoiding institutional hallmarks. Because each self-contained GH held fewer than 20

residents, Mississippi regulations allowed noncommercial appliances. The requirement that

dishwashers be contained in a separate room was interpreted as being met by their enclosure in

their own small "rooms" beneath the sinks. The requirement of a public restroom for female and

males was deemed met because the main NH to which the GHs were affiliated had gender-

specific bathrooms. The Survey and Certification agency was enthusiastic about testing the

model and was flexible as long as the purpose of each regulation was met. Ultimately, the only

built elements that appeared distinctly institutional were the two illuminated exit signs that are

both visible from the central area.

Originally, the sponsor hoped that furnishings for the bedrooms would largely be provided by

residents and their families, but because the initial residents were all current residents of the

traditional NH, many had little furniture to bring. Family and community members were

encouraged to volunteer furnishings for the shared areas, although basic dining room, hearth, and

den furnishings were purchased. Early on, an executive from corporate headquarters ordered

hearth furniture from a supplier that proved unsuitable both in high cost and institutional

appearance. These sofas and chairs were replaced by lounge chairs purchased from local

retailers, which were both less expensive and consistent with the kinds of furniture preferred by

older people living independently in that community.

Description of Costs

The construction costs for the first four GHs (exclusive of land costs) were $3,759,400 ($939,850 per house) plus an additional $144,540 for furnishings and equipment ($146 per SF). The furnishings and equipment included bedroom furniture, common area furniture, dining table and chairs, patio furniture, kitchen appliances and set-up, housekeeping set up, television, office furniture, computer hardware, telephone, medication refrigerator, and all fixtures. The GH sponsor already owned the land, but site preparation, including roads and pavement, is included in the construction costs.

Performance Evaluation

This section summarizes the technical, functional, and behavioral performance of the GHs, drawing findings from all data collection methods.

Technical evaluation. The technical evaluation considers built elements that relate to the comfort, safety, and security provided by the building. (See Table 2 for detailed observations of technical elements. Generally, the environment worked as intended to cut down noise, eliminate glare, achieve comfortable temperatures, ensure security, and function as an easily navigated home. Lighting switches, outlets, and fixtures were some of the least satisfactory areas. Outlets were too few to allow flexibility of room arrangement and overall, outlets for lamps, appliances, and electrical devices, and illumination were insufficient in number. Regulations require 10 FC (foot candles) for general use & 30 FC for reading, whereas the suggested levels for this population are 100FC (Brawley E., 1997). Without built-in night lights, some elders used plug-in night lights in the bedroom and bathroom, which are permitted in Mississippi, but prohibited in some states. Because the ceiling light fixture is not on a rheostat, a staff member entering a room at night has no recourse but to turn on a bright overhead. Keeping bedroom blinds closed

during the day negated the advantages of sunlight and views; some staff seemingly failed to ask residents if they would like the blinds open. The efficiency of the bathroom pull chords was hampered by corrosion caused by a bathroom design problem, discussed below. Security provisions for the open kitchen needed to be developed post-hoc. The lack of paved front sidewalks presented mobility challenges for all users and possibly deterred residents and family members from taking walks around the neighborhood.

Insert Table 2 about here

Functional evaluation. Generally, both private and shared spaces and their furnishings and decor succeeded in supporting resident independence and comfort, although specific problem areas were identified. The biggest systematic short-fall regarded the individual bathrooms. They were small and designed with insufficient storage or counter space, and the shower was located so that its use caused everything else in the bathroom to get wet. The absence of bathroom doors was a mistaken effort of the designer to provide cueing as well as pare costs. The POE documented the expected reactions; residents and family complained about the inability to keep towels and toilet paper dry, and even residents with dementia, typically did not like using a bathroom without a door. Visitors definitely felt awkward using them. Another unintended consequence was that one resident consistently placed bedding and clothing in the toilet, thus creating plumbing havoc and considerable repair costs. In general, storage space for the equipment needed to run a NH was neglected in the original design. Residents and family members also considered the closet and storage space for individual residents to be inadequate, though it was more ample than in most traditional NHs. Perhaps once clientele are encouraged to think of a NH as a real home, the problem of keeping all of one's possessions in a tiny closet and a few drawers becomes exacerbated.

Insert Table 3 about here

Behavioral evaluation. This component examines the extent to which the design supports

the hoped-for behavior and experience of residents and staff. Topics included the support of

privacy, dignity, symbols and meaning, personalization/individualization, social and community

life, and the management philosophy of the GH (see Table 4). The findings here were mixed.

We noted substantial personalization in the resident's rooms, and some individualization of

shared spaces. The setting engendered pride and a sense of ownership among resident assistants,

shown by the gracious way they answered the door, welcomed visitors, and offered food.

Visitors were observed participating in household life—chatting with a staff member over coffee

and cake, or attending meals. The GHs developed individual traditions, but the two GHs

originally populated by the residents of the locked dementia care unit evolved differently from

the other 2 GHs with a mixed population.

In the dementia GHs, residents were usually assembled in the hearth area unless they were

lying down in their beds and family visitors also tended to remain in the hearth area. The milieu

was relatively serene and we observed few behavior disturbances, outbursts, or expressions of

anxiety. Contrary to conventional wisdom, residents with dementia were able to participate in

lengthy meals.   As time progressed most of these residents were no longer ambulatory and their

rooms became sparser in furnishings and décor. Bedroom doors were usually open. Residents

were discouraged from using the kitchens.   In contrast, in GHs 3 and 4, residents spent

considerable time in their rooms, entertaining visitors there, and these rooms became more richly

decorated and personalized as time progressed. The residents used the kitchens freely (a photo

captures a late-rising resident in a housecoat entering an unoccupied kitchen for late morning

refreshment), and some residents involved themselves with household tasks.

Insert Table 4 about here

Interviews

GH residents responded to the question "what do you like best about your current living situation" with high praise for the environment. Comments include: "best thing to hit the universe;" "I am very satisfied with my home;" "this is my little house and I take care of it" and "it is like a home away from home." Similarly GH family members were enthusiastic. One responded: "It's a beautiful home. She didn't live this good at home. It is just a luxurious place". Another responded: "I think her living area is spacious. The bathroom is perfect for a resident. She's living in high cotton right now."   Respondents also expressed concerns and ideas for environmental improvement. Among resident criticisms were the small size of the bathroom (e.g., "the bathroom is not big enough to cuss at a cat without getting hair in your mouth"), the lack of bathroom door, and lack of access to the public area bathroom. Other miscellaneous comments included that the bathroom mirror was too small, the grab-bars misplaced, the medicine cabinet too small, and the bathroom damp (a function of poor placement of the shower). One resident complained that the toilet leaked. The most common suggestion for the bedrooms was that there should be more space in general and more closet space. One resident felt noise carried from the common areas, one found the room cold, one would have liked better reading light, and another found the lift frightening. One resident considered the built-in medication chest area (which permitted medications storage in resident rooms) to be a waste of space. Family members made similar comments about lack of bathroom privacy, toilet leaks, dampness, and the need for public bathrooms for visitors.   Similarly, they echoed the comments about lack of storage space, shelf space, and better access to lighting. One family member

complained of bare walls and said the resident was prohibited from putting items on the wall (possibly a misunderstanding and definitely contrary to the model expectations).

Staff critiqued the shower and toilet configuration in the bathroom, called for better shower drainage, and found the shower seats problematic (too low, uncomfortable wooden slats, no support to hold elder up, and an imprint is left on the resident's). Other staff comments: grab bars were too high for the residents; a portable shower chair would be preferable to the built in wooden bench; bathrooms were too small; a container was needed for dirty linen; no space was provided for biohazard materials; bedrooms were too small for wheelchair use; carpets could not be kept properly clean; closets were too small; and window alarms for security purposes might be useful in dementia houses.

Four residents and one family member commented negatively about the large dining table, referring to noise, congestion, and chaotic meal-times suggesting that smaller tables would be preferable. During one follow-up period, a resident in one house ate at a small table placed nearby for that purpose. A family member commented that the dividers to keep residents out of an unoccupied kitchen were dangerous to residents; (as noted in Table 3, these screens were a temporary solution and quickly replaced by sliding doors). One resident thought the hearth area had insufficient space for activities, and one wanted a television there. (As also noted, televisions were found in the hearth by the end of the observation period). A family member felt the hearth area was too cold and another felt that the furnishings and carpet were showing wear and tear. A few residents made comments about the outdoor areas (too isolated without enough cars and people to watch, a need for more covered outdoor seating; and insufficient access to outdoors due to lack of automatic door opener or staff assistance.) Other family member saw a need for: a covered portico at the GH entrance to facilitate picking up elders during inclement

weather; more parking spaces; better maintenance of the grounds; a better security system; reduced access to the front door code; and removal of Halloween decorations still up at Christmas.

Staff critiques included: the whirlpool bath design does not support the elders in a sitting position; a call button is needed on the wall adjacent to the tub; the cabinets in the beauty shop area prohibited wheelchairs to be positioned directly in front of the rinsing sink; the pantry should be in closer proximity to the kitchen; the cabinets are placed too high, necessitating use of a step ladder; the refrigerator doesn't hold the temperature at the required level; the residential appliances were always breaking down, including the laundry appliances; the kitchen sink faucet needed to extend further; (in one house) the counter tops were slanted to the degree that dishes slid off and (in another house) a bubble appeared in the counter top laminate. In addition, staff commented on the need for more electrical outlets in the hearth area; the need for a lift track for the dining and hearth area; the potential tripping hazard the transition strip area between carpet and floor presented; and the need for a water faucet in the courtyard. Staff expressed some timidity about being alone with the residents, especially at night. The abundant windows were a plus during the day, but made some staff frightened at night during storms.

Unstructured interviews during observation periods confirmed these impressions. Family visitors were generally enthusiastic and appreciative; some indicated they and other family members found visiting GHs much more pleasant than visiting the traditional NH; some family worried about security at night and wondered if a typical private-home security system was needed.

Discussion

Study Questions

Private physical environment effects on NH experience. Residents and family appreciated

having a private bedroom and bathroom, and this positive reaction outweighed response to some

of the design problems of the bathrooms. Residents of House 3 and 4, in particular, used their

bedrooms to entertain guests and to undertake projects and activities on their own. In all houses,

but especially Houses 3 and 4, some residents and family members personalized the rooms a

great deal. Given that initially all residents had moved from a traditional NH and had given up

possessions, we would expect the personalization to increase as residents enter the GHs directly

from the community or from assisted living settings. Of course, residents entering from such

community settings may take private rooms for granted and have higher expectations for living

space in their own quarters and for personal storage space.

Shared physical environment effects on NH experience.   The kitchens, dining areas, and

hearth areas conveyed the sense of normal living environments, engendered staff pride, and in

general shaped the GH experience positively.   This was amply reflected in comments of

residents, family, and staff, and in the observations made during behavioral mapping. The den

area is under-utilized presently; currently, most activities take place at the dining room table.

Because the den area is at the back of the house out of sight from the dining or hearth area,

frontline staff lack visual access and activity personnel and/or volunteers might be needed to

make formal use of that space. The den is too small to accommodate simultaneous activities for

the entire household but could be used for individuals and small groups. Similarly, outdoor patio

space could also be used for planned activities.

GH as home. Residents and family members often used the term "home" to describe the

GHs; one resident called it "my home away from home." The hallmarks of home include

personal symbols of home, autonomy and control over space and time. A resident's cane or a

walker stationed in shared space or a sweater draped over a chair is suggestive of home, where

all possessions are not kept in the bedroom.   Two years later the feeling of "home" continued

along with chores that need to be done such as cleaning the refrigerator, sweeping the floor and

watering the plants.

Family members reported an increase in their visiting patterns because "it doesn't feel like a

nursing home." Extended families sometimes gathered in the hearth area. In one GH, two

musically inclined resident assistants on the evening shift tend to harmonize at the piano and

several residents appear to enjoy the singing. One husband dines at the GH almost daily and

spends time with his wife in her well furnished room or on the patio, landscaped with cuttings

from their garden. Bridal and baby showers for staff have been held at the houses with elders

included in the festivities.   An unintended consequence of this welcoming attitude was that one

grandchild stayed overnight so often at the GH and various other family members attended so

many meals that the staff felt exploited.

GH as workspace. The GHs were perceived as pleasant work- places. Front-line staff told us

that they liked coming to work.   Some of the biggest challenges concerned storage space and

finding optimal locations for all supplies, including health care equipment, cleaning supplies, and

food supplies. These challenges were addressed operationally by determining through trial-and-

error how much of various commodities to keep in each house. A photo showing a pantry shelf

with a dozen or so industrial size mustard jars reveals an early stage in working out these details.

Also challenging was to manage the time required for cooking.

Professional members of the clinical support team, especially licensed nurses, also had

adjustments to make and needed to overcome initial negative attitudes. Some did not want to

ring doorbells to enter. Some developed a makeshift med cart (e.g. on a tea trolley); despite that

medications were stored in resident's rooms and could also be mashed there, if needed. Some

nurses seemed reluctant to give up carting around the Physician's Desk Reference, the charts,

and other paraphernalia. Some complained about walking from house to house in the heat.

Office space for professionals was not optimal; department heads, including the GH

administrators or "guides" as they were called, the director of nursing, the director of activities,

and the director of social work had offices in the main NH, several blocks away from the GHs.

Clinical support team nurses ("charge nurses" in a traditional home) worked out of their cars or

in the GH offices. On the positive side, however, in addition to performing care routines, we

also observed licensed nurses pitching in and helping feed residents while functioning as a role

model for elder assistants.

   Cross-GH differences. The GHs developed individual differences that reflected the

characteristics, needs, and preferences of the residents living in each house, the personalities and

interests of the visitors, and the imagination and particular skills of frontline staff members.

However, the differences among houses were not as pronounced as the differences between

Houses 1 and 2 versus Houses 3 and 4. Mortality rates were low in Houses 1 and 2 and thus we

observed little turnover during the period of intense observation and beyond, but rather gradual

decline in the population, which in the beginning were largely ambulatory and characterized as

having the "behavior problems" that led to assignment to a locked dementia care unit. The

atmosphere in these homes was relatively serene, but focused on the hearth area with little

independent initiation of activities by residents. In Houses 3 and 4, even though each housed

some residents with dementia, the entire living space was more likely to be used and residents

also used their own rooms during the day, often keeping the doors closed for privacy when they

were in and out of the rooms. Although houses became differentiated from each, the rhythm of each house seems identical from day to day; weekdays seem similar to Saturday and Sunday.

Support of care tasks and life activities.   With the emphasis on building a residential setting, less attention was given to building an environment that supported care tasks. NH services require extra storage space not found in a typical residential design. The GHs provide the elders with privacy and community ambience exceeding traditional NHs, but fell short of providing adequate space for care and related storage. The intent was that the spa rooms accommodate therapy sessions but the therapists found the space inadequate, preferring to use the kitchen counter as the balance beam and a walk around the hearth area as the exercise route. The spa area (except for the beauty parlor) was generally underutilized—to use it fully would require staff to initiate a spa experience at various times of the day and evening for residents.

In theory, the GH should support a wide range of solo activities as well as natural activities occurring in pairs or smaller groups. But such activities do not arise automatically. We did not observe staff facilitating arrangements to use resident's rooms, den, or patio to encourage such resident clusters. Though staff always welcomed residents to the dining room table at any time, even if they themselves were having small meetings there, during our observations we saw few creative efforts to facilitate individual ways of spending time. Nonetheless, in Houses 3 and 4, some residents formed close friendships, a few developed a strong rhythm of relationships with outside visitors, and a few residents took on tasks such as drying dishes, or distributing laundry or mail. In House 1 and 2, we also observed residents performing tasks such as sweeping or folding but this activity was sparser.

Design directives

Bedrooms and bathroom. Provide locking doors for bathrooms (which would not interfere with the track installation into the bathrooms) and in future buildings, place the shower so that bathrooms will not become entirely wet with shower use. Design and install storage on the bathroom wall large enough to store incontinence products. Increase the counter and storage space in bathrooms for elder's personal items, and install single lever faucet hardware. Replace the bathroom light switch with a motion activated switch. Increase the number of light switches and electrical outlets in bedrooms, and provide additional lighting and night lights in rooms. Replace all conventional toggle switches with pressure or rocker type switches. Equip the medication storage cabinet with internal light that turns on when cabinet is opened.

Shared space. Relocate air vents away from ceiling above dining chairs. In each house, provide a room devoted to medical equipment storage. At year 2, some of this equipment ended up in the corridors. Enclose bookcase shelving in back of hearth for additional secure storage space. Eliminate or cover elder's name when dietary information is posted on the refrigerator. Try to transfer most residents to dining room chairs for meals; if chairs are moved temporarily, return them to the table rather than allow them to accumulate in corridors and the hearth area. Add more countertop appliance garages and clear kitchen counters of clutter. Consider accepting limited television use in the hearth area and building in a flat-screen television console with closing doors to encourage more purposive use of the television, and conservation of space. Provide an automatic door opener to outside patio area.

Consider designing and equipping the dens as spaces conducive to solo and small-group activities, paying attention to providing flat surfaces, adequate lighting and storage space. Wall-mounted wheelchair-accessible flat surfaces that fold down when not in use would provide activity space if the room is too small to accommodate a permanent card-table size table.

Consider including a computer, sewing projects, puzzles, and large print books. Provide enclosed storage for supplies. The den could be a bit larger to accommodate such activity without losing its cozy quality. If a television is considered necessary given that most residents have their own, consider another built-in console.

Install a bank of mailboxes for elder assistants to receive communications from NH administration. The current use of a shoe storage bag that hangs on the office door is unsightly.

General suggestions.   Consider installing a trash compactor in a central campus space or in smaller units in each house. The trash cans are often over flowing, suggesting inadequate capacity. Garbage quantity and collection frequency are problematic. Store biohazard waste in secure space other than lawn storage shed. Build a community center on the campus near the GHs that serves multiple functions such as a gathering place for elders, a wellness center, medical treatment office, offices for clinical supports team members, and central storage. Consider a central storage area separate from the GHs for extra chairs, water bottles, and other items common to all GHs but not used all the time. Install sidewalks in front of all houses adjacent to road. The only place to take a walk is down the middle of a one way street with parking on both sides.

Postscript and Concluding Comments

By 2006, 6 more GHs were opened on the Tupelo campus, leaving 24 licensed beds in the original NH. The new GHs were constructed to apply many of the lessons learned from this POE; the bathrooms were improved and included doors, and the pantry was built to be accessible from the kitchen. The new GHs, however, were constructed as 12-person houses, changing the footprint and introducing some new issues, discovered in a subsequent POE. Also some decisions, including using difficult-to-access armoires rather than closets, eliminating the drive-

up possibility at the front door, and eliminating the popular shampoo sink in each service areas all need further study. With 10 GHs in operation, the utility of a community center and paved sidewalks seems even more evident.

Since 2005, several new GH and small-house NH projects have opened (some of which have adapted to different climate, landscape, or community conditions or they too have benefited from the early experience with the first GH). To our knowledge all other projects limit themselves to 10 persons in a GH and some have provided more space in the bedrooms and bathrooms. Some GHs have been equipped with garages, which allow for residents to enter a car from indoors and offer extra storage. Several have off-street parking.

We expect to see continued creativity with small-house models. This manuscript has illustrated the rich results from investment in post-occupancy evaluation. We had the luxury of conducting a longitudinal POE, which allowed us to monitor environments and their use over time. But one-time POEs can also be amply rewarding in the insights that they generate. The small-house NH is a relatively new phenomenon that could be well-served if POEs are designed for each new project.

This POE suggested that the new designs with their emphasis on privacy and convivial shared spaces were well received by all the users—residents, visitors, and staff, and encouraged much of the family-like behavior the model hoped to achieve. The study illustrated the richness of ideas for improvements that are generated by the ideas of users and from structured observation. The study also invites reconsideration of aspects of the theoretical model. Televisions may be a fact of modern life. The prohibition of TV in the heart reflected a strong bias that viewing is time-wasting and a reaction to traditional nursing homes when television blares when no residents are watching, is used as a universal baby-sitter, or is used to suit the

taste of staff members. The POE revealed that initially the den TV would be wheeled to the

hearth and then ultimately left there—one hearth area at one time even had <u>two</u> TV's, captured in

a photo. What is left to work out is whether the original premise was correct, and how to

develop staff interventions to make best use of a shared TV and individual TVs in ways most

pleasing and functional for specific residents. The POE also demonstrates that changing the

physical environment is not always sufficient, but that staff need to assist residents to take

advantage of the setting, and consciously avoid old habits.

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Table 1. Conceptual Framework for Post Occupancy Evaluation of the GHs

Performance Criteria	Criteria-Based Performance Measures	Outcomes/Goals
Building Performance	*Data Sources*	*Short-term*
Technical	Analysis of site & floor plans	Examining how well
Functional	Environmental checklists	buildings met GH goals.
Behavioral	Interviews of users	
Users/Occupants	Behavioral mapping	*Mid-term*
Residents	Place-centered time scans	Providing feedback for
Management	Physical tracers	planning, critique, or design
Staff	Photographs	directives
Visitors (Family & others)	Administrative data	
Setting – Green Houses		*Long-term*
Private spaces	*Timing*	Adding to a research data
Shared spaces	Data collection before move-in, 6 months, 1	base on the effects of
Outdoor spaces	year, and 18 months later. Supplemented by 2	physical environments for
Staff/administrative spaces	site visits in 2006, 2007, and 2008.	long-term care.

Technical Elements
Technical elements of the environment involve survival issues such as health, safety and security aspects of building occupancy. This element plays an important role in the comfort of the resident and supports basic physiological and security/safety needs.

Functional Elements
Functional elements of the environment support organization and activities within the building. Characteristics include prosthetic and therapeutic elements including accessibility, stimulation, challenge, sensory compensation and sensory enhancement, adaptability of environment to respond to changes in functioning. Functional elements support basic social needs.

Behavioral Elements
Behavioral elements have an effect on quality of life by how the resident uses their environment, the influence of management decisions, programs and policies. Management programs and policies have an impact on expressions of territoriality, personalization, familiarity, activities, satisfaction, etc. Behavioral elements fulfill the basic needs of self-esteem and self-actualization.

Users
The primary users of the GH are the residents. Family members, visitors, frontline staff, managing staff, and volunteers are secondary users of the space.

Setting
The overall setting is a group of 4 GHs.   Categories of environmental characteristics include: physical, social, psychological and cultural.

Table 2. Technical Performance Evaluation of the Green Houses

Lighting: Natural light & blinds, Glare, Illumination (100FC), Task lighting, Rocker switches, Rheostats, Electrical Outlets
Overview. Natural light is in abundant supply in the Green Houses. Glare is not a problem. Resident rooms have blinds on windows to control light levels. Illumination levels could be improved on, especially in bathrooms. For adequate illumination in bedrooms, residents need to supply lamps. Task lighting is adequate in kitchen area.   Ceiling lights in the bathrooms are rusting out. In the kitchen/hearth area there are 14 lights, mostly canisters that use energy efficient compact fluorescent light bulbs of 26 & 13 watt. Most often, every light in the main shared area is on throughout the entire day. **Switches and outlets**. The toggle light switches in the bedrooms are small and difficult for residents to use. (A more appropriate switch would be a lighted rocker or pressure type switch). One overhead light is located in the middle of the room so that wherever the bed is located, it could not be used for task lighting for the bed. Two overhead light switches are placed in a location on a side wall next to the spot where the bed was almost always located (because of being the shortest distance for a ceiling lift between bed and bathroom). Because of limited wall space, residents tend to place shelving units in front of the switch, thus obscuring it and making its use difficult. Electrical outlets are insufficient for well placed night lights or task lighting or for electrical appliances and equipment, including entertainment equipment.   Lights are not on a rheostat.   No switches are illuminated. **Bedroom lighting**. There are 2 ceiling-mounted light fixtures in bedroom and no wall-mounted fixtures. There is no night light in bedroom. The wall-mounted medicine storage cabinet in each bedroom lacks task lighting. **Bathroom lighting**. Bathroom lighting includes one wall-mounted light fixture and one ceiling mounted light fixture There is no night light in bathroom. **Window blind use**. GHs differed in use of blinds. From observation, the elder rarely operated the blinds independently. If open, staff, generally opened them in morning. Some house interiors are very dark, relying on electric lights while others are filled with sunlight. For example, on 7-13-05, between 11:00am and 1:00 pm blinds in elder rooms were as follows: House 1 – 3 open 7 closed; House 2 – 2 open 8 closed; House 3: 7 open 3 closed; House 4– 5 open 5 closed.
Appliances: Refrigerator, Range, Dishwashers, Icemaker, Washer, Dryer
Residential rather than commercial models are being used for these appliances, which is permitted if a NH serves less than 24 people. During observation periods, one or more of these appliances were often out of order. For example, during one visit the washer was broken and the laundry needed to be done at the main nursing home. Two dishwashers are in each house. Disinfectant soap is used because the dishwasher water temperature cannot reach the required 180 degrees. The icemaker placed next to the dishwasher is not a good location because the heat the dishwasher generates increases the load on the icemaker. The range is gas and a stove guard is available to trap pots in case the staff member cooking is called away.   For future developments, use cook tops that are cool to the touch. Smaller appliances such as griddles, deep fryers, blenders, coffee makers, microwaves are constantly in use and often replaced.
Heating and cooling: Air conditioning, Heating, Background noise.
Temperature control Individual temperature control units are located in resident rooms giving them the opportunity to regulate the temperature. Background fan noise is not a problem. Vents directly above dining area create drafts, especially when AC is on.
Safety/security: Call system, communication between residents and staff and between frontline staff and clinical support team; Exit/entrance control, Fire detection & alarms, Biohazard waste.
Wireless communication. Call station systems in resident rooms are powered by batteries (150+). A computer system warns when batteries are low, but once a month all bathroom pull chord and bed push buttons are tested. Some corrosion has affected bathroom pull cords.   Instant notification for the call system is provided with a pager. Resident assistants wear pendants that have the ability to alert Clinical Support Team of an emergency situation. The wireless communication system is supplemented with 2 land telephone lines located in the office. Sprinkling systems are located in each house. Fire detection alarms follow city codes. **Exit and entrance control**. A keypad code is required to open the front doors; competent elders and frequent family visitors are aware of the code. After one elder in House 1 eloped through a window (with no negative repercussions), limited-opening hardware has now been installed in all the windows. The yards are enclosed with a 6-foot high metal fence. A gate to the yard is opened with an access code. In House 4 staff and elders have planted a vegetable and flower garden using perennials from an elder's home garden. **Secured access into kitchen.** Initially, staff purchased screens for the dementia GHs to cut off kitchen access when kitchens were unoccupied and/or meal preparations were underway. These temporary screens proved dangerous to elders, and gates were installed to block entry to the kitchen. Magnetic pulls on kitchen cabinets provide secured access to cabinets. **Emergency exit** Travel distance between exit access doors and exits is less than 40'. Travel distance from the center of the GH to the nearest exit is less than 40'. Travel distance from elder rooms to the nearest exit is less than 50'. **In house security system.** No private security system is installed. **Biohazard waste**. It was intended that bio hazard waste be kept in the service area in close proximity to laundry facilities. Two years later 2 storage units with red bio-hazard signs are located between houses on the campus; one of these storage units previously housed lawn equipment.
Acoustics: Noise control, Communication systems
Compared to many nursing homes, the houses are acoustically quiet. There is no overhead paging system. The generous use of carpet, casters on dining chairs and ceiling materials combine to reduce noise. The frequently ringing doorbell and the alarm if the door is opened without the code are the most common noises. When televisions were relocated to the hearth area, a new source of noise was introduced.
Interior finishes: Contrast, Texture, Maintenance, Spatial definition
These finishes are attractive, provide contrast, and offer different textures. Bedrooms are individualized by use of different paint

colors. **Maintenance** of wall coverings from damage by wheelchairs is a problem, and maintenance staff suggests using a material other than drywall for the walls would have been preferential. Cracks in the ceiling soffit area of each house suggest an impending problem. Maintenance of the kitchen areas differed between houses with some showing more wear and less cleanliness than others. Initially, some of the counters slanted to the degree of dishes sliding off. **Spatial definition** is very good, especially in visually separating the dining area from the hearth area though this differentiation could be further enhanced by use of zone lighting.
Windows. Height from floor, Security
Window Minimum window regulated size in a resident room is 12.5 s.f. Green House windows are 18s.f. with sills 34 inches from floor. The value of the larger windows greatly outweighs the security issue of elopement. Opening blinds during the day would further enhance the benefit from the larger window
Doors: Threshold, Automatic, Access, Hardware
Thresholds. Recommended threshold levels of <1/2 inch is achieved although differing heights of floor coverings in shared areas and doors to outside are problematic. Some elders are tripping on the strip between the dining and hearth area. **Access.** The GH has 3 doors to the outside. The wide front entrance provides good access for emergency gurneys and an ambulance can backup directly to the covered entrance area. The side door into the service area is also beneficial. The glassed door onto the patio is obviously convenient for entry and exit, bringing barbecued foods easily inside, and permitting staff observation and resident previewing. Staff who smoke tend to use the patio for breaks. The only other entry to the yard and patio is a gate which can be opened with an access code. **Automatic door opener** There are no automatic door openers in the Green Houses, although one providing better access to the patio would be a benefit. Hardware is lever type that passes the fist test.
Immediate neighborhood. (Road, Sidewalks, Parking, Distances)
Roads. The GHs were built in an undeveloped part of the campus near independent housing where roads needed to be constructed. All GHs are side-by-side on the same street. The road is paved and can accommodate cars passing each other, but not when cars are parked on both sides, which is most of the time. **Sidewalks**. No paved sidewalks are available for the street at the front of the house, though there are paved walkways from the side entrance to the street. **Parking**. No off-street parking is available. Parking for staff and visitors is parallel on both sides of the one-way street. By 2006, 6 additional GHs were constructed, and a circular road was completed. **Distances**. The GHs are in easy distance of each other, and are approximately a 10-minute walk from the original nursing home. **Development possibilities**. Additional proximate land is available where more convenient community center, health center, and staff offices could be developed, but the main nursing home (now with only 24 beds) is used for that purpose.

Table 3. Functional Elements in Green Houses

Human factors.   Anthropometric considerations; Wheelchair accessibility; Furniture to support comfort & functional competence; Lifts; Mobility facilitation; Resident activity facilitation; Bathroom availability and functionality.
Anthropometric considerations. Most features in the GHs anthropometrically support elders and resident assistants. Exceptions: some of the kitchen cabinets are located too high, toilets are too low; and automatic door opened have not been installed. The bathrooms need counter space around the sinks. Paved sidewalks are needed in front of the GHs. **Wheelchair accessibility.** This is adequate except at the shampoo bowl in the beauty shop, where wheelchairs can not get close enough**. Furniture.**   Overall the furniture supports functional competence although many of the hearth chairs are too over-stuffed for ease of access. The outdoor area needs covered seating because of the heat**. Lifts.** Each bedroom is equipped with tracking for a lift that extends from the bed to the bathroom lavatory and shower space. Initially, ceiling reinforcement was required to support the system. Difficulty with track slippage required modifications to each track to prevent future lift accidents. The lifts are used often and staff is positive about them. Suggested extension of lifts to hearth area was discouraged because of the intent to keep area residential in appearance**. Mobility facilitation.**   The wider hallways facilitate ease of passage and the residential scale provides shared spaces within a manageable distance. At Year 2, some of the hallways were cluttered with medical equipment and unused dining room chairs became an obstacle when stored in the hearth area. **Activities.** The intent of the Green House activity program is that elders would assist in cleaning, laundry, washing dishes and food preparation to the extent they wish, and that such activity plus normal interactions would, in part, substitute for formal organized group activities. Also resident assistants were expected to encourage and facilitate solo and group activities that residents chose. The kitchen and dining table did become the fulcrum of activity, but only a minority of residents was seen involved in meal preparation and domestic activities. The original model called for televisions in the sunroom only (as well as televisions residents might opt to have in their own rooms). Rather quickly staff moved televisions from the den into the hearth area, at first temporarily and eventually permanently including 2 televisions in one house. Some equipment for other activities was stored in the hearth bookcases and an occasional card table with a puzzle was seen. Two of the houses had pianos in the hearth area, and for a time one had a loom where two residents were weaving. **Laundry.** The laundry room as designed was unsafe for elders to be in alone because it is also a storage area for chemicals and biohazard waste until the latter was moved to outdoor storage areas. Unfortunately, the laundry area was not placed in a small designated space with a counter for folding clothes and a locked storage cabinet for laundry products that might be deemed dangerous**. Bathrooms.** Each elder has a private bathroom that is easily reached from anywhere in the GH. Another bathroom is located in the service area, which meets the requirement for a staff bathroom and also serves the spa and beauty parlor area. An eye washing station is incorporated into the sink. It was the intent that visitors would largely use the elder's own bathrooms. But without doors, visitors complained of a lack of privacy and typically used the staff bathroom. The bathroom faucet hardware consists of 2 levers, whereas a single lever would have been preferential to minimize the likelihood that a faucet is left on and for easier achievement of a comfortable water temperature. **Beauty shop.** A well-used beauty shop is located in an alcove in the service area. It is difficult to place a wheelchair directly in front of the sink and the space does not have a mirror or adequate lighting but it is used often in spite of the shortcomings.
Spatial factors. Quantity and size (capacity) of spaces; location in relation to staff work spaces; storage.
Space. Space per resident in the GHs far exceeds regulatory requirements for 10 residents.   The living room area is 704 NSF. (18 NSF. of lounge space per resident or 180 NSF is required. The dining room area provides 357 NSF, whereas 150 would have been required. The small den provides an additional 150 NSF and the accessible patio provides more space**. Location in relation to work space.**   Staff workspace is obviously not limited to any one location, although the office serves as the clinical support team base, houses the computer for the MDS, and serves as a staff break area. Cross contamination is a theoretical concern as staff routinely moves between the kitchen area and the public and private living areas. The den is out of view of the kitchen; the advantage it that it offers another potentially private space for residents and for family groups to visit residents, but the downside is that it is inconvenient for staff to facilitate access or monitor the room.   **Storage.**   Storage in the GH is limited both for residents' personal items and for supplies and equipment. The bedroom closets are too small, the bathroom counter space is extremely limited, the narrow glass shelf above the towel bar is inadequate and the bathroom medicine cabinet is not deep enough to be useful as a storage area. Several residents hang clothes from the lift tracks and others bring portable wardrobes into their rooms. The pantry area for food storage is not optimally located in relation to the kitchen. There is no front entrance closet. A front coat closet is generally included in residential settings and would be useful in the GH as well.
Communication. Signage; Telephone; Inter-staff communication.
Signage. Initially, other than required emergency signage, posted signs were minimized.   Slowly, signage has increased and it is often in the form of reminders to staff about required tasks posted on the side of the refrigerator. The required printed daily menu is usually sitting on the counter or posted on the refrigerator. Its font size is small. The posted message at the front door inviting guests to ring the doorbell is inviting and easy to read. A plaque with the name of the house hangs from each mailbox. Most elders have attractive name signage next to their doors. On one common-space refrigerator a dietary requirement for an elder is posted in letters large enough for a visitor across the counter to read. In some houses,

color-coded advance directives were noticed on each elder's doorframe. **Telephone**. Elders have telephone jacks in their rooms. At baseline 33 out of 40 elders had a phone in their room.. Elders may use the cell phone at the kitchen counter, but the cell phones are awkward to use and they are an integral part of the call system. There is a need for access to a telephone with large numbers, preferably next to a lighted section in a quiet area.

Staff communication. In each house's office, a large plastic shoe bag with pouches (intended for storage of shoes) hangs from the door. This is the space where resident assistants receive memos and other campus information.

Table 4. Behavioral Elements in Green Houses

Use of shared space.
Overview. The four GHs diverge into 2 groups; House 1 and 2 that are dementia-specific and House 3 and 4 that serve a mixed population. In all 4 GHs, the kitchen and hearth area were heavily used; often one or more resident was seated at the dining room table at non-meal times; the patios were used by residents; and the den was infrequently used,. We found differences in the way space was used between these two houses. **Houses 1 and 2.** Elders in these houses tended to spend their days sitting in the hearth area as a group, seldom spending independent time in their rooms unless in bed. Often some of these residents sat the dining room table, even when staff meetings occurred there. Use of areas of the service area and the kitchen area tended to be discouraged. Elders used the outdoor space frequently, sometimes with assistance and other times independently. Mealtimes begin earlier and last longer in those houses (often up to 1 ½ hours) and residents tolerated the long meal periods well. Licensed nursing staff and other clinical support team members and other visitors there at meal-time assist the residents with eating. One resident who easily was distracted at meals received his meals at the low kitchen counter. Throughout the day the hearth area is used. Visitors often remained in the hearth area with their relatives. Initially, the television was in the den area, then it was moved between the den and hearth and 2 years later it is a permanent fixture in the hearth area. The extensive use of the hearth area in these houses has implications for the need for clear space for wheelchair placement, the need for furniture that can withstand the wear and tear on the furniture, and the removal of obstacles. Over time most residents were in wheelchairs most of the time, and were not transferred to dining chairs during meals. Photographs reveal clutter from dining room chairs that were moved to accommodate wheelchairs at meals and never returned; possibly off-site storage is needed for those chairs. Not uncommonly 3 or 4 large extra water bottles for a drinking fountain were placed on the hearth floor near the kitchen counter rather than being stored elsewhere. **Houses 3 and 4.** In these houses, elders do have access to the kitchen. Some assist with washing dishes, setting the table, cleanup, or laundry. A large group of elders is seldom found sitting together in the hearth where, as with House 1 and 2, the televisions have been relocated. For the most part, elders spend time in their own room and entertain visitors there as well, though visitors and/or residents are often seen spending some time at the dining table having a snack and/or conversing with staff. Elders often come into the kitchen area to chat for a moment or have a cup of coffee and then return to their rooms. Because the distance between resident rooms and shared spaces is manageable, elders can come into the hearth area or kitchen for a snack and return to their room and they can preview the space.
Privacy and territoriality.
Privacy. Privacy within shared space is available both in outdoor areas and in the den. Elders tend to sit in the same location at each meal for dining. Elders' doors are often closed in Houses 3 and 4 and are usually open in Houses 1 and 2. Four elders have installed curtains to separate the bathroom from the bedroom. Lack of doors for the elder's bathrooms was the biggest problem related to privacy.   **Controlled access.** Controlled access to private space is most notable by the number of elders who have chosen to keep their doors closed, even when they are not in them. This shows a sense of ownership of that space, not possible in a shared room. In public spaces, privacy is attainable in the den area and outside spaces. The hearth area was furnished with single person chairs only although at Year 2, one house moved the couch from the den into the hearth area. The height of the bookcase and fireplace facilitate privacy for the bedroom directly behind the hearth area.
Dignity.
Space is lacking for storing incontinence products either in residents' rooms or in supply areas. There was no designated storage site for dirty linens designed into the original plan. Large gray covered waste baskets with labels are used. In some rooms, the baskets are stored in the bathroom and in other rooms the baskets are stored in the bedroom area. Lack of bathroom doors was also seen as a dignity issue by both residents and visitors.
Image/meaning.
The residential scale of each GH and the design of a kitchen open to the dining room and hearth area convey the image of a family room in a conventional house. The large dining table, the personalization of each house, the absence of overhead paging, the comfortable light levels and the dignified furnishings all combine to create a comfortable and inviting setting. The Green Houses convey a message of something special and elegant, and behavior is shaped by the expectation. In House 3 and 4, a family feeling was also cultivated—for example, paper plates were used occasionally for dinner after a busy day, and a patio barbeque was used for outdoor grilling. Food such as fresh baked cookies and beverages is also generally offered to visitors and available to residents. Residents can view groceries being delivered to the GHs. Efforts were made to create meaning and tradition. The GHs were each named after the oldest resident among those who first moved in. Initially in each house staff developed a guest book for their house and asked visitors to sign it. At a later date the guest book was replaced with a photograph album of celebrations held in the house. In House 4, residents were encouraged to bring cuttings from their family gardens, and a specially chosen tree was planted in memory of each deceased resident. In the last period of observation, we noted that House 3 had dedicated one wall as a picture gallery; 8X10 pictures of each elder from their younger days are clustered together, including pictures of deceased elders and one elder who briefly moved in and moved back to assisted living. One house named the den after a deceased resident. These memorials attest to

the sense of community experienced by staff yet they raise questions of the practicality and sustainability of dedicating limited space to remembering deceased residents and whether this detracts from meaningful symbols for new residents.

Personalization and individualization.

Personalization of both private and shared spaces is encouraged. Each GH has taken on an identity all of its own through decoration choices and the posted greeting at the front entrance. Elder rooms are personalized in different ways, some elaborate and some decorated simply. In year 2, the rooms in Houses 1 and 2 had become more barren of personal objects while the rooms in Houses 3 and 4 filled up with personal items. As outliers, one room is completely void of any item while another room is stuffed with furnishings brought from home. In one house, the hearth displays weaving done by several residents. In our years of observing these 4 GHs, we saw no example of an animal, fish, or bird living in the private or shared space.

Socializing and Community Building

The philosophy of the GHs is that each be a self contained functioning household within a community of similar households and a larger community. During the first year of the GH, many visitors came from the outside and residents were engaged with them. We also noted that some family or friends visited very frequently. In House 4, one elder's husband was present for almost all dinners, and became a virtual community member. Birthdays are celebrated on the precise day, with staff baking a typical normally-sized birthday layer cake rather than a large sheet cake. Yet the opportunities to socialize and form relationships with other residents in the house and with residents in other GHs are fairly limited; we did not observe staff spending time facilitating residents visiting each other in their rooms. In House 4, two residents became very close friends and were almost inseparable. On Sunday we observed no particular activity to create religious observances or help residents visit other churches. A minister visits during the lunch hour on occasion and preaches as the residents eat. Lack of paved sidewalks creates a difficulty for residents who might wish to walk or wheel in the area and family members who might with to take such walks.

Management Philosophy. Viability and refinement of model. Sustaining the model.

Viability of model. The guiding philosophy and organizational requirements are very specific in the GH model. They may be unrealistic in the expectations that the dementia and non-dementia house will function in similar ways, especially on matters such group decision-making on menus and collection of house recipes. Possibly the specificity of the prohibition of television in the hearth area was a mis-placed value judgment, though it may also be an example of staff reverting to what is easy and familiar rather than individualized facilitation of residents to watch the television of their choice. A required criterion to be considered a GH is that "all spaces must be accessible to elders," yet this proved unattainable in houses where the majority of the residents had substantial degrees of dementia. A single large dining table for residents and guests is required in the model, yet some feedback suggested that some residents and family found the large table size impractical. On a positive note, frontline staff greets guests in a welcoming way and exhibit pride in the GH, and licensed nurses can be observed assisting front-line staff and modeling good care practices; both of these results were envisaged by the model. **Sustaining the model**. Three years later when 10 GHs were on the campus, a new food service contractor modified and centralized meal functions, moving the larger meal to noon, requiring preparation of many choices of menu within each single house rather than developing group choice with alternatives, and rotating food items that were unfamiliar to the local palate. As a result line staff spent even more time in the kitchen (e.g. baking alternative desserts, and preparing alternative salads and main course, and enormous quantities of garbage were observed. Staff in House 4 from the original group was well enough socialized to the original vision that it refused to comply with the new regime, whereas the other 3 houses made the changes. By the end of Year 2, other signs of "institution creep" had occurred in all houses, especially in House 1 and 2. Medical equipment began to clutter the hallways and some spaces where furniture was moved out slowly became empty spaces. Several houses re-invented a med cart—e.g. using a wheeled tea trolley. A visit to the original GHs in August 2008 suggested that the institutional markers had disappeared, the clutter abated, and the housekeeping improved. During that visit, the food service functions were not assessed.

1 Foyer
2 Hearth Room
3 Kitchen
4 Den
5 Bedroom
6 Office
7 Beauty Shop
8 Spa
9 Utility Room

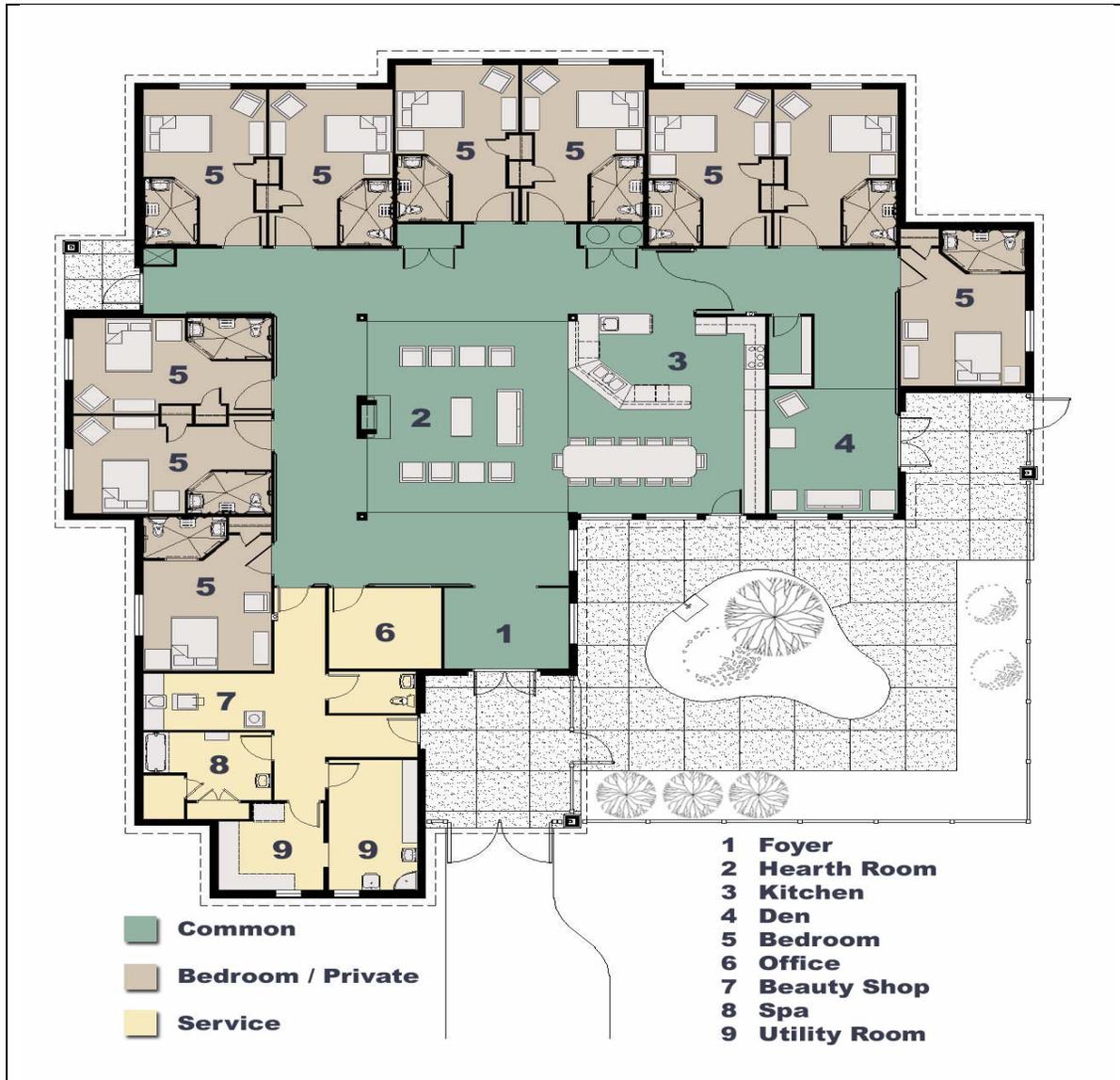Common
Bedroom / Private
Service

Figure 1. Green House Floor Plan. Source: Copyrighted by the McCarty Company, Tupelo, MS and used with permission.