

**Exploring the cost and value of
private versus shared bedrooms in nursing homes.**

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Executive Summary

The field of long-term care, particularly related to nursing homes, is under tremendous pressure to change. The traditional staff-centric or medical models are no longer considered appropriate, and a new emphasis on person-centered or self-directed care is emerging. There is growing pressure to value quality of life at least as much as quality of care. These changes are affecting all aspects of care, from the structure of governance to staff training and management structure to facility design. One aspect of the change movement is greater emphasis on autonomy, dignity and privacy. The value of private bedrooms over shared bedrooms is central to this debate, with some arguing the benefits of private rooms are self-evident, while others suggest they are too expensive to build and operate. This paper identifies a broad range of potential outcomes related to bedroom configuration, examines the empirical evidence for and against (where it is available), and analyzes difference in construction costs to explore the life-cycle costs of private versus shared bedrooms in nursing homes.

The vast majority of factors identified in this study, regardless of whether there was solid empirical data, information from the focus groups, or other anecdotal evidence, indicated better outcomes associated with private rooms over shared rooms in nursing homes. There is strong evidence that, as a general cohort, older adults overwhelmingly prefer private rooms over shared rooms in residential settings, potentially even among people who thought they would prefer a shared room. The primary factors that influence this preference appear to be privacy (for self and when conversing with others), lack of control (over life-style and environment), and feeling uncomfortable being forced to be

an “unwilling observer” to others. There is also some limited, mostly anecdotal evidence, about the positive benefits of sharing a room.

In clinical terms, the evidence is strong on iatrogenic outcomes, especially related to nosocomial infections. Pneumonia is the leading cause of death among nursing home residents, with overall mortality rates reported between 20% -50%, and as high as 80% in some studies. Studies indicate pneumonia is the second most frequent hospital-acquired infection, and the incidence rate for nosocomial pneumonia in long-term care facilities is of similar magnitude. The vast majority of this research suggests there is a reduced risk of developing a nosocomial infection in a private room, versus being in a shared bedroom, although much of the research was conducted in acute care settings. Empirical evidence of impact on sleep hygiene is weaker, though anecdotal evidence clearly suggest individuals are more likely to be woken up when staff enter the room and provide care to a roommate than when they live alone.

There are numerous operational factors that suggest staff spend more time managing difficult situations when people have roommates than when they don't, and possibly more time (which costs more money) cleaning and maintaining shared rooms. One particularly interesting point from the focus groups was that when a roommate pair needed to be separated, this often necessitated the forced relocation of two or sometimes three other residents to find compatible situations. This has both significant operational and psychosocial/satisfaction implications. Further, marketing costs appear to be higher for shared rooms, as they are harder to fill than private rooms.

Finally, the construction cost analysis suggests that while private rooms cost more to construct, the difference in costs may not be as great as some have argued, and may be

recouped relatively quickly. The analysis conducted for this paper suggests that the difference in construction costs could be recouped in less than 1 year, assuming the beds are occupied. If one of the beds in the shared room is not occupied, it might only take 40 days to recoup the cost differential to build the private room as opposed to the shared room.

The analyses conducted for this project only identified four potential factors where there is some evidence, albeit limited or weak, that outcomes might be better or costs might be higher in a shared room than in a private room. First, there are likely some energy-related costs with shared rooms, particularly for HVAC and electricity for lighting. Second, time staff spend walking may be impacted, if a unit/household with all private rooms is larger, or hallways are longer. Third, there may be a decrease in falls in shared rooms if roommates provide some assistance, though there was also a counter argument that private rooms, which tend to be better for visiting, may encourage families to spend more time visiting and increase their availability to provide assistance. Finally, there are some who feel that some people “just do better” in a shared room, though there is little evidence to support this.

The field of long-term care, particularly related to nursing homes, is under tremendous pressure to change. The traditional models of staff-centric or medical models are no longer considered appropriate, and a new emphasis on person-centered or self-directed care is emerging. There is growing pressure to value quality of life at least as much as quality of care. These changes are affecting all aspects of care, from the structure of governance to staff training and management structure to facility design. This report focuses on one aspect of facility design, bedroom configuration.

Traditionally, nursing home design was predicated on hospital design: building codes were derived from hospital codes, where the goal was to maximize the ability of staff to watch over and care for critically ill patients. Florence Nightingale's work was instrumental in helping the field move from large wards to smaller bedrooms of 6 and 4 patients, and over the years this was generally reduced to rooms for two beds. Traditional hospital, and thus nursing home design, places these two beds side by side, with the head of the beds on the same wall. Privacy, or what passes for privacy, is provided by a curtain between the beds, which when pulled, often keeps the person on the hallway side from being able to see to the outside. One aspect of the change movement is greater emphasis on autonomy, dignity and privacy, and it is argued these can be better provided with private bedrooms. Advocates of private rooms cite myriad benefits ranging from higher satisfaction for residents and families to better clinical outcomes. On the other side, there are providers who say that private rooms are cost prohibitive to build and that Medicaid, which funds a substantial portion of the costs of nursing home care, won't pay the facility up-charge for a private room (unless there is a medical necessity). Since many facilities charge more for a private room, there is a disincentive to let people on

Medicaid live in private rooms. Some people also sometimes argue that friendships and supportive relationships are forged in shared rooms, or that the benefits of private rooms do not justify the added costs. The evidence to support the positive or negative assertions about outcomes and the assertions about construction and operational costs of private versus shared rooms is relatively weak, and needs to be pieced together from disparate sources.

The purpose of this study and report was to conduct an in-depth literature review and brief qualitative exploratory inquiry into the broad range of factors related to private versus shared bedrooms in nursing homes. In addition, a detailed analysis of construction costs of different bedroom configurations was undertaken. Factors explored fell into four broad categories, each of which is reported separately. First, psychosocial factors such as satisfaction, privacy, and dignity were examined. This was followed by an analysis of clinical factors such as nosocomial infections, sleep and falls. Third, on-going operational costs, particularly related to differential allocations of staff time, which account for roughly 75 % of the life-cycle costs of nursing homes. Finally, physical environment related factors, including initial construction and building related (energy) costs. The majority of information comes from published literature. In addition, interviews were conducted with facility staff and administrators, and with designers of nursing homes. Finally, a construction cost analysis was conducted on a large sample of nursing home bedroom plans. In conducting this cost analysis, and in some of the focus groups, topics or issues related to shared bedrooms were divided into three bedroom configurations: private, traditional, side-by-side (hospital style) layout and a newer shared bedroom layout where each person has their own territory and access to a window,

but they share an entryway and bathroom. The degree of privacy afforded in these rooms varies, depending on whether separation between the residents is achieved with a curtain or with more solid barriers (walls and doors). These latter rooms are referred to as enhanced shared rooms. There was no reference to these types of rooms in any of the research literature that was examined. Thus information from enhanced shared rooms comes only from the focus groups conducted for this project and the construction-cost analysis.

Psychosocial Factors

Summary

The evidence related to preference for a private room over a shared room is overwhelming, regardless of the setting (assisted living, group home, nursing home, hospital or hospice). There are a few, relatively weak, references that argue that some people prefer the company afforded by a shared room, or that having a roommate is actually beneficial. However, the majority of evidence, both empirical and anecdotal, indicates people have a strong preference for being in a private room. Numerous reasons are given, ranging from just having one's own space, to ability to control routine and environment, to ability to have private conversations with visitors and staff and more.

Privacy has been studied in many settings, for many decades. This paper will not review this extensive literature, but will offer Westin's (1967) formulation of four types of privacy: 1) to exercise autonomy and maintain individualism and consciousness of individual choice; 2) to achieve emotional release (particularly at important times of loss, shock or sorrow); 3) to conduct self-evaluation, which requires private information-processing and reflection ; and 4) to achieve limited and protected communication (from [1]. Each of these types of privacy shows up in the nursing home literature and focus groups conducted for this project.

Many of the studies of preference for private rooms have been conducted in hospitals. Kaldenburg [2], analyzing a sample of over 132,000 hospital patients, reports

that, regardless of age or gender, patients without a roommate were more satisfied with their room than patients with a roommate. Ulrich and Zimmerman [3] report an analysis of Press-Ganey satisfaction surveys with over 2 million hospital patients (56% in private rooms, 44% in shared rooms), which show that satisfaction was, on average, 4.5 percent higher for people in private rooms than shared rooms, which is a substantial difference. In another study, the majority of hospice patients also expressed a desire to be in a private room [4].

There is also strong evidence that, as a general cohort, older adults overwhelmingly prefer private rooms over shared rooms in residential settings. In a study conducted by AARP, individuals over the age of 50 preferred a private room by a ratio of 20:1 (82% versus 4%) [5]. These results replicate early research on preference for private rooms conducted by Lawton and Bader [6], which also demonstrated an overwhelming preference for private rooms. This was strongest (92%) for community dwelling individuals, and 85-95% of nursing homes residents who lived in a private room. Among nursing home residents who lived in a shared bedroom, close to 50% said they would prefer a private room, while the others expressed a preference for being in a shared room. There is substantial evidence that seniors tend to express satisfaction with their current living situation, regardless of the objective quality of that housing [7]. However, in a small scale study conducted in Japan, Terakawa [8] followed residents who moved from an older nursing home where all bedrooms were traditional shared bedrooms, to a new nursing home where all residents had private rooms. Residents were interviewed about how they felt about having a private room one month prior to the move, and one month and 8 months after the move. The table below summarizes the results, and suggests that

even people who indicated they did not want a private room and expected not to like having a private room, were completely satisfied with their private room by eight months after the move.

Table #1 Terakawa Study results

	1 month before	1 month after	8 months after
Completely positive	42%	89%	100%
Partially positive	18%		
Neutral	21%	4%	
Completely negative	18%	7%	

The results of this study should be taken cautiously. The relocation, obviously, incorporated other changes than just the move into a private room, which may have impacted the results. However, the research questions focused on satisfaction with their bedrooms. This result is particularly interesting in light of Japanese culture, which is traditionally more communally focused, with soji screens providing less visual and acoustic privacy than a solid wall. That people who were familiar with this more communal life-style indicated complete positive satisfaction with the private rooms less than a year after moving in is intriguing. It suggests that expressed opinion about satisfaction with or preference for a shared room may be based on being reasonably satisfied with a current situation (in a shared room) and may not be based on experience in both a private and shared bedroom. Mosley-Ashley [9] interviewed 131 cognitively intact nursing homes residents, and found that having a private bedroom was among the most desired change, along with more privacy in general. Residents who desired more privacy had lower life satisfaction than residents who felt they had sufficient privacy (note: results did not report differences in satisfaction among residents who had a private room versus a roommate).

One of the larger nursing home based studies to explore issues related to privacy conducted individual interviews with 686 residents and family members from 36 nursing homes in the Netherlands to examine attitudes of how "at home" residents feel. Privacy was identified as a large part of whether the residents felt at home. Privacy was related to four factors: the quality of the building (including the ability to make a private phone call, to be alone, to talk to others in private and to receive visitor, but not specifically including having a private room), feelings of resident-centeredness, autonomy, and the attitudes of residents towards each other. The results indicate a large variance in residents feeling at home, ranging from 40-100%. Several reasons were given as to why residents did not feel at home included insufficient time on their own, less resident-centered nurses, and disturbances by other residents. In addition, a building where residents were not given sufficient access to talk to others privately through phone calls or visits was an indicator of not feeling at home. These residents stressed the importance of personal space in order to be alone and create their own environment, but also stressed flexible routines and nurse attitudes as important factors in feeling at home [10].

Several other studies have demonstrated that mixing cognitively intact residents with or near more cognitively impaired residents has a deleterious impact on the emotional status of the less impaired resident, as manifested by depressed mood, loneliness, anxiety, insecurity, irritability, and lower life satisfaction [11-13]. Zeisel's [14] research demonstrates that, among residents with dementia, anxiety and aggression were significantly lower in facilities with greater bedroom privacy and more personalization in the bedrooms. Apparently, these types of functional differences are not only relevant in individuals with dementia. In one of the focus groups, a family member

described her mother, who got increasingly mean and less functional with a roommate. “She changed so much within 24 hours of getting a private room. She acted independent again. We needed to call the phone company to get her phone connected and she said ‘I can do that, let me call.’ It was like she was thinking it was 5 years ago, or even one year ago when she did take care of those things.”[15] Staff described this resident in the following terms: “We had one lady who moved in [to the nursing home] from assisted living to a shared room. She got angry and depressed. As soon as she moved into a private room, well, she’s like a different lady, it’s amazing. She likes to entertain. She often has a couple of gentlemen friends who come over for a drink. They can shut the door and have a nice time without bothering anyone else.” [15]

What are the specific factors that impact this preference? The primary factors appear to be privacy (for self and when conversing with others), lack of control (over lifestyle and environment), and feeling uncomfortable being forced to be an “unwilling observer” to others.

When discussed in the relevant literature and in the focus groups, the term “privacy” related to both being able to receive care without someone else being present (which was equated with dignity), and being able to have private conversations with visitors. Again and again in the focus groups, staff and residents discussed the indignity of either getting care while someone else was in the room, or of being in the room while a roommate received care. “I don’t know how residents stand the lack of privacy in the rooms with only the curtain. If you are being cared for, or even if your room mate is being cared for, you hear everything. It’s a total violation of your privacy and right to

confidentiality.” [15]. One resident commented “I’d like a private room. My room mate talks all of the time. She’s a good lady, but I don’t feel like I should hear everything that she’s saying. I don’t want to listen to the noise. I don’t say anything because I don’t want to hurt her feelings.” [15]

The related concept of privacy with visitors brought out equally strong opinions. Numerous studies in hospitals demonstrate that patients feel they have more privacy to visit with families in a private room [3, 16]. A family member in one of the focus groups explained “I was uncomfortable talking with her when her roommate was in there. We couldn’t talk about anything private or personal because [the roommate] would over hear us. We didn’t want her to know private things about our family. Staff would say, ‘Oh, don’t worry, she can’t hear you.’ But that didn’t make it feel any less of a violation of privacy.” [15] Residents are equally uncomfortable: “[When I had a shared room] I always felt bad for my visitors. We could never have an appropriate conversation. We didn’t feel free to laugh out loud or express ourselves, we couldn’t be ourselves.” [15] Residents also constrain their behavior because of the presence of a roommate. “When mom was in a shared room, she almost “ceased living” – she put her life on hold out of respect for her room mate. She didn’t want to talk on the phone, have guests, or listen to her TV because it might interrupt or disturb her room mate. She was just brought up to be polite and respectful. She was sick and needed to be able to talk to her sisters about her diagnosis, but it was private, and she didn’t want to have her room mate listening to some of these conversations. She was always waiting for her to leave the room.” Staff also recognize benefits of private rooms in supporting more positive visiting experiences [17].

The death and dying process is also a major issue because most family members want to be around – and it should be a quality time – but they are sensitive to the fact that they are also in someone else’s room. Families feel bad for the other resident and the encroachment of their family, and the resident who is not dying is also uncomfortable, having to intrude on what should be a private time for the family. Staff in the focus groups felt this sometimes kept as many family from gathering or staying as long as they would have, had they been in a private room. [15]. A resident put it in stronger language “If that would ever happen [having a roommate who was dying], I’d tell [staff] to get me out or get them out!” [15]

Lack of control is another commonly cited factor that impacts preference for a private room. Common areas that cause conflicts between roommates include the television (on/off, volume, program selection), radio, time to get up and go to bed, having curtains open/closed, having the door to the hallway open or closed, HVAC (heating, ventilation and air conditioning) levels, and personalizing or decorating one’s room [1-3, 18, 19]. Having a roommate can have a significant impact on ability of follow one’s preferred daily routine, specifically when one person likes to get up or go to bed later than the other. Bathroom use was also identified in the focus groups as a big issue (who goes first, who takes longer). Older adults often experience urge and/or functional incontinence, and need to use the bathroom very quickly once they feel the need to go. One facility discussed the challenge of pets—when a person wanted to bring in their cat when they moved from assisted living, but the person they were assigned to live with did not want the cat. These kinds of issues build up a lot of resentment, impact satisfaction and quality of life—these are the issues that cause resident relocation. Clearly, most of

these issues are moot in a private room. On the issue of personal furniture, numerous people in the focus groups talked about how crowded the shared rooms tend to be, making it much more difficult for a resident to bring in furniture from home, which tends to be larger. Bedrooms in nursing homes also have to serve multiple functions—sleeping, daily activities and social space—and are generally not sized accordingly. Several staff in the focus groups talked about the importance of encouraging residents to bring possessions from home, but how much easier that was to do with private rooms: not having to leave space for a roommate’s possessions or decorations, not having to worry about different tastes (see analysis of square footage in the construction section). One resident specifically said she preferred the “hallway” bed (as opposed to the one closer to the window) because there was more wall space to hang her favorite pictures and cards from grandchildren. [20].

Control, as used in the above context, relates to the concept of personal territory. Territorial behavior is defined as claiming specific individual areas in space common to a group [21]. Territoriality, which is instinctual, may reduce the stress of interpersonal contact. Loss of territory has been linked to behavioral difficulties, and there is indication that social withdrawal may be a substitute for loss of physical privacy. In one study, residents in shared bedrooms tended to establish territories in the hall which they may defended aggressively, whereas occupants of private rooms tend to share hall space better [38]. Lawton [6] suggested that single rooms increase overall social interaction. Nelson and Paluck [36] examined the hypothesis that if territoriality is important for sociability, variables such as sociability, self-esteem, and maladjustment may be manipulated with the introduction of perceived private space. Thirty-seven

institutionalized elderly were selected from 2 nursing homes, and their rooms were divided into three different territories (subject's space, roommate space, common space) with the use of a 4cm strip of yellow vinyl adhesive tape. The demarcation of territorial boundaries significantly increased the subject's level of satisfaction, and decreased the amount of clinical maladjustment. In addition, the results indicate that the divided territories had an effect on mental status, with the mean number of errors on the SPMSQ (Short and Portable Mental Status Questionnaire) decreasing during the experiment. After the elimination of the boundaries, the errors again increased.

None of the published references described the layout of shared rooms—leading one to assume they were primarily traditional shared bedrooms, with beds side by side along one wall. In the focus group in the facility that had the three room layouts (see page 37 for illustrations of the different room configurations), some of the residents felt the enhanced shared rooms provided sufficient privacy, as evidenced by this comment from a resident who moved from a traditional shared to an enhanced shared bedroom. “When I got my ‘private’ room [which is actually an enhanced shared room] I felt more like my old self, more free. I can explore new things that I might like to do. I didn’t used to like to watch TV or listen to the news, now I do and can do it without interrupting someone else. I’m learning about new things. In a shared room, you just ‘make do’.”

[15] In this facility, rooms are configured so that each bedroom space is separate, with a curtain separating the sleeping area from the entry hall and bathroom (see Plan #1). But psychologically, it appears to feel more like, and have the benefits of, a private room.

Clearly, conflicts between residents are a major operational expense, as described in the Operational Factors section, particularly when it leads to relocation of one or more

residents. But beyond the operational costs of managing this conflict, there are emotional costs associated with relocation. As one nurse put it in a focus group: “The dimension that we have trouble capturing is the level of emotional distress that is caused by the roommate situations. When a resident moves out of an incompatible roommate situation, that is only one side of the issue. The roommate that is left also has an abrupt adjustment trying to anticipate who will be next. If you have a roommate for a week or two then another for a week or two, then another, it is disruptive. Makes them feel like they don’t own the space. It affects their psychological health and their physical health.” [15]. There are some extreme examples of the negative consequences of sharing a room in the literature. Foltz-Gray [18] documents examples of a resident who stuffed a sheet in his roommate’s mouth to stop his snoring, and another who smothered his roommate to death with a pillow.

There is also some limited, mostly anecdotal evidence, about the positive benefits of sharing a room. In one of the few studies that does not show overwhelming evidence for the negative consequences of shared rooms, Bitzan [11] studied 31 nursing home residents who lived in shared rooms, and found that 22% indicated an overall strong or positive emotional bond with their roommate (which is higher than in many other studies), whereas 77% had moderate or weak emotional bond with their roommate. Specifically, 80% denied having problems getting along with their roommate, but 80% also denied any intimacy of sharing problems or concerns with their roommate. Interestingly, the majority of roommates did not enjoy spending time with their roommate, did not perceive their roommate to be sensitive to their feelings, and agreed they got along best when they kept their feelings and activities to themselves. This study

would have been stronger had the same measures been administered to residents who lived in a private room, for comparison purposes. These residents may also be reflecting general satisfaction with their current living situation, as a way of reducing cognitive stress. Also, the study did not address preference for a private or shared room, only degree of compatibility with roommate. Foltz-Gray also provides anecdotal evidence of several individuals who express a strong preference for having a “compatible” roommate, and concludes "for many residents, the security and comradeship offered by a roommate far outweigh the loss of privacy" (p.37). Some of the focus group participants also described some benefits of sharing a room. One social worker stated “Shared rooms are good for people who are depressed- helps keep them company. But staff have to make sure they are compatible.” [20]. One resident stated “It’s nice not to be alone” [20]. However, these positive expressions tend to be based more on anecdote and less on objective, rigorous research. Zelter finds positive results from “roommate pairing”, which consists of matching up a depressed resident with dementia with another resident who is compatible, which he asserts helps to reduce anxiety, relieve depression, increase cognitive clarity, normalize experiences, foster goal-setting, and encourage a coping personality [22]. Thus, there appears to be some evidence that having a roommate can be a positive situation for at least some people, if roommates are chosen to be compatible, or even more preferable but less common, get to participate in the process of selecting their roommate [18]. Far more common is simply placing a new residents where there is an available bed.

One article explored the concept of homelessness among nursing home residents [23]. While the concept of homelessness is larger than just the issue of a private room,

Carboni asserts that homelessness is related to a lack of privacy (among other factors), which was evident for all residents of the nursing home. Lack of meaningful personal possessions was also reflective of a sense of homelessness. Unfortunately, Carboni does not report whether the residents involved in her study lived in private or shared rooms. Although not specifically mentioned in the article, one could reasonably ask whether staff interactions with residents, such as whether they treated the residents' rooms as their private space, always knocking and waiting for permission to enter, might also be related to the feeling of homelessness. Is knocking less frequent on rooms with multiple people, since it may be harder to know who the knock is for, or know whether all individuals in the room give permission for one to enter? Further, given residents' apparent differential respect for their own space in private rooms over shared rooms (as evidenced by the need for less maintenance and housekeeping), it is worth considering whether staff are more likely to treat the private room of a resident with more respect than a room that is shared by two residents.

Clinical Factors

Summary

A variety of potential clinical outcomes related to bedroom design were explored. One topic in particular has received a significant amount of attention, in both hospital and nursing home settings: nosocomial infection rates. In some studies the focus was exclusively on private versus shared room status, while in other studies, other factors such as infection control measures and improved ventilation were also considered. Other topics include increased morbidity resulting from roommate altercations, iatrogenic harm resulting from relocation caused by roommate incompatibility (adverse drug events from new staff not knowing the resident's medications or routines), medication errors resulting from having more than one person in the room, falls, sleep hygiene, and continence. In addition, hospitalization of nursing home residents increases cost of care, increases risk for avoidable medical errors, and reduces quality of life.

The majority of research on nosocomial infections has been conducted in hospital settings [3, 17, 24-33]. This is an important issue, as nosocomial infections contributed to over 88,000 deaths and \$4.5 billion of additional costs in 1995 [25]. Commonly acquired conditions include pneumonia, influenza A, and methicillin-resistant *staphylococcus aureus* (MRSA). Pneumonia is the second most frequent hospital-acquired infection, and studies indicate the incidence rate for nosocomial pneumonia in long-term care facilities is of similar magnitude [34]. Pneumonia is the leading cause of death among nursing home residents, with overall mortality rates reported between 20% -50%,

and as high as 80% in some studies (Langmore et al., 1998; Muder, 1998; [33]).

Pneumonia is the major reason for hospital transfer among nursing home residents (Muder, 1998[33]). The national costs for treating pneumonia in nursing homes in 1998 ranged from \$101 to \$436 million (Kruse et al, 2003, Muder, 1998) (NOTE- Langmore and Muder cited in Coleman). Further, the morality rate from pneumonia is especially high for elders.

The vast majority of this research suggests there is a reduced risk of developing a nosocomial infection in a private room, versus being in a shared bedroom. Ulrich and Zimring [3] identified 16 studies that examined nosocomial infection rates in hospitals by private vs. shared rooms, with results clearly indicating that infection rates are lower in private rooms. Bronson Methodist hospital reduced its nosocomial infection rate by 11% after opening a new building which featured all private rooms, prominent hand washing sinks, and improved ventilation. Sheba Medical Center experienced a significant decrease in the rate of nosocomial infections after transforming the medical-surgical Pediatric Intensive Care unit (PICU) from an open ward to one with separate, private rooms [24]. In this study, there were no changes in staffing, ventilation or infection control measures.

Clostridium difficile-associated diarrhea (CDAD) and antibiotic-associated diarrhea (ADD) are frequent nosocomial infections that occur in spatial clusters, suggesting that physical proximity may be a risk factor. Chang and Nelson (2000) conducted a retrospective study of 1859 hospital admissions over a 6 month period. Only neighbor/roommate exposure to patients with CDAD or ADD was a significant risk factor for nosocomial CDAD in a univariate analysis. In a multivariate analysis, the risk

of CDAD and ADD nosocomial infection attributable to physical proximity (neighbor/roommate status) was 12%. The authors suggest that high neighbor risk may be from staff that do not properly clean hands between patient care activities [27]. Boyce et al. [26] studied the role of contaminated environmental surfaces as a reservoir of methicillin-resistant *staphylococcus aureus* (MRSA) in hospitals. The researchers took culture surveys of inanimate objects in the rooms of infected and non-infected patients in a 200-bed hospital containing 38 patients with MRSA. Ninety-six (27%) of 350 surfaces were contaminated. Environmental contamination occurred in the rooms of 73% of the infected patients and 69% of colonized patients, and 0% of the rooms of patients without MRSA infection. Frequently contaminated objects included the floor, bed linens, patient's gown, overbed tables, and blood pressure cuffs. 65% of nurses performing care on the patients had contaminated gowns, while 42% of staff with no direct patient contact but with environmental contact also had contaminated gloves and/or gowns. Thus sharing a room with an individual infected with MRSA substantially increases the risk of being exposed to and, potentially, contracting MRSA (Boyce, 1997).

In research conducted in nursing homes, Drinka [29] found that roommates of individuals infected with influenza A had a 3.07 relative higher risk of acquiring the illness than individuals in a private room. This statistic, combined with the 3.5% excess mortality rate of acquiring Influenza A, has serious life-threatening implications. Similarly, Pegues (1993) found that 84% of nursing home residents who developed acute nonbacterial gastroenteritis during an outbreak lived in a room with a roommate, whereas only 16% of residents who became ill lived in private rooms. Harkness and colleagues [34] determined that the risk of acquiring pneumonia in long-term care was 10 times

greater for individuals who experienced disorientation, and 20 times greater for people with altered levels of consciousness. Information gathered from the focus groups for this project suggests that, in resident relocation situations, residents who are least able to complain (often those with dementia or altered levels of consciousness) are most likely to be assigned a new roommate “because they can’t complain.” Thus, facility policies and practices relating to room assignment may, inadvertently, be adding to the risk of residents developing nosocomial pneumonia.

Many nursing home residents who develop pneumonia or influenza A end up being hospitalized. Nursing home residents contract more than 1.5 million infections annually, and each resident faces a 5% to 10% risk per year of infection. These infections (primarily pneumonia and influenza A) account for almost 1/4 of hospitalizations of nursing home residents [33]. Hospitalization results in high emotional and financial cost. Trauma may be experienced by the patient being transferred as he/she is moved to a strange environment without enough explanation, cared for by unfamiliar people and subjected to an unfamiliar routine. In addition, millions of dollars are needed to cover the health care costs of the hospitalized elderly. It is thought that many of these hospitalizations could be avoided, or possibly dealt with in the nursing home environment. In 1989, Kayser-Jones estimated 216,000 nursing home residents who were hospitalized might have been treated in the nursing home, for a cost savings of \$942,763,530 [35]. Note, however, this is cost savings to medicare and third party payors, not to the nursing homes themselves. In an alternative analysis, Kruse (2003) estimates that the national costs of pneumonia treated in the nursing home in 1998 range from \$101 to \$436 million. The average cost for treating an episode of pneumonia

in the nursing home was \$458 over and above usual care, which is significantly less than the costs of treatment in a hospital.

The studies by Drinka and Pegues were the only studies found that specifically examined private versus shared bedroom status with nosocomial infection rates in nursing home residents. Several prominent researchers with large nursing home research data sets were contacted to inquire about whether their data set coded for private versus shared bedroom status, with the hope that some secondary analysis could be conducted, but the answer was no. The one exception is research being conducted by Drs. Rosalie Kane and Lois Cutler on quality of life in nursing homes. The analysis for this research is mid-way through completion, and there is hope that they may be able to provide additional insights.

Nosocomial infections are only one class of clinical outcomes related to private rooms. Sleep was another factor identified as being impacted by private versus shared bedroom status. Again, much of the research has been conducted in hospital settings. Noise is the primary factor that contributes to poor sleep hygiene. Ulrich and Zimmerman (2004) cite 13 studies that clearly show that noise is much higher in multi-bedded rooms, and that this negatively impacted sleep. Most noise stems from presence of another person (plus associated staff and visitors). They also identified studies, conducted in hospitals, that noise also increases stress (heart rate and blood pressure), and decreases oxygen saturation [3]. MAAP, a London-based architectural firm, developed a report for the Department of Health for Great Britain, based on surveys and working practices in seven hospitals in the UK and Sweden. They conclude that patients would

recover more quickly “in their own [private] rooms because they would be exposed to less noise, sleep better and have greater privacy” [36]. None of this research was conducted in nursing homes. Nor was any research found that differentiated the impact of having a private room versus using other sound control methods (installing sound-absorbing ceiling tiles, sound-absorbing flooring, reducing overhead paging, etc.). Information from the focus groups conducted for this project, however, suggests that residents do wake up when staff come in to check on their roommates, especially if they have to turn on the light to give care, which often happens several times a night. Staff indicated they try to be quiet, but it’s not always possible when asking a resident who is hard of hearing if they need to use the bathroom or be changed.

Falls were also hypothesized to be related to private rooms. However, no research was found that specifically linked prevalence of falls to being in a private versus a shared room in nursing homes. There is evidence that most falls in health care settings occur in bedrooms when patients/residents are alone or while attempting to go to the bathroom [16, 37], and that there may be fewer falls in acuity-adaptable rooms in hospitals [16]. Capezuti et al [38] studied the relationship of bedrails to falls, which might also be impacted by having a roommate, but did not include shared versus private bedroom status as a variable. There were some suggestions, though evidently not evidence-based, that placing people who are at a high risk of falls in multi-bed rooms might reduce the occurrence of falls, as roommates could remind individuals not to rise without assistance [16, 39]. Conversely, Ulrich [40] suggests that frequency of falls may be reduced if there is sufficient space in the bedroom for family visitors, who would provide assistance to the patient, and that this is easier to accomplish in a private room

than in a shared room. During the focus groups, several staff at different facilities mentioned that there are more falls in shared rooms “no doubt about it. Don’t know if it’s because there’s more stuff in there or greater chance for things to get moved around so they aren’t in the expected location.” [20]. From another facility, staff remarked “two people in a room that size with wheelchairs, walkers, two beds, no room to maneuver. And a lot of stuff to trip on.” [15].

Several other factors were identified as potential clinical outcomes related to private versus shared rooms. These included use of PRN and psychotropic medications, rate of distressed behaviors by residents, and medical error rates. No evidence was found in the literature on any of these topics related to nursing homes. While there is evidence that there are fewer medication errors in private rooms in hospitals [16], this literature was not extensively reviewed, as medications are seldom delivered at the bedside in nursing homes, but rather are distributed during meals, and thus is not relevant here. This may change in the future as some facilities that are incorporating person-centered and self-directed care concepts are locating medications in bedrooms. The question of whether residents, particularly residents with dementia, are more likely to exhibit symptoms of distress (agitation, requests for attention, aggressiveness toward other residents or staff) if they share a room is one that should be explored. Similarly, the rate of resident-to-resident injury between roommates, between individuals who lived in multi-bed rooms and between individuals living in private rooms, should be explored. During the focus groups, one housekeeper indicated that she spends more time with residents in shared rooms who are upset by something than she spends with residents in

private rooms, whom, she said, were upset less often [20]. This suggests people in private rooms are less likely to be upset than people in shared rooms.

Operational Issues

Summary

Two key issues were identified that relate to operational efficiency: time spent managing roommate issues, and quality of staff-resident communications. Roommate conflict issues actually relate to a number of factors, including increased time and effort for admissions, time spent dealing with families, time spent managing conflict, and time spent managing transfers, all of which appear to be greater with shared rooms than private rooms. Information on the quality of resident-staff communications comes primarily from hospital studies, but was supported by focus group discussions. There was also some cost factors, related to lost income from rehabilitation residents wanting to be discharged sooner because they were uncomfortable in shared bedrooms and challenges marketing shared rooms.

Resources spent managing roommate related issues were clearly identified as the key operational factor. These additional resources (primarily staff time and effort) begin at the time of admissions and continue through end of life. Although no empirical evidence could be found, there was anecdotal evidence from both the focus groups and several published references that it is easier to fill an opening when the room is a private room [36, 41]. This makes sense, in part because there are no gender issues, unless the bedrooms share a toilet room. Thus, a provider can admit the next person on the waiting list, without having to be concerned with the individual's gender. In none of the facilities

where focus groups were held, did they have an open bed available in a private room. When a private room becomes available, it is always filled immediately, often from someone in-house who has been waiting. Thus, new admissions are most often placed in shared rooms, except in special circumstances (i.e. one facility had a resident with MS who is in her 50's, who was given a private room upon admission). This relates to the ability of the facility to market itself successfully. As one staff described it, "Our facility is wanting to be a leader in all of this [culture change], but I don't know if they can stay the leader if they continue to have shared rooms. Most new facilities are going to private rooms. Hospitals are doing it; dorms at colleges are doing it. Shared rooms are keeping them [this facility] back. People these days are used to privacy. Facilities that want to be number one will have privacy for residents. Residents demand it, they deserve it. It's ... a quality of life issue, and you've got to have more private rooms." [15]. In this continuing care retirement community, it was noted that they are losing residents from the independent and assisted living areas of the campus to other nursing homes, because they have private rooms. Thus, keeping up with the market trends, which are generally moving toward a greater percentage of private rooms, will be increasingly important to maintaining a high census. All of the facilities who participated in the focus groups indicated that virtually never have an empty private bedroom: these are always filled first. Anecdotally, marketing shared rooms is much harder than marketing a private room. One study, conducted in a hospital, estimated that multi-bed hospitals can only reach about 80-85% occupancy because of the shared rooms, and that an 80 bed, all private room hospital could care for as many patients as a 100 bed hospital with 2-person rooms at substantial savings [42].

Managing room-mate conflict had even greater cost implications. Again, no empirical evidence was found related to time spent managing roommate conflict in the literature, but the staff in the focus groups indicated it could be substantial. In one facility, the social worker estimated she only spent an average of 2-3 hours per week managing roommate related issues [20]. In several other facilities, however, the estimates were much higher. “We spend an incredible amount of time dealing with and resolving problems that occur because people share the same space.” [15]. Some direct care staff said it was difficult to separate out time spent managing roommate issues, because it’s all folded into to all of their care activities, while others said it could take a few hours out of each day. “A roommate conflict can easily consume a day in any given situation. More likely it’s going to consume 30 minutes to 2 hours of every day.” [15]. A social worker indicated “it feels like 99% of my time is roommate issues. If I could spend the amount of time that I do handling roommate issues, and spend it somewhere else – with a resident in some other way, how much more powerful and great would that be.” [15]. This sentiment was echoed by another social worker: “Bricks and mortar have a “one-time” cost versus the on-going cost of the social worker’s hourly wages into eternity. If we weren’t spending the time relocating people and managing room conflicts we’d be doing something else – more valuable – with our time, like taking more trips, or other activities that improve the quality of life for folks.” [15]. In another facility, when there was a problem, it would take as much as 25 or more hours a week of the social worker’s time. This is time spent with the residents, with staff who may be upset by the situation, and with family members. All staff said they try to help residents resolve the conflicts, but

that there were times when the best solution was to relocate one of the residents. It can take several days of discussion about relocation before it actually takes place.

One of the facilities where focus groups were conducted have bedrooms in all three configurations: private, traditional shared and enhanced shared. A CNA noticed a clear difference in time spent managing roommate conflict between the traditional and enhanced shared rooms. “[When I worked in the household with enhanced shared rooms], 1% of my time was dealing with roommate issues (HVAC controls are located on one side of the room). But when I work [in the household with traditional shared rooms] 50% of my time is dealing with roommate issues and the family issues that are associated with educating residents and families about respect and the dying process. A lot of problem solving keeps you from doing more productive work with residents.” [15]. This is the only direct reference to the differences between the two styles of shared bedrooms.

Apparently, it’s not just the social workers and nursing staff who spend time on roommate issues. As mentioned previously, even housekeepers feel these effects, and may feel the need to devote more time to residents in shared rooms because they are less content and more upset [20]. thus there are both psychological costs to the residents and operational costs to the organization in terms of staff efficiency.

Once an individual (and their family) have agreed to the move (or are resigned to it because staff insist), there are additional operational costs. Room cleaning time and maintenance issues are greater at the time of relocation than routine room care. All furniture must be removed from the room and cleaned (mattresses wiped down and disinfected, drawers emptied and cleaned, etc.), and any maintenance issues (patching

walls where personal belongings hung, repainting, stripping and refinishing the floor) must be addressed. The furniture from the room is typically stored in the hallways temporarily, which could cause other problems as people negotiate around it. This also causes disruption to the remaining resident, who cannot access his or her room while it is being cleaned. In one facility this was estimated to be an additional 90 minutes of cleaning time over routine cleaning, while in another they said it can take “days” (though, presumably, staff time would be intermittent during these days). No research was found to document these actual costs.

All these costs may be further compounded by the fact that, when a building is close to full, there may not be an appropriate empty room available for the individual who is relocating to move into. All facilities indicated that unanticipated resident relocation (because of roommate problems) can cause a domino effect, requiring one, two or sometimes up to three other residents to also relocate. Each of these relocations also take a substantial amount of staff time, explaining to residents and families why it is best for someone, who may be relatively happy in his/her current location, to move. Often people don’t want to move, forcing nursing staff to use their authority that it “is in everyone’s best interest.” This directly contradicts the principles of person-centered or self-directed care, as residents are given little or no choice or control in these situations. However, the time management consequences, especially for nursing and social workers, can be substantial. Finally, depending on where the individual(s) are relocated to (i.e., a different household), staff may have to spend additional time getting to know the resident and the clinical and daily routines, and helping the resident adjust to the new roommate.

So not only are there operational costs, there may also be negative clinical correlates of this type of move.

The quality of staff-resident communications can also be compromised in shared bedrooms. New HIPAA (Healthcare Insurance Portability and Accountability Act) regulations mandate implementation of certain confidentiality procedures. Having a conversation with a resident about private medical matters is much more difficult when there is a roommate in the room. The question of what constitutes “private” information is somewhat up for debate. On the conservative side, some feel information about ability to maintain continence, or needing assistance with dressing should be considered private. Clearly, these are activities that are hard to keep private from a roommate. Not surprisingly, most of the research about the quality of staff-patient communication related to private versus shared bedrooms was conducted in hospital settings [3, 25]. Patients have reported withholding medical information when in rooms with curtains because of concerns over privacy [43]. In another study, nurses overwhelmingly judged private rooms as superior for examining a patient [17]. Finally, a Press Ganey satisfaction survey with a sample of over 2 million patients clearly show people in private rooms have a higher satisfaction with “concern for privacy” than patients in shared bedrooms (cited in [3]).

A few additional operational correlates were identified in the focus groups. Several housekeepers indicated that private rooms take less time to clean than shared rooms, not just because there are two people in a shared room. In several facilities, housekeepers and direct care staff said that people in private rooms seem to “keep their spaces better.” They speculated that there is a greater sense of ownership of the whole

room as personal territory in a private room, whereas in a shared room, everything feels like common space, and people don't take as much care with it. [20, 49].

Length of stay is also identified as a potential operational correlate of private rooms. Again, most of the research was conducted in hospitals, where the general goal is to reduce length of stay. Reducing length of stay is not necessarily a primary goal in nursing homes, except in their short-term rehabilitation units. At one facility, staff mentioned that their rehabilitation services department was having a problem because people "are so anxious to get out of the shared rooms" that they leave before their course of therapy is completed. There are two consequences of this. First, the facility was "losing" Medicare Part A funding because people were leaving "early". Second, staff felt some were retuning to their apartments before they were actually ready, endangering their health. "Some of these folks leave too soon and they are not successful and have to come back." [15]. So having shared rooms for the short stay rehabilitation patients has both clinical and operational (cost) consequences.

There were also some references that discussed positive consequences of shared rooms in terms of staff efficiency. Again, mostly conducted in hospitals, and particularly in intensive care units (where staff observation of patients is critical), there is some evidence that staff can more efficiently observe multiple patients in open-bay configurations [45]. Chaudhury [17] found that the only dimension nurses in 4 hospitals rated private rooms worse than shared rooms was on walking distance from the nursing station. But this may have as much to do with unit configuration as it does the percentage of private rooms. Several studies have shown that radial units are much more efficient, from the perspective of walking distance and time spent walking, than corridor designs

[46, 47]. There appears to be insufficient evidence to document whether differences in staff time spent walking in nursing homes is based on the percentage of private versus shared rooms or on other variables such as unit/household size or configuration.

Construction & Building Related Factors

Summary

There are very few empirical studies exploring construction or building-related operational costs of nursing homes, or even hospitals. What evidence exists supports the logical assumption that private rooms are more costly in terms of initial construction. Unfortunately, none of the previously published studies systematically differentiate between different room styles, which can vary significantly, and obviously affects construction costs, as well as psychosocial and operational, and possibly clinical outcomes. A detailed analysis was conducted of 189 bedroom plans from nursing homes built in the past 10 years to compare construction costs of three bedroom configurations. Both high and low-end construction estimates were used. Results suggest differences in initial costs are relatively small, and when compared to differences in average room charges, differences can be recouped in less than 1 year.

Only one study that examined bedroom configurations in nursing homes was identified. Kaup and Norris-Baker [44] examined size and usable square footage of 58 bedroom configurations in 14 buildings as it related to achieving a “residential experience” (being more homelike). They assert that more recent concepts for design of nursing homes have moved away from a primary focus on support staff efficiency to one

that recognizes the need to respect residents' privacy and support autonomy. One way this is being achieved is through a greater percentage of private rooms, and more space options. Their sample included 35 private rooms and 23 2-bedded rooms. They found that square footage was larger for rooms built after the implementation of Americans with Disabilities Act Accessibility Guidelines in 1990, particularly in bedroom associated toilet rooms. Not all square footage in rooms, however, was considered usable space (usable space was defined as space a resident could personalize with a piece of furniture, and thus did not include area needed for door swings or entrance hallways or other space not suitable for furniture). Of particular interest to this study, they found that private rooms (excluding bathrooms) increased an average of 22% from pre-ADAAG to post-ADAAG. While shared rooms increased an average of only 11%. Bathrooms increased in private rooms an average of 75%, and in shared rooms an average of 46%. They note that some shared bedrooms used architectural features to define resident spaces, which "contributed significantly to positive outcomes like having equal access to windows, storage and the toilet room, as well as contributing significantly to privacy from the hallway" (p3). In reviewing these plans, these latter rooms qualify as enhanced shared bedrooms as defined for this paper. Yet the authors did not differentiate these plans in their overall analyses.

Chaudhury et al [16] conducted a cost analysis of private versus shared rooms in hospitals. The analysis was conducted based on ten sets of hospital unit plans, with either all private rooms or a mix of private and shared rooms. Plans were classified as either all private or mixed, and a grossing factor derived for the two groups. Gross floor area per bed (for the whole unit, which includes all shared social spaces and staff support areas)

was calculated by multiplying the square footage of the room by the grossing factor for that floor plan type (private or mixed). Cost per square foot was estimated at \$285 per square foot. Using this format, the cost per patient room was estimated at \$182,400 per patient in all private room configurations and \$122,550 per patient in mixed room configurations. A second analysis, based on a single floor plan, was conducted to estimate the difference in cost if private rooms were replaced with shared rooms. This analysis assumed total patients room area and half the associated corridor would be reduced by 20%, assuming core service area space would remain the same. Under this scenario, the cost of construction for the whole unit was \$153,000 per patient in the all private room scenario, and \$134,000 per patient in the all shared room scenario.

Interviews with architects and facility staff (administrators and maintenance/housekeeping staff) were conducted for this project, to identify additional factors that might differentially impact life-cycle costs of private versus shared bedrooms. A number of ongoing building-related cost factors were identified, but no data was found to empirically support the actual differences in costs, which would benefit from additional study. These variables include HVAC costs (private and enhanced shared rooms are more likely to have an HVAC units/system per resident, while traditional shared rooms will have one HVAC unit/system per two residents), energy costs from lights (traditional shared rooms are more likely to have fewer lights per resident than enhanced shared or private rooms, and both shared layouts will have fewer lights per resident in the bathroom than a bathroom in a private room), and ongoing maintenance and housekeeping costs (where staff felt private rooms needed less ongoing attention than shared rooms, as described under Operational Factors section of this paper).

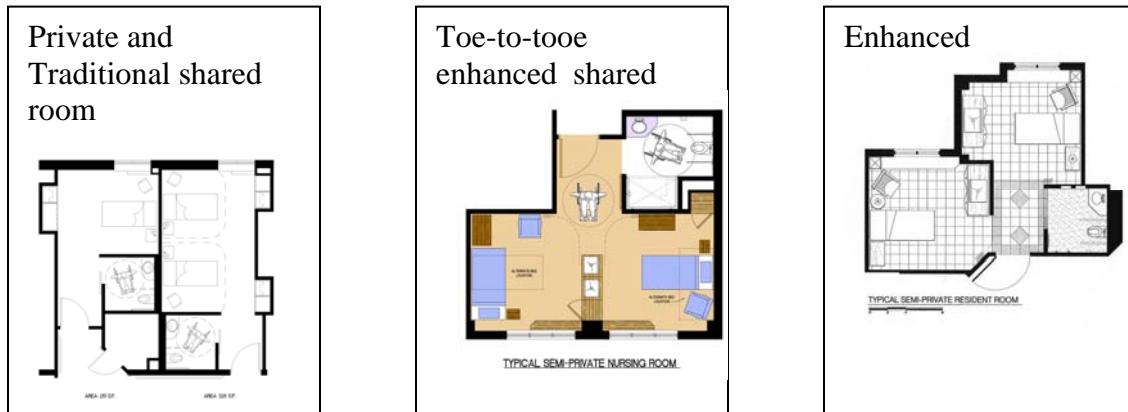
One architect suggested the differences may stem from facility ownership. “In terms of trends, not for profits are not so concerned about square footage, but about quality of life, therefore rooms are larger. With for profit clients, they tend to look at code mandated [minimum] square footage requirements as what they need to be at, and in this case, private rooms are harder to arrange furniture in, whereas in shared there is more square footage, so more versatility. When we [as architects] do a building analysis, we look at square foot per resident in the whole facility. This number has clearly gone up [over time].” He estimates that only 10% of the increase in overall square foot per resident comes from increases in the size of bedrooms and associated bathrooms, and most of the rest of the increase comes from program spaces for residents, and to a lesser extent, staff support spaces.

Because of the lack of any systematic analysis in the literature, a detailed analysis of bedroom design was undertaken for this project. This analysis was conducted in a different style from the analysis conducted by Chaudhury and colleagues. The assumption was made that other factors, such as unit/household size, unit configuration (hallway, open plan, mixed), decisions about inclusion of a kitchen, decentralized activity space, and centralized versus decentralized staff support spaces have a larger impact on the size of shared and support spaces than private versus shared bedrooms. Thus this analysis was limited to the bedrooms and adjoining toilet room themselves. The analysis was also conducted without and with associated hallway space.

A sample of 189 bedroom plans was collected and analyzed. The sample was drawn from design firms that had nursing home projects published in any of the DESIGN issues of Nursing Homes Long-Term Care Management Magazine, from 1997-2005, plus

the 58 plans from the Kaup and Norris-Baker study described above. DESIGN is a review of aging-related construction projects (including nursing homes, assisted living, retirement communities, adult day care, community centers, therapy centers and other settings) that is judged annually by SAGE, the Society for the Advancement of Gerontological Environments. Every design firm (n=36) with a nursing home project (as a free-standing project or a part of a larger project) was contacted, the purpose of the study described, and asked to submit detailed bedroom plans for the project(s) that had been in DESIGN, and any other nursing home projects the firms had designed in the past 10 years (since 1995). Projects submitted included both new construction and renovation projects. Response varied somewhat. Twenty-four firms agreed and submitted plans. Twelve firms either refused (n=2) or agreed (n=10), but, despite repeated requests for plans over a 3 month period, never submitted plans (some firms do not have copies of plans on easily transmitted electronic formats, and plans from completed projects are often filed in relatively inaccessible storage). Some plans were just of bedroom layouts, and some were of full units. It is acknowledged that this sampling method is likely to result in a slightly biased sample, in that these projects were, on the whole, considered worthy of being accepted for publication in a design competition, meaning the designs were generally considered as meeting SAGE's design philosophy (see www.SAGEFederation.org for a description of SAGE and its design principles). However, because the purpose of this study was not to estimate the percentage of rooms built in different configurations, but simply to estimate the costs of constructing different room configurations, this bias was not considered to be a serious flaw.

A total of 189 bedroom plans were analyzed. There were 129 private rooms, 29 traditional shared rooms and 33 enhanced shared rooms, which varied more in size and layout. Sample illustrations of room types are illustrated below.



Detailed measurements were made of wall length (differentiating exterior, interior room-to-room and interior-to-corridor and plumbing wall), number and size of windows, number of interior and exterior corners, presence of a closet, size of room size, of bathroom, presence, size and style of shower, and types of doors (swing, bi-fold, sliding).

Kevin Lawlor, Tom Kauker and Robert Strickland at Project and Construction Services, Inc, a construction estimating firm with 20 years experience were engaged to develop 2 scenarios for estimating the cost of construction of these bedrooms, a low-end

Table 2 Summary of low end versus high end project

Low End Project	High End Project
Slab on grade	Slab on grade
2x4 framing	2x6 framing
Vinyl exterior	Brick veneer exterior
1/2" drywall	5/8" drywall
Paint	Wall paper
Vinyl flooring	Carpet
Wood truss roof system	Wood truss roof system
20 year shingle	40 year shingle

scenario and a high-end scenario. A summary of the differences of the two scenarios is provided in Table 2. It should also be noted that these costs are for a bedroom only, and

do not include shared project costs of land, utilities, site preparation, fees, or construction of shared areas of the facility (staff work and support spaces; living, dining and other shared communal rooms; administration offices, kitchens and laundry facilities, etc.). To the extent possible, the goal was develop a costing method that would allow a focus on the differential costs of the bedrooms only. Costs are based on construction costs for the Cleveland, Ohio area, for 2006. Specific assumptions for the cost estimates are detailed in Appendix 1.

Rooms were coded into one of three categories: traditional shared, enhanced shared, and private. An enhanced shared room required each bed area to have a definable territory and at least a private window. Most traditional shared rooms looked like hospital rooms, with only a so-called privacy curtain between the two beds, although a few had a more solid partition between the beds. Table 3 presents the breakdown of room size, and low and high end cost summaries by room configuration. As expected, the average size of an enhanced shared room is larger than a traditional shared room, by 66 square feet [sf]. For comparison purposes with a private room, these figures are also calculated and presented on a sf per person. Thus, the average enhanced shared room is 33 sf larger than a traditional shared room, and a private room is 46 and 79 sf larger than an enhanced shared and traditional shared room, respectively, per person. The right side of the table presents cost estimates data. Note that these cost figures were not used by applying a cost-per-square foot to the size of the room, but rather by costing out the exact measurements of each element of the room plan. Again, as expected, the average per person cost of a private room is more expensive (\$14,906) than an enhanced shared room

(\$10,301 per person), which is more expensive than a traditional shared room (\$8,252 per person).

Table 3: Break down of size and costs of bedrooms by configuration

	ROOM SIZE		LOW END		HIGH END	
	Sq ft/room	Sq Ft/person	\$ per room	\$ per person	\$ per room	\$ per person
traditional shared	270 (range 182 to 380)	135 (range 91 to 190)	16504 (range 13,741 to 22,002)	8,252	22,539 (range 18,616 to 30,711)	11,270
enhanced shared	326 (range 155 to 562)	163 (range 77.5 to 281)	20,601 (range 14,752 to 29,123)	10,301	29,303 (range 21,306 to 39,477)	14,652
Private	214 (range 101 to 450)	214 (range 101 to 450)	14,906 (range 9,885 to 26912)	14,906	20,234 (range 13,435 to 38,478)	20,234

Several additional sets of figures were calculated. While it was deemed not feasible to include the shared areas of the unit, as too many other factors besides bedroom configuration impact the size of this space, it is possible to include the hallway space associated with each room. The detailed analysis of room measurements differentiated between hallway walls (which need to be fire rated, and thus are more expensive) and other interior walls. Costs for hallway space associated with each bedroom were calculated (flooring, ceiling, lighting wall treatment and handrail). This increased the traditional shared rooms by an average of 53.14 sf per room (26.5 sf per person), increased the enhanced shared rooms by an average of 45 sf per room (22.5 sf per person), and increased the private rooms by an average of 41.2 sf per person (See Table 4). It is not surprising that the associated hallway space for enhanced shared rooms is smaller than for traditional shared rooms. This is likely a reflection of the age of the

design, with more recent plans using both enhanced shared rooms and a clustered bedroom arrangement to minimize space dedicated to hallways, whereas older plans had more traditional shared rooms arrayed along a straight hallway. A more detailed analysis of unit/household plans might be able to address these differences. For this reason, the rest of the analyses presented use the figures from Table 3, all bedrooms included in the analysis, but not associated hallway costs.

Table #4: Size and Cost Calculations with Associated Hallway Space

	ROOM SIZE		LOW END		HIGH END	
	Sq ft/room	Sq Ft/person	\$ per room	\$ per person	\$ per room	\$ per person
Traditional Shared	323	161.5	17,126	8,563	23,258	11,679
Enhanced shared	371	185.5	20,978	10,489	29,126	14,562
Private	255	255	15,247	15,247	20,888	20,888

Finally, cost of debt service was examined. Debt service was calculated at 7% annual interest rate for 30 years. Table 5 shows the additional costs of this life-cycle perspective.

Table #5: Cost Calculations with Associated Hallway Space

	LOW END		HIGH END	
	Construction	Construction + debt	Construction	Construction + debt
Traditional Shared	8,563	20,506	11,679	28,015
Enhanced Shared	10,489	25,121	14,562	34,877
Private	15,247	36,515	20,888	50,026

Thus, as expected, across all analyses, the data shows that construction costs (per person) are highest for private rooms over enhanced shared rooms over traditional shared rooms. But how significant are these costs? A recent cost of care survey conducted by

Genworth Financial [48] may shed some light on this. The survey, conducted in March and April of 2005, was completed in 88 regions of the US, with responses by more than 77,000 nursing homes, assisted living facilities, and home care providers. Nationally, the average private pay rates in nursing homes is \$69,400, or \$190 per day. The average cost for a semi-private room is \$61,000, or \$167 per day. There are differences between states and between urban and rural areas within a state, but for the purposes of this project, we will use these national averages.

Thus the average difference between a private room and a shared room is \$23 per day. There is no data on the price difference for an enhanced shared room, so for the purposes of this study, we will simply split the difference and assume an enhanced shared room averages \$178.50, or a price differential of \$11.50. Using these figures, it is possible to estimate the number of resident days needed to cover the differential costs of the different room configurations. Table #6 shows the time it takes to recover the differential costs of construction, calculated with and without debt service, using the above revenue data.

Table #6: Cost differential between room configurations, calculated with and without interest, assuming full occupancy

	Cost differential without debt service	Time (# of days) to recoup without debt service	Cost differential with debt service (7% for 30 years)	Time (# of days/ months/years to recoup with interest)
Low End Construction				
Traditional to Enhanced	\$1,926	167	\$4,612	401 / 13.4 / 1.1
Enhanced to Private	\$4,758	414	\$11,394	991 / 33 / 2.8
Traditional to Private	\$6,684	291	\$16,006	696 / 23.2 / 1.9
High End Construction				
Traditional to Enhanced	\$2,883	251	\$6,905	600 / 20 / 1.7

Enhanced to Private	\$6,326	550	\$15,149	1,317 / 43.9 / 3.7
Traditional to Private	\$9,209	400	\$22,054	959 / 32 / 2.7

Thus, assuming the differential income assumption of \$11.50 (traditional shared → enhanced shared or enhanced share → private) or \$23 (traditional shared → private), for a project with low-end construction costs, it takes between 1 and 3 years to recoup the additional costs of constructing private bedrooms versus shared bedrooms. For higher end construction projects, it takes between one and one half years to just over three and one half years to recoup the additional construction cost of the more private rooms. Of course, a higher end project might also charge more, so the difference in base rates (the \$167 vs. \$190 per day) charged might also change.

This analysis is based on the assumption that the rooms are filled and the facility is getting revenue for residents being in the rooms. Although no hard data could be found that identified the percentage of unoccupied beds that are in private rooms versus shared rooms, all the facilities that participated in the focus groups indicated that they were much more likely to have a vacancy in a shared room than in a private room. If an individual refuses to move into a facility because he or she cannot have a private room, then the actual lost income per day is not \$23, but \$167, the cost of the shared room that is now empty. With this scenario (See Table # 7), in a low-end project, it would only take 96 days (132 for the high end project) to recoup the cost differential of constructing a private room versus a traditional shared bedroom.

Table #7: Cost differential between room configurations, calculated with and without interest, assuming vacancies

	Cost differential without debt service	Time (# of days) to recoup without interest	Cost differential with debt service (7% for 30 years)	Time (# of days / months) to recoup with interest
Low End Construction				
Traditional to Enhanced	\$1,926	12	\$4,612	28 / 0.9
Enhanced to Private	\$4,758	27	\$11,394	64 / 2.1
Traditional to Private	\$6,684	40	\$16,006	96 / 3.2
High End Construction				
Traditional to Enhanced	\$2,883	17	\$6,905	41 / 1.4
Enhanced to Private	\$6,326	35	\$15,149	85 / 2.8
Traditional to Private	\$9,209	55	\$22,054	132 / 4.4

These analyses suggest that the differences in construction costs are easily recouped, generally in less than three years, assume full occupancy. This drops dramatically—to less than 3 months—if a bed in a shared room is unoccupied when it would have been filled if it had been a private room.

One final analysis was run. The above data assumes a cost differential of \$23 between a private and a shared bedroom (with the enhanced shared bedroom assumed to be halfway between). Not all facilities charge this differential. If a facility is serving people on Medicaid, the cost analysis changes. Generally speaking, Medicaid will not pay extra for a private room, unless it is medically necessary. The state of Michigan, however, has recognized the tremendous benefits of private rooms, and will now include in their capital cost formula an additional \$5 per patient per day for private rooms (up to 100 beds). Even with this minor increase, it would only take a facility roughly 9 years (low end construction, full occupancy) or slightly more than 12 years (high end construction, full occupancy) years to recoup the construction cost differential. Assuming a 30 year mortgage, it means the facility is ahead, financially, for 21 (or 18) years of the mortgage. This analysis is summarized in Table #8.

Table #8 Time to recoup construction cost differentials assuming \$5/day

difference

	Cost differential with debt service	Time (# of days / months/ years) to recoup at \$5 /day
Traditional to Enhanced - Low End	\$4,612	922 / 30.7 / 2.6
Enhanced to Private - Low End	\$11,394	2279 / 76 / 6.3
Traditional to Private - Low End	\$16,006	3201 / 106 / 8.9
Traditional to Enhanced - High End	\$6,905	1381 / 46 / 3.8
Enhanced to Private - High End	\$15,149	3030 / 101 / 8.4
Traditional to Private - High End	\$22,054	4411 / 147 / 12.3

Summary

The vast majority of factors identified in this study, regardless of whether there was solid empirical data, information from the focus groups, or other anecdotal evidence, indicated better outcomes associated with private rooms over shared rooms in nursing homes. The evidence is strongest for psychosocial issues, particularly related to preference and satisfaction for families and staff as well as residents. Several studies attempted to look at more quality of life issues, but it is difficult to tease out the effect of bedroom configuration from other factors. In clinical terms, the evidence is strong on iatrogenic outcomes, especially related to nosocomial infections. Evidence of impact on falls and sleep hygiene is weaker. There are numerous operational factors that suggest staff spend more time managing difficult situations when people have roommates than when they don't, and possibly more time (which costs more money) cleaning and maintaining shared rooms. Finally, the cost analysis suggests that while private rooms

and enhanced shared rooms do cost more to construct, the difference in costs may not be as great as some have argued, and may be recouped relatively quickly.

The analyses conducted for this project only identified four potential factors where there is some evidence, albeit limited or weak, that outcomes might be better or costs might be higher in a shared room than in a private room. First, there are likely some energy-related costs with shared rooms, particularly for HVAC and electricity for lighting. Second, time staff spend walking may be impacted, if a unit/household with all private rooms is larger, or hallways are longer. Third, there may be a decrease in falls in shared rooms if roommates provide some assistance, though there was also a counter argument that private rooms, which tend to be better for visiting, may encourage families to spend more time visiting and increase their availability to provide assistance. Finally, there are some who feel that some people “just do better” in a shared room. The study by Terakawa (2004) might refute these results over time, but her sample was small, and was conducted in Japan, so there may be cultural differences. There is simply not enough data to comment on the relative merits of enhanced shared rooms as compared to private rooms.

One weakness to this analysis is that it was not possible to estimate the associated unit size differences caused by having more private rooms. It is argued that unit/household size and configuration (radial, open plan, hallway plan or other variation) has a more significant impact on overall unit/household size than the number of private versus shared rooms. The analysis that was conducted that included hallway costs begins to get at this figure, but it is likely that the age of the design of the building has at least as large an impact on the amount of hallway space as the room configuration. A detailed

analysis of a large sample of unit plans, categorized by age of the design, might be able to address this issue. It is worth noting that, of course, construction is only a small portion of overall expenses a facility incurs in providing care.

There is clearly a need for much more research in this area. On the psychosocial side, there needs to be an analysis of whether individuals who indicate they are content and satisfied with a shared room would be more content and satisfied with a private room if they have the opportunity to experience one. Replicating the Terakawa study in the US would be a good first step. Consideration should also be given to what characteristics (of the individual or the situation) differentiate people who prefer a shared room from a private room. For instance, being able to continue to live with a spouse or sibling, if one chooses, may bring higher satisfaction than living alone. Quality of end-of-life experiences, for the individual who is dying, for the family, and for the roommate, should be explored. In terms of clinical outcomes, the evidence related to nosocomial infections is fairly strong. But the relationship of bedroom configuration to incidence of increased agitation, disruptiveness and distress has not been studied. This area, in particular, should focus on the three different bedroom configurations. There is also a need for greater understanding of the impact of presence of a roommate on falls, because of the serious morbidity issues associated with falls. Negative clinical outcomes that result from roommate conflict is not well understood. Finally, when medications are given in bedrooms (regardless of where they are stored) rates of medication errors should be tracked by bedroom configuration.

Operational correlates of private versus shared bedrooms are perhaps least understood. The issue with the largest financial impact relates to lost revenue from being

unable to fill a shared room when an individual would have agreed to move into a private room. Studies that explore this should try to project what the future generations of nursing homes residents will expect or accept. It is likely that baby-boomers will be even less likely to accept living in a room with a stranger than the current cohort of elder residents. A related topic would be an exploration of the differential costs of marketing a shared room versus a private room versus an enhanced shared room. There is clear evidence that roommate conflict can occupy a substantial portion of staff time. While all private rooms might free up staff time, it won't necessarily reduce costs. The question is what staff do with this time—whether this translates into better care. While the focus groups suggested that maintenance and housekeeping costs are higher per person for shared rooms than for privates, there is no concrete evidence to support this. Nor is there any evidence on differential energy-use costs for HVAC and electricity.

On the cost of construction side, a larger analysis of how unit layout relates to bedroom configuration and therefore costs would be of great benefit to the industry. This might also be tied to staff efficiency studies, such as tracking how much time staff spend walking, and spend with residents in their bedrooms versus in shared spaces of the household.

Across all topics, attention should be given to differentiating bedroom configuration. The vast majority of studies reviewed do not include bedroom configuration as a variable, and none have explored differential impacts of the enhanced shared bedrooms. A more detailed study of this should consider differentiating territory-enhanced rooms where each person has their own territory but spaces are separated by curtain (and thus lack auditory and olfactory privacy), from privacy-enhanced bedrooms,

where each person has, in essence, a private bedroom with a solid door, but shares the bathroom.

Providers and designers are making decisions in a vacuum about the financial, clinical, operational and psychosocial implications of different designs, both in terms of bedroom configuration and larger unit/household layout. There is some evidence that the average age of nursing homes is 30 or more years. Over the next decade, much of this older stock of buildings will be significantly renovated or replaced. There is a clear need for more evidence-based information with which to make informed decisions.

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49. Focus Group, Facility #3

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Exploring the cost and value of private versus shared bedroom in nursing homes

Construction Cost Assumptions

Standard assumption: 1 story
bdlg, in Cleveland Ohio, 2006
prices

	low end	high end
Foundation	Footer, 16" x 12", 3 x #4 rebar, poured concrete	Footer, 16" x 12", 3 x #4 rebar, poured concrete
Slab on grade floor	Additional cost per corner Visqueen, 4" gravel, 4" concrete	Additional cost per corner Visqueen, 4" gravel, 4" concrete
Exterior wall, to 8' high	2x4 frame, vinyl siding, R-15, 1/2" drywall; sheathing, vapor barrier Exterior corners/angles	2x6 frame, brick veneer, R-19, 5/8" drywall; sheathing & vapor barrier Exterior corner/angle
Roof	Pre-engineered truss system, 24" on center, 1/2" OSB, 15# felt, ice-guard, 20 year shingle	Pre-engineered truss system, 24" on center, 5/8" plywood, 30# felt, ice-guard, 40 year dimensional shingle
Glazing	30" x 36" high, vinyl, casement, double pane \$185.00 Price per linear foot	30" x 48" high, Pella-type, wood frame, double hung, triple glaze \$425.00 Price per linear foot
Interior room to room walls (non plumbing, non-corridor)	2x4 frame, R-11, 1/2" drywall	Staggered frame, R-13, 5/8" drywall each side
Corridor wall	2x4 frame, R-11, 5/8" drywall one side, 1/2: on other side	2x4 frame, R-13, 5/8" drywall both sides
plumbing wall	2x6 frame, R11, 1/2" drywall	2x6 frame, R13, 5/8" drywall
Bedroom	48" solid fire rated, flush surface, birch; pre-hung, pre-finished, with passage hardware set	48" solid fire rated, 4 or 6 panel, oak; solid core; pre-finished; pre-hung; with passage hardware set
Bathroom door; pre-hung; per ea.		

Swing	Hollow core, flush surface; with hardware; painted	Solid core, 4 or 6 panel, oak
Slide	Surface mount, hollow core; with hardware; painted	Pocket door, solid core
Closet door; with hardware; painted; flush; per ea.		
Bi-Fold; 3' wide	Press board or masonite	Press board or masonite
Slide ; as above	Wood	Wood
Hinge; 3' wide with hardware, hollow core, painted	Wood	Wood
Interior Finishes (all per SF)		
Flooring (sq foot)	vinyl sheet; non-slip	Health care grade carpeting
Ceiling (sq foot); 2x4; 15/16" grid	drop-in acoustical tile	5/8" drywall, painted; suspended
Bathroom floor (sq ft)	vinyl sheet	Ceramic tile
Base	vinyl cove	Wood molding; painted
Ceiling;	Drywall (attached to truss); taped, sanded, painted or textured	Drywall (attached to truss); taped, sanded, painted or textured
		Oak chair rail; stained & sealed; 1 piece
Wall finish (tell me whether you give me linear foot x 8 ft height)	Paint; prime + 2 coats	Vinyl paper; average weight & price
Window/door trim (per linear foot)	Drywall or simple pine molding, painted	Detailed oak moldings/casing,; stained & sealed; 1 piece
Lighting	Low end ceiling fixture	High end ceiling fixture
	4' fluorescent above bed	Swing arm incandescent/compact fluorescent
		20' cove fluorescent lighting along side walls
Bathroom lighting	Ceiling fixture	Ceiling fixture
		Mirror light
		Shower light
Fixtures		
Toilet		
Tank type	low end tank	High end tank

Grab bars; per LF	stainless steel, side and back wall mount	Fold-down, powder coated, both sides of toilet
Lavatory	Wall mount (lavatory only)	36" wood vanity, laminate top, drop in sink;
Plumbing allowance	Flat mirror; 20" X 30", framed	Medicine cabinet; with framed mirror; 20" x 30"; surface mount
Shower		
3x3	Low-end, prefab, multi-piece unit	High end , 1 piece unit
3x4	Low-end, prefab, multi-piece unit	High end , 1 piece unit
3x5	Low-end, prefab, multi-piece unit	High end , 1 piece unit, with integral bench
En suite (plumbing fixture plus \$ sq ft for ceramic tile on walls and floor	Ceramic tile = \$8.50/SF; for shower stall, with floor & base & ceiling, 3' x 3', \$775.00 + plumbing trim \$450.	
Misc allowances		
Hardware (faucets, soap dispenser, paper towel, outlets, switches, etc)	Low end range	High end range
HVAC (sq foot)	P-Tac	4 pipe

* Actual construction cost figures may be requested from Dr. Calkins at mcalkins@IDEASInstitute.org.