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Exploring the Cost and Value of Private Versus Shared Bedrooms in Nursing Homes

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Purpose: There is debate about the relative merits and costs of private versus shared bedrooms in nursing homes, particularly in light of the current efforts at creating both cost-efficient and person-centered care facilities. The purpose of this project was to explore the extent to which there is evidence-based information that supports the merits of three different bedroom configurations: traditional shared, enhanced shared, and private. ***Design and Methods:*** We developed a framework of four broad domains that were related to the different bedroom configurations: psychosocial, clinical, operational, and construction or building factors. Within each dimension, we identified individual factors through the literature, interviews, and focus groups, with the goal of determining the breadth, depth, and quality of evidence supporting the benefits of one configuration over another. ***Results:*** 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. Cost estimates suggest that construction cost (plus debt service) differences range from roughly $20,506 per bed for a traditional shared room to $36,515 for a private one, and that such differences are recouped in less than 2 years if beds are occupied, and in less than 3 months if a shared bed remains unoccupied at average private-pay room costs. ***Implications:*** Despite limited empirical evidence in some areas, this project provides the foundation for an evidence-based life-cycle costing perspective regarding the relative merits of different bedroom configurations.

Key Words: Construction, Design, Nosocomial Infection, Operational costs, Privacy

Nursing homes are 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 (Capitman, Leutz, Bishop, & Casler, 2004; Sloane & Zimmerman, 2005; Weiner, 2003). One central aspect of the change movement is greater emphasis on autonomy, dignity, and privacy. The value of private over shared bedrooms is central to this debate, with some researchers and providers arguing that the benefits of private rooms are either self-evident or well supported in the literature, and others suggesting that private rooms are too expensive to build and operate. Designers have added to the complexity of the issue by creating "enhanced shared" rooms, which either give each resident a well-defined and generally exclusive territory within the room or provide essentially private bedrooms with a shared bathroom. Although privacy and the benefits or detriments associated with it are central to this discussion, there are a host of other factors that are important. Nevertheless, there has been no systematic examination of the broad range of factors that are related to different bedroom configurations, and there is no cohesive body of evidence supporting either private or shared rooms in long-term-care settings. This is a timely issue, given that the average age of nursing homes is 29 years or more and many are being replaced now or in the near future (Lewis, 2005).

Our purpose in this exploratory project was to define as broad a range as possible of potential factors associated with different bedroom configurations, and to determine the extent of existing evidence, both empirical and anecdotal, that supports one bedroom configuration over another. In particular, our goal was to move beyond the relatively well-documented satisfaction-related outcomes to explore other factors that impact the life-cycle costs of private versus shared bedrooms.

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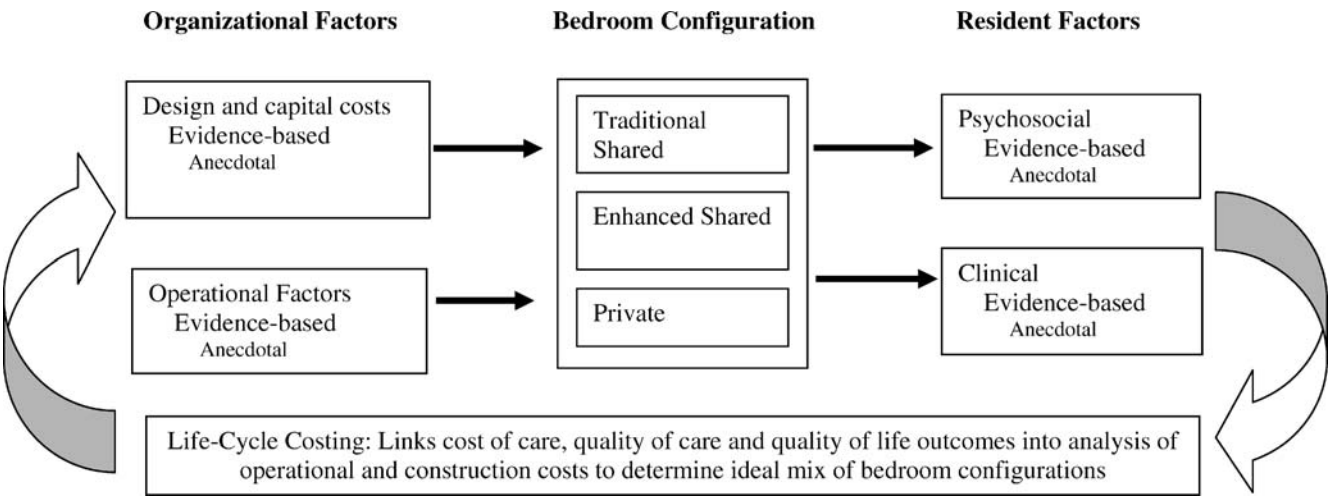

Figure 1. Conceptual framework.

The vast majority of research in nursing homes on this topic relates to psychosocial outcomes (preference and satisfaction). There is some, albeit more limited, research on clinical factors, although this is well studied in hospitals. Despite a growing interest in staffing issues, there is relatively little research that explores operational correlates of different room configurations on operational factors. Because of the lack of any previous comprehensive examination of the broad range of factors related to private rooms in nursing homes, for this project we drew on a framework developed by Chaudhury, Mahmood, and Valente (2005) to explore single- versus multiple-occupancy rooms in hospitals. Chaudhury and colleagues identified three clusters of factors: organizational costs (initial construction and ongoing operating costs), hospital management and patient care issues (infection control, patient transfer, and patient monitoring), and therapeutic impacts (privacy, stress, and family accommodation). We modified their framework slightly for this project, separating organizational factors from resident factors. Organizational factors can be further broken down into building-related issues (design and capital costs for construction and building operation) and operational issues (staffing issues, marketing or maintaining census, and time spent managing residents). Resident factors include psychosocial outcomes (well-being, satisfaction) and clinical issues (sleep, falls, nosocomial infections, etc.). This framework, shown in Figure 1, suggests that evidence (with greater weight on evidence-based outcomes than empirical outcomes) about resident factors should be fed into the decision-making process about design and operational issues (which also uses evidence-based and empirical information) to determine the ideal mix of bedroom configurations for a given project. Ideally, more research is then conducted on resident outcomes, which is fed back into the cycle again.

The issue of private rooms is of primacy in institutional settings—hospitals and nursing homes—where people often have little or no choice about where they live or with whom they may share a room. Different factors are more or less salient across these two settings. In hospitals, patients typically stay a few days or weeks at most. There may be multiple visitors every day, and there is a heavy focus on treatment and getting well enough to go home. Nursing homes provide support for chronic care; the length of stay is months to years, so issues of well-being and quality of life, as well as cost considerations, take primacy. This is generally reflected in the literature, with more research on clinical factors and accommodating family and visitors conducted in hospital settings, and an emphasis on well-being and quality of life in the nursing home literature. We explored the literature from both of these settings in order to identify the broadest range of potential factors.

Methods

We used an iterative process, alternating literature review with interviews and focus groups. We conducted a preliminary review of the literature by using the IDEAS Institute's in-office library (which has over 3,500 articles and books on long-term care catalogued) to explore factors and outcomes that may be associated with different bedroom designs (private vs shared). We grouped the factors topically into the aforementioned framework.

Before conducting a more thorough literature search, we conducted interviews with four nursing home administrators and four architects specializing in long-term care to flush out additional factors within each dimension that might not surface readily in the literature review. We then used these terms (from the initial search and the interviews) to conduct a systematic review of the literature. We conducted initial searches on Ageline and PubMed, and we included articles from 1970 to the present in our

search. As we identified and abstracted articles, we also culled their references for related articles. We included only those articles that specifically addressed bedroom design or configuration, both empirical and anecdotal. We categorized articles by setting and type (empirical or descriptive). Because some of the topics identified in the interviews were not found in the literature, we held focus groups in three nursing homes, with staff, family members, and residents in attendance, to further probe the importance of these other factors. We selected a focus group format because it allows for discussion among different departments (nursing, social work, housekeeping, maintenance, and dietary), and this setup can encourage fertile discussions about topics that are sometimes infrequently thought about. We used a semistructured discussion guideline to allow for open-ended discussion and to ensure that all topics were systematically covered; this also allowed us to identify additional factors. Focus groups were run by two individuals, with one serving as facilitator and one as recorder. We identified several additional factors through the focus groups, and we conducted a second literature search (following the same parameters already described) for references on these factors.

We identified a total of 112 articles. Although we made efforts to focus on references specifically related to nursing homes ($n = 55$), some topics were only addressed in articles related to other settings (hospitals, $n = 37$; independent or assistant living, $n = 7$; multiple settings, such as articles on transfers, $n = 7$; and other or nonsetting specific, $n = 6$). It is worth noting that none of the published references differentiated a traditional shared bedroom, in which beds are side by side and occupants share one window and one bathroom, from what we refer to in this article as an enhanced shared bedroom, which is a relatively newer configuration in which each person has his or her own distinct territory and window and does not have to cross into the roommate's space to reach his or her own (see Figure 2).

Because of an almost complete lack of information in the literature, we undertook a detailed analysis of bedroom design and construction costs for this project. We collected and analyzed 189 bedroom plans. We drew our sample from design firms that had nursing home projects published in any of the DESIGN issues of *Nursing Homes: Long-Term Care Management* magazine, plus 58 plans from another study (Kaup & Norris-Baker, 2004). DESIGN is a review of elder-related facilities that is judged annually by SAGE, the Society for the Advancement of Gerontological Environments. We contacted every design firm ($n = 36$) with a nursing home project; we described the purpose of our study, and we invited the firm to submit detailed bedroom plans for the project(s) that had been in DESIGN, as well as any other nursing home projects the firm had designed over the past 10 years. 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. We acknowledge that this sampling method likely resulted in a slightly biased sample, in that these projects were, on the whole, considered worthy of being accepted for publication in a premiere design review publication. However, as our purpose in this study was not to estimate the percentage of rooms built in different configurations

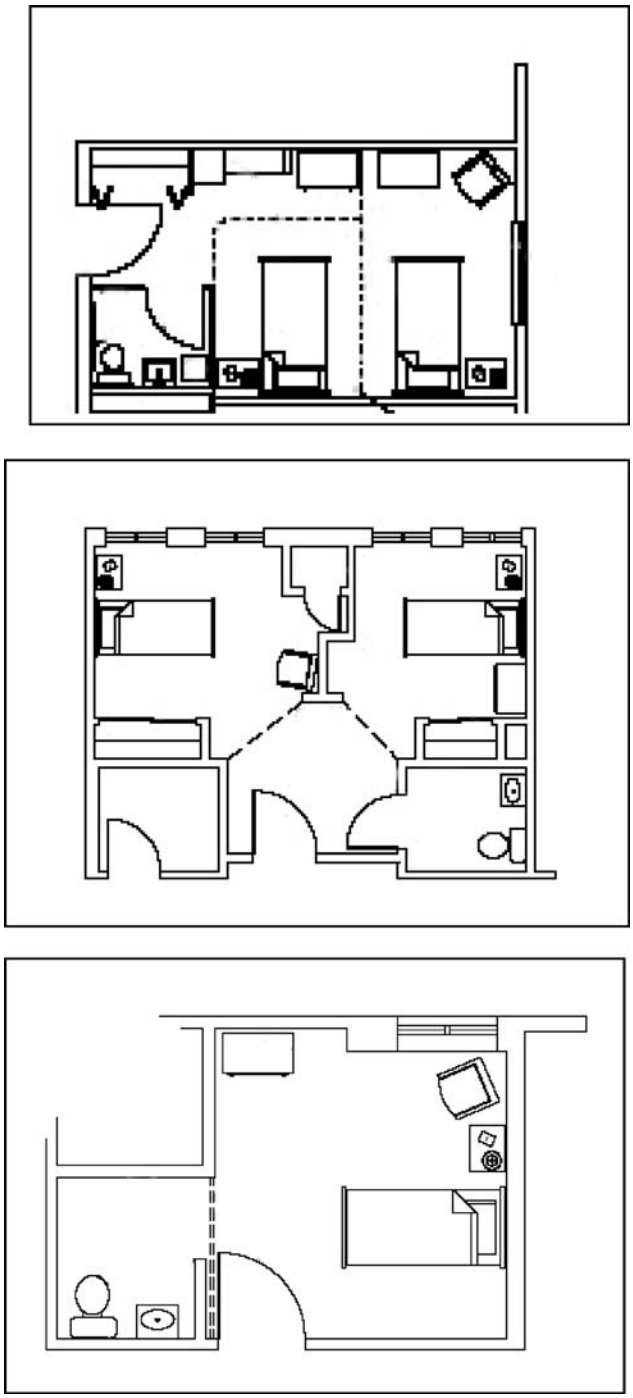

Figure 2. Different bedroom configurations: traditional shared, enhanced shared, and private.

but simply to estimate the costs of constructing different room configurations, we did not consider this bias to be a serious flaw.

Results of the Literature Review

We identified a total of 38 different factors within the four dimensions of the model. We identified most of the factors in at least one published reference, although there were several factors that we identified in focus groups that we did not find in the literature on either nursing homes or acute care settings (we discuss this issue separately). The vast majority of references related to the resident side of the model (psychosocial and clinical) as opposed to operational and building factors. The appendix lists the references, the setting (hospital, nursing home, etc.), and which factors we identified in each article. Because the purpose of this project was not a meta-analysis of extant research but rather an exploration of the broadest range of possible factors, we provide no other analysis of the articles.

Psychosocial Factors.—There is strong evidence that, as a general cohort, older adults overwhelming prefer private rooms over shared rooms in residential settings, potentially even among people who thought they would prefer a shared room. A study by the American Association of Retired Persons found that individuals over the age of 50 preferred a private room by a ratio of 20:1 (82% vs 4%; see Baugh, 1996). These results replicate early research on the preference for private rooms conducted by Lawton and Bader (1970). The primary factors that influence this preference 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, though several of these come from anecdotal resources and not empirical studies.

There is also evidence that seniors tend to express satisfaction with their current living situation, regardless of the objective quality of that housing (Pinquart & Burmedi, 2004). However, in a small-scale study conducted in Japan, Terakawa (2004) studied 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. The results indicated that even people who initially did not want a private room and expected not to like having a private room were completely satisfied with their private room by 8 months after the move. These results suggest 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. Other researchers have found that having a private bedroom is among the most desired changes of nursing home residents (Mosher-Ashley & Lemay, 2001). Residents who desired more privacy had lower life satisfaction than did residents who felt they had sufficient privacy.

There is a related concept of privacy with visitors, though the vast majority of research on this topic comes from acute care settings, where visiting, often with multiple people, occurs on a more frequent basis. Patients feel they have better visits with families in a private room, and they express higher satisfaction with this configuration (Chaudhury et al., 2005; Ulrich & Zimring, 2004).

Lack of control is another commonly cited factor that impacts preference for a private room in nursing homes. Common issues that cause conflicts between roommates include the television and radio (on or off, volume, and program selection); the time to get up and go to bed; having curtains open or closed; having the door to the hallway open or closed; heating, ventilation, and air conditioning levels; and the personalization or decoration of one's room (Foltz-Gray, 1995; Harris, McBride, Ross, & Curtis, 2002; Kaldenberg, 1999; Kane, Baker, Salmon, & Veazie, 1998; Ulrich & Zimring, 2004).

There is also some limited, mostly anecdotal, evidence about the positive benefits of sharing a room. Bitzan (1998) 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, whereas 78% had a moderate or weak emotional bond with their roommate. Interestingly, even among those who indicated a positive emotional bond with their roommate, the majority 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.

Clinical Factors.—In clinical terms, the evidence is strong on iatrogenic outcomes, especially related to nosocomial infections. Pneumonia, the leading cause of death among nursing home residents, with overall mortality rates reported between 20% and 50% and as high as 80% in some studies (Zimmerman, Gruber-Baldini, Hebel, Sloane, & Magaziner, 2002), is the second most frequent nosocomial infection in nursing homes (Harkness, Bentley, & Roghmann, 1990). The vast majority of research suggests that there is a reduced risk of developing a nosocomial infection in a private room than in a shared bedroom (Fune, Shua-Haim, Ross, & Frank, 1999; Pegues & Woernle, 1993; Sharbaugh, 2003; Zimmerman et al.), although much of the research was conducted in acute care settings (Ben-Abraham et al., 2002; Berry, 2004; Boyce, Potter-Bynoe, Chenevert, & King, 1997; Chang & Nelson, 2000; Chaudhury, Mahmood, & Valente, 2004; Coleman, 2004; Drinka, Krause, Nest, Goodman, &

Gravenstein, 2003; Ulrich & Zimring, 2004). Research conducted in nursing homes found that roommates of individuals infected with Influenza A had a 3.07 relative higher risk of acquiring the illness than did individuals in a private room (Drinka et al.). This statistic, combined with the 3.5% excess mortality rate associated with acquiring Influenza A, has serious life-threatening implications. Similarly, Pegues and Woernle 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. Beyond the potentially life-threatening consequences, there are also significant cost implications of nosocomial infections in nursing homes, which are estimated in one study to be in the range of $1 billion (Kayser-Jones, Wiener, & Barbaccia, 1989).

The empirical evidence of the negative impact on sleep in shared rooms in hospitals is fairly strong (Duffin, 2002; Ulrich & Zimring, 2004), although in nursing homes the evidence is weaker (Schnelle, Alessi, Al-Samarrai, Fricker, & Ouslander, 1999).

Falls prevalence was also hypothesized to be related to private rooms. However, we found no research that specifically linked the prevalence of falls to being in a private versus shared room in nursing homes. There were some suggestions, though no empirical evidence, that placing people who are at a high risk of falls in multibed rooms in hospitals might reduce the occurrence of falls, as roommates could remind individuals not to rise without assistance (Chaudhury et al., 2005; Tutuarima, van der Meulen, de Haan, van Straten, & Limburg, 1997).

Operational Factors.—We identified two issues in the literature that relate to operational efficiency: the marketing of shared rooms, and the quality of staff–resident communications. However, empirical studies on both these topics are practically nonexistent, and virtually all of the evidence on this topic comes from interviews, focus groups, and a few descriptive articles. Duffin (2002) and Fisher (1995) both suggest that it is harder to market shared rooms, in part because of gender-matching issues and in part because of a preference for private rooms. However, we found no empirical studies to support these anecdotal descriptions.

Information on the quality of resident–staff communications comes primarily from hospital studies (Berry, 2004; Ulrich & Zimring, 2004). The Healthcare Insurance Portability and Accountability Act regulations, known as HIPAA, mandate the 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, though this issue is certainly more relevant in a hospital setting than a nursing home, where HIPAA concerns are often focused on communication at the nursing station, not in the bedroom.

There were also some references that discussed the positive consequences of shared rooms in terms of staff efficiency, although again this literature was mostly conducted in hospital settings. Chaudhury and colleagues (2004) found that the only dimension that nurses in four hospitals rated private rooms worse than shared rooms was on walking distance from the nursing station. However, this may have as much to do with unit configuration as it does with 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 (Shepley & Davies, 2003; Trites, Galbraith, Sturdavant, & Leckwart, 1970), regardless of bedroom configuration, and these results may be translatable to a nursing home setting.

Building Factors.—There are very few empirical studies exploring construction or ongoing building-related costs of nursing homes. The only relevant construction cost analysis that we identified was conducted by Chaudhury and colleagues (2005) of private versus shared rooms in hospitals. They calculated gross floor area per bed (for the whole unit, which includes all shared social spaces and staff support areas), and they estimated construction at $\$285/ft^2$ ($\$285/0.09m^2$). Using this format, they estimated the cost per patient room at $182,400 per patient in all private room configurations and $122,550 per patient in mixed (some private and some shared room) configurations, suggesting that all private rooms would cost substantially more to construct.

Results of Interviews and Focus Groups

In general, the interviews and focus groups reinforced the information we gleaned from the literature review, and we identified a number of additional topics. In addition, two of the focus group facilities had enhanced shared rooms, which staff felt impacted many of the topics of discussion. We found no mention in the published literature on this room configuration.

Psychosocial Factors.—Staff and residents echoed the strong preference for private bedrooms found in the literature. In one facility that had a number of enhanced shared rooms, staff and residents alike said these rooms were perceived more like a ''private room with a shared bathroom'' than a shared room, with all the benefits thereof. Issues related to visiting appeared to be most critical during the death and dying process. Most family members want to be close to the dying relative but 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 that being in a shared room sometimes kept as many family members from gathering or staying as long as they would have preferred.

Clinical Factors.—Discussion of clinical factors in the interviews and focus groups related primarily to sleep and falls. Both residents and staff indicated that an individual is more likely to wake up when a staff member enters the room and provides care to a roommate than when the individual lives alone, although this may be mitigated in some enhanced shared rooms, depending on the level of acoustic separation between the residents. This can be a serious disruptor of sleep, because some individuals are checked every two hours. Staff members were uncertain how much of an impact frequently interrupted sleep had on residents the next day. In addition, several staff at different facilities indicated they were sure that there are more falls in shared rooms, though they had no hard data to support this. We identified several other factors as potential clinical outcomes related to private versus shared rooms in the focus groups that were not apparent in the literature, including the use of as-needed (known as PRN) and psychotropic medications, the rate of distressed behaviors by residents (particularly residents with dementia), and medical error rates. However, information on these topics from the focus groups was mixed.

Operational Factors.—Not surprisingly, much of the discussion in the interviews and focus groups revolved around operational issues, as these are of primary concern to staff and administrators. Topics included increased time and effort for marketing and 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.

Focus group participants agreed with the limited literature about the increased difficulty of marketing shared rooms (which translates into greater costs). None of the focus group facilities had an open bed available in a private room, though there were several openings in shared rooms. When a private room becomes available, staff indicated that it is always filled immediately, often from someone in house who has been waiting. One focus group was held in the nursing home of a retirement community, and staff indicated that residents were leaving the campus to go to a different nursing home rather than move into a shared room, which represents lost income for the facility.

The management of roommate conflict had even greater cost implications. We found no empirical evidence related to the time spent managing roommate conflict in the literature, but the staff in the focus groups indicated that it could be substantial. Estimates of the average time spent (recognizing that on any given week it could be considerably higher) ranged from 2 to 25 hours per week. Apparently, it is not just the social workers and nursing staff who spend time on roommate issues. One housekeeper indicated she spends more time with residents in shared rooms who are upset by something than she spends with residents in private rooms, who seem to be upset less often.

If resolution of differences between residents is not possible, and the decision is made to relocate a resident, there are additional operational costs. Room-cleaning time and maintenance issues are greater at the time of relocation than routine room care is. All furniture must be removed and disinfected, and any maintenance issues (patching walls where personal belongings hung, repainting, and stripping and refinishing the floor) must be addressed. This also causes disruption to the remaining resident, who cannot access his or her room while it is being cleaned. In one facility, this process was estimated to add an additional 90 min of cleaning time over routine cleaning.

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 into which the individual who is relocating can move. 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 takes a substantial amount of staff time, as staff members explain to residents and families why it is best for someone, who may be relatively happy in her or his current location, to move. Often people do not 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. The time-management consequences, especially for nursing and social workers, can be substantial, though this remains undocumented. Finally, depending on where the individual(s) are relocated to (i.e., a different unit or household), staff may have to spend additional time getting to know the resident and his or her clinical needs and daily routines and helping the resident adjust to a new roommate. Thus, there are not only operational costs but also negative clinical correlates of this type of move.

We identified a few additional operational correlates 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 of it. There were also some cost factors related to lost income from rehabilitation residents who wanted to be discharged sooner because they were uncomfortable in shared bedrooms. Medicare Part A reimbursement rates are substantially higher, so an early discharge may mean both lost revenue and increased risk for people returning home before they are ready.

Results of the Bedroom Plan Analysis

In this project we conducted an analysis of 189 bedrooms to compare the construction costs of three bedroom configurations: traditional shared, enhanced shared, and private. Table 1 shows the average and range of the size of the three bedroom configurations.

To estimate the cost of construction, we made detailed measurements of wall length (differentiating exterior, interior room to room and interior to corridor, and plumbing wall), and we noted windows, presence of a closet, size of room, plus associated bathroom, shower and other fixtures, and more. We based cost estimates on exact dimensions of each element of the bedroom and adjoining bathroom, using standard commercial-grade-construction assumptions (e.g., slab on grade, 2×4 framing, vinyl exterior, 0.5-in. or 1.27-cm drywall, painted walls, vinyl flooring, wood truss roof system, 20-year shingle) for the Cleveland, Ohio area. The average per-person cost of a private room is more expensive at $14,906 per person than that of an enhanced shared room at $10,301 per person, which itself is more expensive than a traditional shared room at $8,252 per person. (Additional information about cost analyses including additional specifics of cost breakouts, analyses including associated hallway spaces, and low-end vs high-end construction assumptions are available at www.IDEASInstitute.org). When the cost of debt service is added (7% for 30 years), these costs per bed increase to $36,515, $25,121, and $20,506 for private, enhanced, and traditional rooms, respectively.

Although the costs themselves are clearly higher for a private room, the significance of this difference remains unclear. In a private pay market, there is typically a difference in the cost of a shared bedroom and that of a private room. A large national study found that difference to be $23 ($167 for shared, and $190 for private; see Genworth Financial, 2005). Because there is no revenue data on enhanced shared rooms, we combined the data from the two shared configurations, for an average cost of $22,814 per person for shared rooms. Thus the difference in construction costs between a private and a shared room, per person, is $13,702. If a facility charges $23 more for a private room, the difference in costs (including debt) to construct a private room as opposed to a shared room can be recouped in less than 2 years (596 days). This assumes the shared room has two occupants. If, in fact, a bed remains unoccupied (possibly because potential residents choose to go to a facility that offers private rooms), then the revenue difference is not $23 per day, but $167 (if we assume there is one empty bed). In that case, the time it would take to recoup the cost of constructing a private room drops to 82 days, or less than 3 months. Stated another way, for every 82 resident days below full census, the facility could have built a private room with the lost revenue. After the 82 days, the facility is actually making more money on the private room that it would make on the shared room.

Table 1. Room Size of Three Bedroom Configurations

Configuration	Room Size	
	ft^2/room	ft^2/person
Traditional shared	270 (182–380)	135 (91.0–190)
Enhanced shared	326 (155–562)	163 (77.5–281)
Private	214 (101–450)	214 (101.0–450)

Note: Room size range is shown in parentheses.

This analysis, of course, is based on the assumption of a cost differential of $23 between a private and a shared bedroom. If a facility is housing people who are on Medicaid, then 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 it now includes 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 7.5 years to recoup the construction cost differential. If we assume that there is a 30-year mortgage, it means the facility is ahead, financially, for 22 years of the mortgage. This analysis is summarized in Table 2.

Discussion

The vast majority of factors identified in this study 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. In clinical terms, the evidence is strong on iatrogenic outcomes, especially related to nosocomial infections. Evidence of impact of room configuration on falls and sleep hygiene is weaker. There are numerous operational factors that suggest that staff members spend more

Table 2. Breakdown of Construction Costs Plus Debt and Time to Recoup the Cost Differential

Room Type	Construction and Debt Cost ($)	Cost Differential ($)	Time to Recoup: Occupied @ $23	Unoccupied @ $167	Unoccupied @ $5	@ $1.25
Shared	22,814					
Private	36,515	13,702	596 days	82 days	7.5 years	30.0 years

Note: Construction and debt cost is shown per person.

time managing difficult situations when people have roommates than when they do not, and possibly more resources cleaning and maintaining shared rooms, though these findings are from the focus group and are not found in the research literature. Finally, the construction cost analysis suggests that although private rooms cost more to construct, the difference in costs may not be as significant as some people have argued. Even with a modest $5 a day differential room rate, the cost of construction and debt of a private room versus a shared room can be recouped in less than 8 years.

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 or household size and configuration (radial, open plan, hallway plan, or other variation) has a more significant impact on overall unit or household size than the number of private versus shared rooms. A study that expanded the plan analysis to include the whole unit configuration would shed light on this.

There is clearly a need for much more research in this area. Two or three potential topics for each domain of the framework are suggested here. In terms of psychosocial issues, researchers must analyze whether individuals who indicate they are satisfied with a shared room would be more satisfied with a private room if they had the opportunity to experience one. 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. Surprisingly, there was very little information specific to the needs or preferences of people with dementia. In terms of clinical outcomes, the relationship of bedroom configuration to incidence of increased disruptiveness, distress, agitation, or aggression, particularly in individuals with dementia, requires more study. This area, in particular, should focus on the three different bedroom configurations (i.e., it should differentiate between traditional and enhanced shared rooms). There is also a need for greater understanding of the impact of the presence of a roommate on falls, because of the serious morbidity issues associated with falls.

Operational correlates of private versus shared bedrooms are not well addressed in the extant literature, although the focus groups indicated a number of issues worthy of further exploration. 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. 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, albeit anecdotal, evidence that roommate conflict can occupy a substantial portion of staff time. Although having all private rooms might free up staff time, it will not necessarily reduce costs. The question is what staff members do with this time—whether this translates into better care. The focus groups suggested that maintenance and housekeeping costs are higher per person for shared rooms than for private rooms, but there is no concrete evidence to support this.

On the cost of construction side, an 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 is spent walking to destinations in units with different layouts.

Across all topics, attention should be given to differentiating between bedroom configurations. The vast majority of studies that we 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 her or his own territory but spaces are separated by a 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.

Currently, the Medicaid program serves as a disincentive to construct private rooms. Private rooms do cost more to construct, and there is, with few exceptions, no additional reimbursement to cover these additional costs. Given the need to control costs, it would not be inappropriate to suggest that additional reimbursement should equal (not exceed) the additional cost of construction plus debt service. An increase of $1.25 a day would cover the costs as assumed in this model in 30 years (the assumed length of the mortgage).

The evidence on preferences, satisfaction, and quality of life for residents living in private rooms in nursing homes is substantial. Virtually all other factors that impact life-cycle costs also trend toward better indicators for private rooms, although there is a need for better evidence to support this. Even the cost analysis suggests that, with a relatively minor increase in reimbursement, the differential construction and capital costs can be recovered. Unfortunately, some providers and designers, and well as the regulators and legislators who control Medicaid budgets, are not yet swayed by this evidence, and they are still building shared rooms. Over the next decade many nursing home buildings will be significantly renovated or replaced. There is a clear need for more evidence-based information, with widespread dissemination efforts, to support making more informed, evidence-based decisions.

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Appendix

Ref		Physical							Operational Issues									Psycho-Social								Clinical Outcomes							
	Setting	SQ Ft	Maintenance	Housekeeping	Energy	Room Functionality	Room/Hospital Design	Construction costs	Transfer issues	Time spent walking	Occupancy rates	Time to do admissions	Time w/ roommate conflict	Time w/ family concerns	Length of stay	Staff turnover	Resident turnover	Other 1	Costs (General)	Resident Satisfaction & QoL	Resident Preferences & control	Sfatt satisfaction	Family satisfaction	Assistance calls	Communication quality	Self-esteem	Roommate Relationships	Concept of home	Autonomy/Dignity	Privacy	Sleep quality	Falls	Hospitalization rate	Adverse drug reaction	Mental health	Disruptive/distressed behavior	Medical error rates	Nosocomial infection
Kane, R. (2001). Long-Term Care and a Good Quality of Life: Bringing them Closer Together. The Gerontologist, 41(3), 293-304.	NH																			×	×								×	×							
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Kayser-Jones, J. S., Wiener, C.L., Barbaccia, J.C. (1989). Factors Contributing to the Hospitalization of Nursing Home Residents. The Gerontologist, 29(4), 502-510.	NH								×										×																	
Kruse, R., Boles, K., Mehr, D., Spalding, D. & Lave, J. (2003). The Cost of Treating Pneumonia in the Nursing Home Setting. Journal of the American Medical Directors Association, 4, 81-89.	NH																	×																		
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Medina-Walpole, A. K., P. (1999). Nursing Home-Acquired Pneumonia. JAGS, 47, 1005-1015.	NH								×																											
Miller, S., Gozalo, P., Mor, V. (2001). Hospice Enrollment and Hospitalization of Dying Nursing Home Patients. The American Journal of Medicine, 111, 38-44.	NH																	×	×																	
Mirotznik, J. (2002). Does Cognitive Status Moderate the Health Effects of Single-Person Room Transfers on Nursing Home Residents? The Gerontologist, 42(5), 634-642.	NH								×																	×										
Mosher-Ashley, P., & Lemay, E. (2001). Improving residents' life satisfaction. Nursing Homes and Long-Trm Care Management Magazine, 50(5), 50-54.	NH																			×		×														
Mylotte, J., Goodnough, S., Gould, M. (2005). Pneumonia Versus Aspiration Pneumonitis in Nursing Home Residents: Prospective Application of a Clinical Algorithm. JAGS, 53, 755-761.	NH																																		×	
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Sharbaugh, R. (2003). When drugs don't kill "bugs". Nursing Homes and Long-Term Care Management Magazine, 52(5), 70-73.	NH																													×						×

Reference	Setting	Physical							Operational Issues										Psycho-Social									Cinical Outcomes								
		SQ Ft	Maintenance	Housekeeping	Energy	Room Functionality	Room/Hospital Design	Construction costs	Transfer issues	Time spent walking	Occupancy rates	Time to do admissions	Time w/ roommate conflict	Time w/ family concerns	Length of stay	Staff turnover	Resident turnover	Other 1	Costs (General)	Resident Satisfaction & QoL	Resident Preferences & control	Sfatt satisfaction	Family satisfaction	Assistance calls	Communication quality	Self-esteem	Roommate Relationships	Concept of home	Autonomy/Dignity	Privacy	Sleep quality	Falls	Hospitalization rate	Adverse drug reaction	Mental health	Disruptive/distressed behavior	Medical error rates	Nosocomial infection	Use of psychotropic medication
Barker, W., Zimmer, J., Hall, W., Ruff, B., Freundlich, C., Eggert, G. (1994). Rates, Patterns, Causes, and Costs of Hospitalization of Nursing Home Residents: A Population-Based Study. American Journal of Public Health, 84(10), 1615-1620.	NH																															x					
Bitzan, J. (1998). Emotional Borededness and Subjective Well-Being. Journal of Gerontological Nursing, 8-15.	NH																	x		x						x							x				
Boockvar, K., Gruber-Baldini, A., Burton, L., Zimmerman, S., May C. & Magaziner, J. (2005). Outcomes of Infection in Nursing Home Residents with and without Early Hospital Transfer. JAGS, 53, 590-596.	NH								x																						x						
Bowman, C., Elford, J., Dovey, J., Campbell, S., Barrowclough, H. (2001). Acute Hospital Admissions from Nursing Homes: Some May be Avoidable. Postgrad Medical Journal, 77, 40-42.	NH								x																							x					
Capezuti, E., Evans, L., Strumpf, N. & Maislin, G. (1996). Physical Restraint Use and Falls in Nursing Home Residents. JAGS, 44, 627-633.	NH																														x						
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Carboni, J. (1990). Homelessness Among the Institutionalized Elderly. Journal of Gerontological Nursing, 16(7), 32-37.	NH																			x								x									
Coleman, P. R. (2004). Pneumonia in the long-term care setting: Etiology, management and prevention. Journal of Gerontological Nursing.	NH																		x																		
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Drinka, P., Krause, P., Nest, L., Goodman, B., & Gravenstein, S. (2003). Risk of acquiring influenza A in a nursing home from a culture-positive roommate. Infection Control and Hospital Epidemiology, 24, 872-874.	NH																																				
Fisher, C. (1995). Redesign emphasizes homelike environment: A new look for nursing homes. Provider, 30(11), 36-44.	NH						x																														
Foltz-Gray, D. (1995, June 1995). Intimate Strangers. Contemporary Long Term Care, 34-37.	NH																				x						x		x								
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Ref	Setting	Physical						Operational Issues								Psycho-Social						Clinical Outcomes						
		SQ Ft	Maintenance	Housekeeping	Energy	Room Functionality	Room/Hospital Design	Construction costs	Transfer issues	Time spent walking	Occupancy rates	Time to do admissions	Time w/ roommate conflict	Time w/ family concerns	Length of stay	Staff turnover	Resident turnover	Other 1	Costs (General)	Resident Satisfaction & QoL	Resident Preferences & control	Sfatt satisfaction	Family satisfaction	Assistance calls	Communication quality	Self-esteem	Roommate Relationships	Concept of home	Autonomy/Dignity	Privacy	Sleep quality	Falls	Hospitalization rate	Adverse drug reaction	Mental health	Disruptive/distressed behavior	Medical error rates	Nosocomial infection
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Kane, R., Baker, M., Salmon, J., Veazie, W. (1998). Consumer Perspectives on Private Versus Shared Accommodations in Assisted Living Settings. Washington, DC: The Public Policy Institute.	AL																				×	×				×		×								
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Berry, L. (2004). Evidence Based Hospital Design Improves Healthcare Outcomes for Patients, Families, and Staff. Retrieved May 24, 2005, from http://www.rwjf.org/newsroom/newsreleasesdetail.jsp?id=10298	Hospital						×												×			×	×							×						
Blomkvist, V., Eriksen, C., Theorell, T., Ulrich, R., & Rasmanis, G. (2005). Acoustics and psychosocial environment in intensive coronary care. Occupational and Environmental Medicine, 62(3), e1-8.	Hospital																		×			×														
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Boyce, J., Potter-Bynoe, G., Chenevert, C., King, T. (1997). Environmental Contamination due to Methicillin-Resistant Staphylococcus Aureus: Possible Infection Control Implications. Infection Control and Hospital Epidemiology, 18(9), 622-627.	Hospital																																			×	
Chang, V., & Nelson, K. (2000). The role of physical proximity in nosocomial diarrhea. Paper presented at the Clinical Infectious diseases.	Hospital																																				×
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Ref		Setting	Physical						Operational Issues									Psycho-Social					Clinical Outcomes					
			SQ Ft	Maintenance	Housekeeping	Energy	Room Functionality	Room/Hospital Design	Construction costs	Transfer issues	Time spent walking	Occupancy rates	Time to do admissions	Time w/ roommate conflict	Time w/ family concerns	Length of stay	Staff turnover	Resident turnover	Other 1	Costs (General)	Resident Satisfaction & QoL	Resident Preferences & control	Sfatt satisfaction	Family satisfaction	Assistance calls	Communication quality	Self-esteem	Roommate Relationships	Concept of home	Autonomy/Dignity	Privacy	Sleep quality	Falls	Hospitalization rate	Adverse drug reaction	Mental health	Disruptive/distressed behavior	Medical error rates	Nosocomial infection
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Thapa, P., Gideon, O., Cost, T., Milam, A. & Ray W. (1998). Antidepressants and the Risk of Falls Among Nursing Home Residents. The New England Journal of Medicine, 339(13), 875-882.		NH																														x					
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Ref	Setting		Physical						Operational Issues										Psycho-Social						Clinical Outcomes				
			SQ Ft	Maintenance	Housekeeping	Energy	Room Functionality	Room/Hospital Design	Construction costs	Transfer issues	Time spent walking	Occupancy rates	Time to do admissions	Time w/ roommate conflict	Time w/ family concerns	Length of stay	Staff turnover	Resident turnover	Other 1	Costs (General)	Resident Satisfaction & QoL	Resident Preferences & control	Sfatt satisfaction	Family satisfaction	Assistance calls	Communication quality	Self-esteem	Roommate Relationships	Concept of home	Autonomy/Dignity	Privacy	Sleep quality	Falls	Hospitalization rate	Adverse drug reaction	Mental health	Disruptive/distressed behavior	Medical error rates	Nosocomial infection
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	NSS	NSS	Setting	
			SQ Ft	
			Maintenance	
			Housekeeping	Physical
			Energy	
		x	Room Functionality	
		x	Room/Hospital Design	
			Construction costs	
			Transfer issues	
			Time spent walking	
			Occupancy rates	Operational Issues
			Time to do admissions	
			Time w/ roommate conflict	
			Time w/ family concerns	
			Length of stay	
			Staff turnover	
			Resident turnover	
			Other 1	
	x		Costs (General)	
			Resident Satisfaction & QoL	
			Resident Preferences & control	
			Sfatt satisfaction	Psycho-Social
			Family satisfaction	
			Assistance calls	
			Communication quality	
			Self-esteem	
			Roommate Relationships	
			Concept of home	
		x	Autonomy/Dignity	
			Privacy	
			Sleep quality	Cinical Outcomes
	x		Falls	
			Hospitalization rate	
			Adverse drug reaction	
			Mental health	
			Disruptive/distressed behavior	
			Medical error rates	
			Nosocomial infection	