MODIFICATIONS TO THE HOSPITAL PHYSICAL ENVIRONMENT: EFFECT ON OLDER ADULTS' RETENTION OF POST-DISCHARGE INSTRUCTIONS

by

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ABSTRACT

This study was conducted in two (originally identical) hospital bedrooms in a community hospital in Burnaby, British Columbia. For the study, one patient room was left in its original state; the second was modified to reduce visual and auditory distraction. In each room, older adults watched a video recording of different post-discharge instructions. After each viewing, and after approximately 24 hours, their learning/retention was tested. While in each room, video equipment and other non-invasive technology recorded physical movements/fidgeting. A significant interaction was found between room type, instruction type and order. Subsequent analyses found that the oldest participants had the most difficulty when faced with learning the more difficult instructions in the “typical” room. Movement/fidget data suggest that participants were less stressed while receiving instruction in the modified room rather than “typical” room. Participants overwhelmingly preferred the modified room and expressed comfort with the use of video to receive post-discharge instruction.
This work is dedicated to my loving husband Michael, and my family. I don’t know that this evolution would have occurred without their loving support, unwavering faith and unique brand of “kick-in-the-butt” encouragement.

The adventure began nearly seven years ago, when I first told my husband “My life just has to change, I just can’t keep doing what I’m doing.” Taking his first leap of faith, he simply replied, “Decide what you want to do and we’ll figure out how to make it happen.” His faith continued as I quit work, six months after buying our first house, and held strong even though I could never answer the question “So what will you do with what you’ve learned, what will you be?”, that was frequently asked by family and friends. All I could say was “It’ll be there, I don’t know what exactly, but it will be there when I’m ready.” It hasn’t been easy, and he’s borne a great deal of added stress and responsibility to help me reach my goal. His faith and love have inspired me to be the best I can be and to have faith in myself; I can only hope to do the same for him.
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INTRODUCTION

We shape our dwellings, and afterwards our dwellings shape us.

Winston Churchill

Patients being discharged from hospital are normally in need of some amount of instruction for post-hospitalization self-care. The learning/retention of post-discharge instructions is a problem for people of all ages (Makaryus & Friedman, 2005; Paulino, Bouvy, Gastelurrutia, Guerreiro & Buurma, 2004). A variety of causes have been identified including: instructions written at a literacy level beyond the competency of the individual (Jolly, Scott, Feied & Sanford, 1993; Safeer, & Keenan, 2005), insufficient time spent by health care providers to communicate effectively with patients, or even the complete failure to communicate the discharge plan (Alibhai, Han & Naglie, 1999). Noise and room reverberation can also be a factor, as this has been shown to interfere with speech discrimination (Harris & Swenson, 1990).

While also affected by these challenges, the learning/retention of post-discharge instructions can be even more problematic for older adult patients. Sensory changes commonly occurring with older age have been cited as contributing to difficulty with learning/retention (Jolly et al., 1993). These include vision changes that can make smaller font sizes difficult to read or hearing deficits that can disrupt communication (Safeer & Keenan, 2005). For example, speech discrimination problems caused by noise and room reverberation that worsen with normal aging are intensified when the older adult is hearing impaired (Harris & Reitz, 1985). As well, the older adult hospital
population has been shown to suffer from a higher prevalence of delirium than younger adults (Litton, 2003). These changes become amplified by the more rapid rate of functional decline experienced by elderly compared with younger patients hospitalized for the same length of time (Creditor 1993; Zorowitz, 2002).

It is widely recognized that with increasing age memory skills deteriorate; in particular there are declines in episodic memory and in the ability to encode and retrieve input (Craik & Bosman 1992; Tulving, 1983). There are many theories as to why these changes occur such as a decrease in neural processing speed (Salthouse, 1996) or a decreased ability to ignore irrelevant environmental stimuli (Hasher, Stoltzfus, Zacks & Rypma, 1991; McDowd, 1996). Support for these theories comes from research showing differences between younger and older adults in the parts of the brain where neural activity takes place during encoding and retrieval (Cabeza, et al., 1997; Grady, Springer, Hongwanishkul, McIntosh & Winocur, 2006). Botwinick (1973) however, in a summary of memory research, cautioned that insufficient learning in the first place may, in fact, be a confound in what is often considered problematic retention.

Research focused on post-discharge instructions for older adults has led to several recommendations to improve learning/retention. These include ensuring that the language of instruction is at a grade level appropriate for the receiver (Jolly, Scott & Sanford, 1995; Safeer & Keenan, 2005); incorporating illustrations (Austin, Matlack, Dunn, Kesler and Brown, 1995) or cartoons (Delp & Jones, 1996); or using elder-specific cognitive schemas (Morrow, Leirer, Altieri and Tanke, 1991). The use of computer technology seems to be concerned mainly with storage and quick retrieval of information

Other recommendations have included finding ways to increase learning/retention by compensating for changes in older adult memory function or sensory perception (Jubeck, 1994) or increasing the participation of caregivers (Coleman et al., 2004).

Research that measures the impact of manipulating components of the physical environment to improve learning/retention could not be found in the current literature. Hospital design research has, however, looked at environmental noise and its impact on various facets of health and healthcare including staff productivity (Grumet, 1994), patient coping (Topf, 1985), anxiety (Gast & Baker, 1989), heart rate and blood pressure (Baker, Garvin, Kennedy & Polivka, 1993), sleep quality (Walder, Francioli, Meyer Lancon & Romand, 2000), discomfort (Baker, 1993; Minckley, 1968) and quality of care (Hagerman, et al., 2005). Several ways of reducing hospital noise have been tried such as changes in staff procedures, staff education, and keeping bedroom doors closed (Moore et al., 1998; Walder et al., 2000), installing carpet and acoustic ceiling tiles, turning down equipment volumes, and restricting visiting hours (McIntosh et al., 1994) and changing from overhead broadcast systems to pagers (Berens & Weigle, 1996). Researchers have also looked for ways to reduce noise transmission through modifications such as sound absorbing ceiling or wall tiles (Hagerman, et al., 2005) or improved bed curtains (“Sound of Silence,” 1999).

Person-environment interaction in hospitals, as it pertains to older adults and/or instruction retention, is an under-researched area. Current physical environment research involving older adults has mainly focused on long-term care. Research in that venue has
been concerned primarily with the role of the physical environment in provoking or reducing the “problem behaviours” associated with dementia (e.g. agitation, aggression, unauthorized exiting) or providing support for independence and activity, aging in place as well as resident satisfaction (Brawley, 2006; Day, Carreon & Stump, 2000; Ulrich, 1991).

As part of a larger project, this study looked at the influence of the physical environment, on older adults’ learning/retention of post-discharge instructions. The overall goal of the larger research program, conducted by Dr. Gloria Gutman, Gerontology Research Centre Simon Fraser University for the Elder Friendly Health Environmental Committee of the Fraser Health Acute Geriatric Clinical Services Planning and Delivery Team, was to improve the elder friendliness of the physical environment of acute care hospitals in Fraser Health (FH). In Study 1 of the project (Gutman, Love, Parke & Friesen, 2006), descriptive data concerning the physical environment were collected from nine of the sixteen existing Acute Care for Elders (ACE) units in the United States. ACE units, a care model developed by SUMMA Health in Akron, Ohio (Counsell, et al. 2000), have five defining characteristics one of which is a “prepared environment.” The stated goal of the prepared environment of ACE units is to encourage independence and self-care to the extent that older adult patients are able. The SUMMA Health ACE unit, the only one to have been the subject of randomized controlled trials was used as the “Gold Standard” for environmental design in this study. Study 2 (Gutman, Sarte, Parke & Friesen, 2005) involved site visits and focus groups conducted at six FH hospitals. A major purpose of the study was to determine the characteristics of a “typical” FH patient room in medical and surgical units. The purpose
of Study 3 was to assess whether modifications to the physical environment of the patient room can improve older adult patients' a) learning/retention of post-discharge instructions, b) ability to safely self-transfer in and out of bed and chair and c) ability to safely self-toilet. The focus of this thesis is Study 3a.

It is indisputable that our population is aging. The number and percentage of persons aged 65 and over is increasing dramatically, with the greatest growth being in the 85 and over group (Kresevic et al., 1998). In Canada, Palmer (1998, cited in Fisher, 2002) reports that adults aged 65 and older have the highest rate of hospitalization, the longest length of stay and are at the greatest risk for functional decline while in the hospital. In British Columbia, older adults make up approximately one-third of hospital cases and account for 55% of inpatient hospital days (Wister, Gutman, Adams & Chou, 2006). In the United States, it is reported that 60% of acute care beds are filled by older adults (Kresevic et al., 1998).

Given the increasing average age of the acute hospital population it is important to examine hospitals to determine what elements can improve or impede learning/retention of post-discharge instructions. To date the focus has been on interpersonal interactions in the provision of instructions (e.g. amount of time spent, language used). This study focused on person-environment interactions in the hospital setting.
LITERATURE REVIEW

Insufficient Learning/Retention of Post-Discharge Instructions

Extent and Impact of the Problem

Makaryus and Friedman (2005) found that less than half of patients were able to state their diagnosis (41.9%), name their medications (27.9%), what the medication was supposed to do for them (37.2%) or list their major side effects (14.0%). This, despite allowing the participants to consult any personal notes they had taken during their hospital stay. Although this was a small-scale study (43 participants), the result further corroborated previous research. Similarly, Alibhai et al. (1999) report that only 36% of their participants could state the purpose of their medications and only 23% could report a potential side effect, indicating a serious lack of knowledge regarding medications in older adult patients. Paulino et al. (2004) found that 63.7% of patients developed drug related problems (DRP) as a result of incorrect self-administration of medications after leaving the hospital. Drug related problems included a lack of knowledge regarding the function or side effects of prescription drugs (52.8%) and incorrect dosage (11.3%).

Barriers for the General Population

Many studies have looked at post-discharge instructions. In reports of these studies, three causes of poor learning/retention are commonly identified: instructions written at a literacy level beyond the competency of the individual (Jolly et al., 1995),
limited time spent by health care professionals in giving post discharge instruction
(Alibhai et al. 1999) and noise (Harris & Swenson, 1990).

While 20% of the population of the United States reads at a fifth grade level or
lower (Kirsch, Jungeblut, Jenkins & Kolstad, 2002), Safeer and Keenan (2005) reported
that most health care materials require a tenth grade reading level, the result of the
mismatch being poor compliance, uncontrolled chronic disease and increased healthcare
costs. Jolly et al. (1995) found significantly improved comprehension by simplifying the
language of written instructions given to emergency department patients.

In their research, Alibhai et al. (1999) found that older adult patients (aged 65-97)
reported having spent an average of 10.5 minutes (range 0-60) with their physician and
5.3 minutes (range 0-40) with the pharmacist before being discharged from hospital. In
the same study 51% reported having spent no time with either a physician or pharmacist
and only 30% claimed to have received written instructions to take home. For
physicians, the most common reason given for the lack of patient education was a lack of
time (18%), for pharmacists the most common reason was that they had not been
informed that the patient was ready to be discharged (41%), followed by lack of time
(39%).

The way in which sound reverberates in a room, in combination with noise, can
also affect learning (Harris & Swenson, 1990). Utilizing specially designed acoustical
rooms, Harris and Swenson (1990) assessed speech comprehension at differing levels of
noise and reverberation. Participants, aged 20 to 50 years, and included persons with no
hearing impairment as well as those with mild and moderate/severe hearing impairments.
They found that at all levels of hearing ability, participants were negatively impacted by
increases in noise or reverberation and that the greater the hearing impairment, the greater the susceptibility to error. In addition, they found a compounding effect when both noise and reverberation were increased. Noise, as it contributes to sensory overload, has also been cited as contributing to improper information processing (Baker, 1984).

Additional Barriers for Older Adults

Literacy

Information from the International Adult Literacy and Skills Survey (Human Resources and Skills Development Canada, 2003), shows that the average prose literacy score for adults over the age of 65 falls at the upper level of the lowest skill level (Level 1). The average score for each age group under age 65 is in Level 3.

Changes in Sensation and Perception

With increasing age, eyes become less able to perceive fine detail, making it difficult to read “normal” print (Gittings & Fozard, 1986; Kalymun, 1989). Colour perception is also affected; yellowing of the lenses makes it more difficult to distinguish between violets, blues and greens. This signals the need for increased colour contrast where colours meet. With increasing age, light does not penetrate the eye as well, thus older adults need more light than younger persons do in order to see and they have more difficulty in dark areas. Further, more adjustment time is needed when moving from light to dark areas (and vice versa) and older people have greater difficulty dealing with glare or the subtle flicker of light that comes from fluorescent lighting (Kalymun, 1989). It is not known how many older adults admitted to acute care have impaired vision; however, of 200 patients in an acute geriatric unit in Liverpool, tested after their acute illness had
settled, 50.5% had impaired vision, even while wearing their current glasses (Jack, Smith, Neoh, Lye & McGalliard 1995). This same study also noted that the prevalence of low vision was highest in patients admitted as the result of a fall (76%).

Less than 12% of adults past age 65 will have normal hearing and up to half will be impaired to the extent that communication is affected ("Strengthen Your Family," cited in Kalymun, 1989). In most cases, higher frequency sounds are particularly difficult to hear and background noise more readily interferes. Elevated blood pressure, shortened attention span, headaches and memory loss have all been attributed to hearing loss (Kalymun, 1989).

Untreated hearing loss as well as the use of hearing aids needs to be considered in environmental design. Acoustic planning to control noise by the use of softer, sound absorbing rather than reflecting surfaces is a recommendation found in the long-term care design literature (Brawley, 2006). This advice has been substantiated by audiological research into the effects of noise and room reverberation on speech discrimination. Harris and Reitz (1985) compared young (mean age = 24.2 yrs.) and elderly adults (mean age = 64.3 yrs) with normal hearing (for their age groups) and elderly adults (mean age = 66 yrs) with impaired hearing. They found that the effect of noise or reverberation alone (i.e. in a “silent room”) on speech discrimination was similar for young and old with normal hearing. However, when noise and reverberation were combined, as they would be in a natural setting, the older participants were significantly more affected than the younger. The hearing-impaired older adults had even more difficulty than the “normal” hearing elderly.
Increased Rates of Delirium

Prevention and the early detection and treatment of delirium are extremely important (Duppils & Wikblad, 2003; Litton, 2003). In the ACE unit literature, Flaherty et al. (2003) describe the positive impact on older patients of the availability of a delirium room (DR). They specifically note how the environment of the DR encourages mobility and discourages bedrest. Their data show that patients cared for in the DR had lengths of stay equal to what would be expected according to their diagnosis, not longer, as is often the case when delirium is part of the diagnosis.

While no research was found looking specifically at the connection between delirium and the poor learning/retention of post-discharge instructions, when one considers that patients of all ages are being released from hospitals “sicker and quicker”, it is possible that some patients, especially older adults, were still in a delirious state when given their post-discharge instruction. This would have interfered with their ability to encode and/or retrieve post-discharge instructions.

Changes in Learning and Memory Function

Age-related declines in memory efficacy are undeniable. However, the degree of change is dependent on what memory function is being considered and will vary between individuals (Rogers, 2000). For example, the declines in procedural (cognitive or motor skills) or semantic memory (facts, amassed knowledge), where usage is frequent, are generally minimal. Retrieval from episodic memory (autobiographical events) suffers more, but can be bolstered by using external cues (e.g. notebooks, calendars). The greatest losses are usually seen in working memory (holding and using information at the
same time), episodic memory, where cues are not present and semantic memory, where usage is infrequent (Craik & Bosman, 1992).

According to Processing-Speed theory (Salthouse, 1996), age-related change in encoding is the result of a decrease in the speed at which the brain carries out cognitive functions. This theory has two main parts, “limited time” and “simultaneity”. The limited time assumption posits that cognitive operations fail to execute properly because previous operations in the sequence have taken too long. Simultaneity relates to the need for higher level processing to access (for the purpose of synchronization) multiple pieces of information at the same time. Because of reduced processing speeds, synchronicity is more difficult to attain.

Hasher et al. (1991) used negative priming as a way of demonstrating older adults’ reduced ability to inhibit. They presented both younger and older adults lists of paired letters. For half the trials, the distracter from the previous pair became the target on the next, for the second half of trials the target letter was paired with a new letter. Older adults were found to be less able to inhibit the intrusion of the distracter. McDowd (1996) noted that the orienting response, which would normally habituate when the novelty of a distraction wears off, remains strong in older adults. Further, she reported that older adults have more difficulty with the Stroop test, which requires inhibiting the written name of a colour while naming the colour of the ink used. Similarly, Winocur and Moscovitch (1983) used paired-associate words to demonstrate the decreased ability to ignore interference caused by previously learned pairs. They found that older people who were living independently, while having more trouble than younger adults, performed better in learning trials than did institutionalized older people.
Differences between younger and older adults in brain activity during encoding or recognition tasks have been detected. Positron emission tomography (PET) has shown differences in the pattern of cerebral blood flow in the brains of younger and older adults during encoding, recognition and recall of word-pairs (Cabeza et al., 1997). Similarly, using functional magnetic resonance imaging (fMRI), Grady et al. (2006) found evidence of a linear increase, beginning after midlife, of activity in brain regions that generally become less active when performing encoding or recognition memory tasks and a decrease in areas that would normally become more active during the same tasks.

Facilitating Learning and Retention

Simplified Language

Based on literacy statistics and considering the cognitive and sensory deficits commonly occurring in older adults, Safeer (2005) recommend 6th grade or less as an appropriate literacy level for patient information.

In their study of 423 adult emergency department patients Jolly et al. (1995) found that simplifying the language of post discharge instructions led to a statistically significant improvement in learning/retention. Participants were each given a simplified version of post-discharge instructions to read and after ten minutes they were asked questions related to the instructions. Not only did they achieve a significant improvement in learning/retention scores overall, but the negative association between age (divided into three age categories: 18-39, 40-59, 60+) and score that had been apparent in previous research (Jolly et. al. 1993) was no longer present.
Illustrations / Cartoons

The addition of illustrations or cartoons to discharge instructions has been suggested amongst methods of addressing illiteracy and low education, and enhancing learning/retention. By doing so, Austin et al. (1995) were successful at improving the comprehension/retention of instructions among emergency department patients with lacerations. The effect was greater among non-whites, females and persons with no more than a high school education. A similar study with a larger sample of emergency department patients also found that compliance increased with the inclusion of cartoons with instructions (Delp & Jones, 1996). Based on these findings, including illustrations with post-discharge instructions could represent a significant opportunity to increase health outcomes when one considers that in Canada 57.3% of elderly patients have not completed high school (Statistics Canada, 2003) or that, after the age of 65, the probability of cognitive impairment (making learning more difficult) increases dramatically with age. For example, the Canadian Study of Health and Aging Working Group (1994) report a prevalence rate for dementia of 2% among Canadians aged 65-74. The rate increases to 34.5% among those aged 85 and over.

Use of Schemas

Morrow et al. (1991) were able to successfully improve memory for medication instructions by grouping and ordering instructions based on a pre-determined elder specific schema. In the first phase of their research they had older adults (mean age=71.4 yrs.) categorize and sort medication information to look for a common method. From this a general schema was developed. In the second phase of research, older adults were presented with medication information. It was found that where the information was
presented in a manner that matched the model, memory for the instructions was improved.

**Learning to Criteria**

Botwinick (1973) raised the issue of the role of learning in retention research. He posed the question of whether the lack of “retention” was actually due to a lack of learning. He cited multiple studies showing similar retention levels, over time, between younger and older adults when initial learning was based on criterion achievement. In the context of hospital post-discharge instruction, patients are not generally afforded the opportunity of repetition of instruction to ensure full comprehension and maximal learning has occurred.

**Use of Technology**

As technology becomes more pervasive in our everyday lives, ways that it can be used to improve the transfer of information to patients is increasingly being considered. Much of technology has focused on improving the efficiency of administrative functions (Dutton & Wood, 1991) or encouraging physicians to use multimedia and internet sources to present information to patients (Sullivan & Wyatt, 2005; The Wave of the Future, 1996). However, recent innovation has also turned an eye towards the patient, particularly in developing interactive patient education programs. Stephenson, (1996) describes a program to help patients make informed decisions; Neafsey, Strickler, Shellman and Chartier (2002) used notebook computers with touchscreens to teach about medication (OTC and prescription) and alcohol interactions. But of special note, because of its similarity to the method employed in this study, is an interactive program (on CD-
ROM) designed to communicate post-discharge instructions to older adults with CHF that includes animation, photos and voice-overs. The program was tested by 42 older adults aged 51-92; despite having limited experience with computers (only six had used one previously) all participants were able to use the program. The older adults reported that they particularly liked that the information was interactive, could be repeated and included a self-test. The only critique from some participants was the desire for even more information (Strömberg, Ahlén, Fridlund & Dahlström, 2002).

Compensation for Age-Related Sensory and Information-Processing Changes

To compensate for changes in vision that normally occur with aging, post-discharge instructions should be written in a large print being mindful of the colour contrast between ink and paper. Teaching in an environment that is well-lit and free of distraction has been recommended. It has been suggested that this can be achieved, at least in part, by using incandescent high intensity lights, curtains, blinds or shades to reduce glare and eliminating or reducing background noise (Jubeck, 1994).

Distracting stimuli can be managed by various means; specifically noise and room reverberation can be controlled using acoustic ceiling tiles, softer floor (and other) surfaces and heavier curtain material. Visual distraction can be decreased by installing sufficient lighting, having non-glare surfaces and using heavier fabric for curtains to reduce movement and shadow. Ahuja, ("Sound of Silence," 1999) at the Georgia Tech Research Institute, has developed bed curtains, called “Quiet Curtains”, that are capable of inhibiting the transmission of sound by 7 to 12 decibels. These, he reports, dramatically increase the intelligibility of speech. (The effect of a decibel decrease of this...
magnitude is likened to the drop in sound generated by 16 people speaking to the sound of only one person).

Although it does not appear that research has been conducted into the role environmental distraction may play in the learning/retention of post-discharge instructions, it is a logical assumption that it is a factor. Dating back to the 1950s research has shown that older adults have more difficulty than younger adults in ignoring irrelevant aspects of the environment (Birren, 1959). The reduction of auditory and visual distraction should therefore be considered as a possible means of facilitating inhibition and attention, thus improving learning and memory performance.

**Family Caregiver Participation**

The role a family caregiver plays in an elderly person's health is multi-faceted and should not be under-estimated. They serve as an extra set of eyes, pair of hands and ears and they can be, in effect, a living assistive device for persons experiencing memory problems. Encouraging family caregivers to be more actively involved with care transitions has been associated with reduced rates of hospital re-admission and increased patient confidence in their ability to self-manage care (Coleman et al., 2004). Although they play an important role, family caregivers are not included in this study. The goal was to improve the learning/retention of instructions, thus fostering independence, since not all patients will have someone with them as they are being given instruction or to help them when they return home.
Person/Environment Interaction

Hospital Environment

Hospital patients have needs that go beyond the treatment protocols prescribed for their acute illness. It is important to consider the full spectrum of psychosocial and physical/functional needs of patients. The elderly, while sharing some common needs with other age groups, have additional concerns that differ from those of younger patients. Elderly patients are more likely to have an aggregation of health problems; sensory or cognitive decline is often combined with any number of chronic illnesses. This would mean, for example, that an elderly patient admitted to hospital due to a hip fracture is more likely than their younger counterpart to also be affected by cataracts, diminished hearing and/or diabetes. Further, common auditory or visual deficits may lead to misinterpretation of important verbal or written instruction/signage, or could contribute to disorientation. If these concerns are not addressed, if the patient as a “whole” is not cared for, health and wellness is jeopardized. Perhaps this helps to explain why the elderly are at greater risk than younger patients, of falls and other injury while in the hospital (Golightly, Bossenmaier, McChesney, Williams, & Wyble, 1984).

When samples of middle-aged hospitalized and non-hospitalized adults were asked to rank events related to hospitalization, the potential for loss of function was rated as the most stressful (Volicer 1974). While such losses may be uncommon for younger patients, for the elderly, they are not. Studies have repeatedly shown that hospitalized older adults quickly lose functional skills such as the ability to bathe, self-toilet and transfer, eat, dress or groom and, they experience decreased mobility and cognitive performance (Critical Path Network, 2002; Hirsch, Somers, Olsen, Mullen & Winograd,
Seventy-four older adults (mean age 84 yrs.) admitted to Stanford University hospital were given functional assessments two weeks prior to admission, on their second day after admission, the day before discharge and one week post-discharge. Statistically significant declines occurred in the overall function score and for mobility, transfer, toileting, feeding and grooming scores by the second day. Further, functional status had not returned by the time of discharge, nor even at the one-week follow-up assessment placing an added strain on caregivers (Hirsch et al., 1990).

Creditor (1993) summarized research highlighting mechanisms through which loss of function may occur. Specifically, bedrest leads the elderly patient to suffer a greater loss of vascular tone as well as decreased bone and muscle mass than younger patients, setting the stage for greater injury from falls and the inability to ambulate (and as such a reduced ability to self-toilet, bathe etc.). Change in routine, unfamiliar surroundings and barriers such as high beds can lead to falls, incontinence, confusion or delirium (because of lowered respiration, sensory deprivation or overload), pressure sores, dehydration or malnutrition. These functional losses can be further exacerbated by medications, changes in diet, procedures/interventions and the expectations of others who anticipate that the elder will lose functional abilities (Palmer, Landefeld, Kresveic & Kowal, 1994). Sensory deprivation and disorientation caused by the physical environment of an intensive care unit, specifically the lack of a window to the outside, has also been correlated with a higher rate of delirium in postoperative surgical patients (Wilson, 1972). In addition to sensory deprivation and disorientation, Keep (1977) in a
summary article, also noted how research has found that windowless rooms hinder vitamin D synthesis, biorhythms and reduce resistance to disease.

Yet the physical environment of hospitals can also be supportive of patients’ psychosocial or functional needs. Oberlander (1979) describes the use of colour, light and pictures in hospital settings as “visual therapy”, meant to compliment medical treatment. She describes in detail several hospital areas (e.g. radiation therapy, admissions, delivery rooms, rehabilitation/exercise rooms, corridors) that have been transformed from sterile and frightening to warm and welcoming through the use of backlit wall and ceiling murals, natural lighting, photographs of nature scenes, “home-like” furniture and drapes to hide equipment. In a study in which 91 medical and surgical patients were interviewed, 83% responded that the environment (design and appearance of the unit) was “very” or “definitely” important to them while only 4.4% responded that it was not important (Olsen, 1978). In this study cleanliness was interpreted by patients as “concern for patient”, being bright and cheerful made patients feel “less sick” and helped to motivate recovery and a “home-like” ambiance was reported by patients as helping to reduce stress and anxiety by offering familiarity in an “alien” environment.

Based on the logic that patients spend many non-purpose related hours exposed to the hospital environment Lawson and Wells-Thorpe (2002) theorized that the physical environment itself might contribute to sense of well-being and recovery. They compared the physical outcomes and opinions of patients in two hospitals that underwent major renovations. They found that non-surgical patients had shorter length of stay in the new units and required lesser amounts of analgesic medications (compared with the same illnesses in the old units). In the one hospital, which dealt solely with mental health
patients, staff reported fewer behavioural problems (thus requiring less intense supervision) and there was a reduction in the incidence of patients injuring themselves. As well, there was a significant difference in preference for both new buildings where patients reported that the environment made them feel better. The design specifics to which they attribute the positive outcomes are privacy, view, environmental comfort and control of the environment (e.g. lights). Satisfaction with appearance was found to be highly personal in so far as aesthetics but was important to all where it alluded to a broader message such as cleanliness or organization. While this study did not target older patients specifically, the findings are important.

A focus on maintaining or improving function can also be effective. Landefeld et al. (1995) examined the impact of a care unit that had been prepared with seniors in mind. In this study, 33% of patients had improved function and 50% were unchanged at discharge, a statistically significant difference from patients in regular care. The treatment group also had significantly fewer patients discharged to long-term care. A similarly positive result was reported by Meissner et al. (1989). They found a statistically significant improvement on nine of ten measured ADLs for patients admitted to the Geriatric Care Unit (GCU) at Durham County hospital in North Carolina. Readmission rates, over the following year, were also lower for patients discharged from the GCU.

Loss of function is costly (Reuben et al. 2004), however, programs designed to maintain or improve the functional status of older adults while hospitalized can help to prevent these costs (Murray, Wells & Callen, 2003). Murray et al. (2003) found a weak correlation between the ADL and IADL components of the Hospital Admission Risk
Profile (HARP) assessment tool and costs associated with functional decline during a hospital stay.

**Hospital Literature**

**Stress**

The negative outcomes associated with stress are numerous and range from physical to psychosocial (Ulrich, Zimring, Quan & Joseph, 2006). One researcher who has done extensive work in the area of hospital stress is Volicer (1973, 1977), who created a survey tool to measure hospital-related stress, the Hospital Stress Rating Scale (HSRS). Using the HSRS, positive correlations between hospital stress and heart rate and blood pressure as well as a negative correlation between stress and volume of blood pumped by the heart with each contraction have been reported in hospital patients (Volicer & Volicer, 1978). Volicer (1978) also used the HSRS in a study of patient reported pain and physical function. She found a significant correlation between increased hospital stress and higher reported pain levels and lower levels of physical functional for both medical and surgical patients.

Hospitalization is stressful, this is indisputable. The primary source of stress varies however, by type of patient (i.e. medical versus surgical). Volicer, Isenberg and Burns (1977) found that while medical patients’ major stressors were financial concerns and the lack of information, surgical patients reported greatest stress due to the unfamiliar surroundings, loss of independence and the fear of severe illness.
Noise

Sound comes from one of two sources, it can be either air-borne (travelling through the air, such as a voice) or structure-borne (caused by vibration through a structure, such as footsteps on a hard floor) and depending on the source of noise, the method of control will vary. It is also important to keep in mind that one type can become the other, as when the structure-borne sound of footsteps bounces off a wall surface or when a voice penetrates a wall. In general, air-borne noise is moderated by creating “soft” surfaces that will absorb instead of reflect sound and by increasing the density of materials used (e.g. thicker drywall, insulation), which inhibits air-flow, the method of sound transmission. Structure-borne noise is reduced by creating a “break” in the vibration flow. For example, a resilient layer (e.g. rubber, vinyl) can be installed under a hard floor (Sound Control, 1995). Sound becomes noise when it is unwanted or perceived as annoying; this of course will vary with personal preference and tolerances; reaction to sound will vary in type and intensity. Noise was reported as the greatest irritant for surgical inpatients (Moore et al. 1998) more specifically Haslam (1970) found that the most annoying noises reported by patients were (in descending order): the conversations of others; patient (e.g. moans, distress); equipment; and radio/television sets.

Environmental noise in patient rooms is a major source of stress for patients, with decibel readings often going above World Health Organization and U.S. Environmental Protection Agency guidelines of 35 decibels (dB) for proper sleep and 40 dB during the day (Haslam, 1970; Hilton, 1985). Problems with noise have been attributed to sources that are “unnecessarily numerous and loud” and a physical environment that is not
designed to control acoustics (e.g. presence of hard sound-reflective surfaces) (Ulrich et al., 2006). There are many sources of noise in a hospital, including equipment (e.g. monitors, alarms, call bells, loudspeakers, carts, heating/air conditioning units), staff, visitors and other patients (e.g. moans, talking, watching TV, listening to the radio). Hospital design research has studied hospital noise and its impact on patient health and healthcare. Noise has been shown to have a negative impact on a wide range of physiological as well as psychosocial functions including: heart rate and blood pressure (Baker et al., 1993), wound healing (McCarthy, Ouimet & Duan, 1991), sleep quality (Walder et al., 2000), patient coping (Topf, 1985), anxiety (Gast & Baker, 1989), discomfort (Baker, 1993; Minkley, 1968) and concentration (Berens & Weigle, 1996). Noise also has a detrimental effect on patient length of stay (Fife & Rappaport, 1976), staff productivity (Grummet, 1994) and quality of care (Hagerman, 2005).

Positive outcomes have been achieved by addressing the issue of noise. For example, the use of acoustic ceiling tiles has been shown to significantly reduce the number of sleep arousals in healthy participants who were asked to sleep in a former surgical ward. Two nights were spent in rooms with standard ceiling tiles and a third night in a room in which a false ceiling and acoustic tile had been installed. Each night an identical soundscape was played while they slept (Berg, 2001). Hagerman et al., (2005) found that changing to sound-absorbing ceiling tiles resulted in a significant drop in pulse amplitude in coronary care patients. Patients in the rooms with better acoustics were also less likely to be re-admitted to the hospital and were more positive about the staff.
Based on analysis of available research, Ulrich et al. (2006) made three recommendations to control hospital noise. The first is the use of single-occupancy rooms, second is the use of sound-absorbing acoustic ceiling tiles and the third is to reduce the level of sound emitted by equipment in the first place. Moore et al (1998) attempted to reduce noise through staff education and by closing patient room doors. While closing doors did lead to a perceptible drop in decibel readings, staff education did not achieve any significant reduction in noise levels. Ulrich (2006) concluded that reducing noise by changing the organization or by staff education was less effective than modifications to the physical environment.

**Acute Care for Elders Units**

One model specifically designed and shown in randomized, controlled trials to reduce the loss of function in elderly hospital patients is the Acute Care for Elders (ACE) unit. ACE units have four distinguishing characteristics: a “prepared” environment; a focus on patient-centred care; interdisciplinary team rounds and discharge planning; and medical care reviews (Counsell, et al. 2000). Counsell et al. (2000) found that patients hospitalized in an ACE unit had fewer functional declines in activities of daily living (ADLs). And while they found no significant difference between intervention and regular care groups as far as cost of care, length of stay, readmissions or home healthcare visits were concerned, the researchers did find that the intervention group (patients, caregivers, nurses and doctors) reported higher levels of satisfaction with care, that the use of restraints was less and that there were more physical therapy consults. Additionally, they found that nursing care plans were more likely to be implemented.
Covinsky et al. (1998), in a different randomized trial, found that patients treated in an ACE unit had improved functional status at discharge compared to “usual” care patients. Further, while at 90 days post-discharge they were similar to “usual” care patients; their cost of care was less.

A physical environment not encouraging independent function is cited as one factor contributing to older adults’ loss of function while hospitalized (Palmer et al., 1994). Calkins (cited in Palmer et al., 1994) points specifically to raised beds, shiny floors that look wet, cluttered hallways and the lack of orientation cues as discouraging the elderly from trying to self ambulate. Palmer et al. note that the “prepared” environment of ACE units is designed to encourage independence and orientation. Modifications have included the placement of clocks and calendars in patient rooms and the careful selection of colours and patterns that were both appealing and that had sufficient contrast for aging eyes to discriminate between. Overall lighting has been improved by adding lights behind the bed and by purchasing beds with lights underneath. In the room, patients have their own space in which to keep personal belongings. Assistive devices are placed by the bedside to encourage patients to ambulate. To further encourage mobility there are shared dining and lounge areas that provide somewhere to go to, and the carpeted hallways include handrails.

It is ironic that while having a “prepared” environment is the first pillar listed when the ACE unit model is described (Counsell et al. 2000; Covinsky et al. 1997; Palmer et al. 1994; Panno, Kolcaba & Holder 2000), it seems to be the area that has received the least amount of research attention. Generally, in the hospital literature, there is a lack of empirical data on the relative merits of specific design elements in promoting
patient independence (e.g. what type of beds, lights or carpet, what colours/patterns, what size of directional and other print are most efficacious).

The ACE unit literature, while not specifically addressing ways of improving patient comprehension/retention of post-discharge instructions, does however provide some direction and insight as to the impact that the physical environment may have on older patients.

**Theoretical Framework**

**Environmental Press Model**

The main theoretical framework for this research is Lawton and Nahemow's (1973) ecological model. The essence of the model and the accompanying Environmental Docility Hypothesis (Lawton & Simon, 1968) is that as competency declines, the individual is less able to cope with “environmental press”. Competency is defined as the aggregate of the individual’s abilities (physical capacities, cognitive ability and integrity of self). Environmental press is interpreted as positive or negative based on interaction with the individual. Press, like competence, can fluctuate over time. For example, an open window near a bed-ridden hospital patient may initially be considered positive press (as it provides fresh air to a stuffy room) but later it can become negative press if the room becomes too cold and the person (with decreased competency because of being bed-ridden) cannot get up to close it. As shown in Figure 1, the competency axis ranges from low to high and the press axis from weak to strong. The central line, labelled "Adaptation level" represents the theoretical mean of adaptation for all people at that competence level around which a normal curve would cluster. With moderate
increases or decreases in press, behaviour and affect will remain positive. However, as press continues to increase/decrease it will reach a point where positive affect and behaviour become threatened. If press surpasses competence or if it fails to provide sufficient challenge or opportunity for social interaction, negative behaviour and affect will occur (Holliday & Gutman, 1999; Lawton & Nahemow, 1973). For example, stairs may present too strong a challenge (press) to a person recovering from hip fracture surgery (decrease in competency). Conversely, insufficient press (e.g. prescribed bed rest when not strictly needed) can result in loss of mobility, boredom and/or sensory deprivation.

According to the model, persons at a low level of competence can demonstrate positive behaviour and affect if the environment is of sufficiently low press, but their range of tolerable press is smaller than that of persons at a higher level of competence who can respond to a wider range of press without negative impact (Lawton & Nahemow, 1973). The model also illustrates that for all levels of competence, there is a point at which it is in balance with press and a point, beyond which, behaviour and affect deteriorate.
While the majority older people are not "incompetent", it is undeniable that the prevalence of disease (particularly chronic disease) increases with age. Normal aging also brings change to the sensory systems; it increases reaction time and the time it takes to process information. Any or all of these factors make it more difficult to cope with environmental press. In the case of a patient receiving post-discharge instructions, the auditory and visual distracters in a typical hospital patient bedroom (where post-discharge instructions are commonly given) represent "environmental press". The
condition for which the patient has been admitted to the hospital reduces competency from the person’s “normal” functioning level with respect to learning and memory. The situation is compounded by the decrease with age in ability to ignore irrelevant aspects of the environment (i.e. the greater distractibility) of older adults. The end result is hypothesized to be a reduced ability to concentrate on the instruction they are receiving leading to reduced encoding.

**Progressively Lowered Stress Threshold Model**

Another theory that may be applicable to this research is the Progressively Lowered Stress Threshold (PLST) model (Hall & Buckwalter, 1987), which posits that persons suffering from dementia have a lowered ability (threshold) to handle a mismatch of person-environment fit. Originally this theory was developed to account for the “problem behaviours” (e.g. agitation, aggression) that dementia patients tend to exhibit when unable to comprehend or control their environment and to offer suggestions to caregivers in creating a care plan. It could also be that older persons in general, especially those who are hospitalized have a lower threshold for stress.

While the PLST model refers mainly to the psychosocial components it notes how the physical environment can be stress inducing, specifically it mentions unnecessary noise, misleading stimuli and unending spaces as possible contributors to stress. Having to cope with the noisy hospital environment may explain why older persons (with or without a diagnosed dementia) have been found to be particularly “at risk” of experiencing heightened anxiety when receiving post-discharge instructions (Richards & Beck, 2004).
The PLST model builds on the Environmental Press Model, in predicting that the progression of dementia will increasingly lower a person’s competency, thus narrowing the tolerable range for environmental press before negative behaviours and affect occur.

Research Question

In reviewing the literature it became clear that a knowledge gap exists concerning the role, if any, that the physical environment plays in supporting or impeding the ability of older hospitalized adults to learn and retain post-discharge instructions. The purpose of this study was to see if modifications to the physical environment of an acute hospital patient room where many older persons typically receive post-discharge instructions would make a difference in older adult learning/retention of post-discharge instructions.

Hypotheses

Specifically, this exploratory research tested three hypotheses:

1. For older adults, modifying a hospital patient bedroom to reduce auditory and visual distractions while they receive post-discharge instructions will result in increased retention in both immediate and delayed testing.

2. Stress levels, as demonstrated by physiological indicators, will be lower when instruction is received in a hospital setting modified to have fewer auditory and visual distracters.

3. Stress indicators will be negatively associated with learning/retention scores, on the assumption that stress acts as a moderating/intervening variable.
Rationale

Research suggests that distractibility increases with age (Birren, 1959; Winocur & Moscovitch, 1983). The “typical” hospital room contains multiple sources of auditory and visual distraction (e.g. other patients, visitors, staff, equipment). Distractions are thought to have a negative impact on encoding because they interrupt concentration and/or because they increase stress, which in turn may impede concentration (Craik & Bosman, 1992). Thus, in an older adult learning and retention should be greater when post-discharge instructions have been presented in a modified setting, that is, one in which there are fewer auditory and visual distracters.

This hypothesis is supported by Lawton and Nahemow’s ecological model (1973) which posits that the fit between the competency of the individual and the press of the physical environment will effect both performance and affect (i.e. closer fit will be associated with more positive performance and affect). In modifying the physical environment to compensate for the increased distractibility, as well as sensory fading that commonly occurs with age, the gap between individual competency and environmental press should be reduced, leading to higher performance and more positive affect (i.e. less stress).
METHOD

Overview of the Research Design

This study was conducted in two (originally identical) hospital bedrooms in an unused area on the seventh floor of Burnaby Hospital, a community hospital in Burnaby, British Columbia. For the study, one room was left in its original state, which was that of a typical four-bed patient room in a medical or surgical unit at Burnaby Hospital and generally, as established in an earlier study (Gutman, Sarte, Parke, & Friesen, 2005) in many of the acute hospitals in FH. The second four-bed room was modified to reduce visual and auditory distraction; it was also designed to be more elder friendly (e.g. more appropriate seating, better lighting and enhanced colour contrast) and aesthetically pleasing than the “typical” room (i.e. coordinated colour scheme, “home-like” decoration). First in one room and then in the other, older adult volunteers watched a video recording of a set of post-discharge instructions. After each viewing, they were tested on their learning/retention of the instructions. Approximately 24 hours later they were telephoned and tested again.

The design of the study was a 2X2 factorial (2 rooms, 2 types of instructions) with repeated measures (immediate, delayed) in which room order and instruction type were counter-balanced creating four groups. Participants were randomly assigned to one of the four groups. As shown in Table 1 the groups were distinguished by the order in which participants were exposed to the “typical” and modified rooms, and the order in which
they received two sets of post-discharge instructions – one designed for hip fracture patients (HIP) and one designed for patients with congestive heart failure (CHF).

### Table 1: Overview of the Research Design

<table>
<thead>
<tr>
<th>Group</th>
<th>Room Type Order</th>
<th>Instruction Type Order</th>
<th>Retention Scores</th>
<th>Immediate</th>
<th>Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
<td>2nd</td>
<td>1st</td>
<td>2nd</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Modified</td>
<td>“Typical”</td>
<td>HIP</td>
<td>CHF</td>
<td>HIP</td>
</tr>
<tr>
<td>2</td>
<td>Modified</td>
<td>“Typical”</td>
<td>CHF</td>
<td>HIP</td>
<td>CHF</td>
</tr>
<tr>
<td>3</td>
<td>“Typical”</td>
<td>Modified</td>
<td>HIP</td>
<td>CHF</td>
<td>HIP</td>
</tr>
<tr>
<td>4</td>
<td>“Typical”</td>
<td>Modified</td>
<td>CHF</td>
<td>HIP</td>
<td>CHF</td>
</tr>
</tbody>
</table>

Throughout their time in each room and during the immediate recall tests, a video camera and webcams recorded signs of distraction (e.g. startle response, orienting response) or adjusting towards the video (presumably to hear/see better), while other non-invasive technology (a wireless electrocardiograph belt and “fidget chair”) recorded indicators of stress (e.g. increased heart rate and body movement).

### Subjects

#### Recruitment and Screening

For this exploratory study, participants were thirty-six older adults (75 years of age or older) living independently or semi-independently in the community. They were recruited by a variety of means that included distributing letters of invitation and making presentations at nearby seniors housing developments (New Vista, Seton Villa, Carl
Mortensen Manor), posting notices on bulletin boards and handing out flyers at nearby seniors centres (Bonsor, Edmonds, Cameron, Confederation) as well as posting notices at Burnaby Hospital to inform the Volunteer and Auxiliary groups about the study. Further, a local newspaper (*Burnaby Now*) was approached with the suggestion that the project be the subject of a news story. An article was written (Hitchcock, 2006) that contained information about the study and the broader project of which it was a part and that included information on how readers could volunteer to participate. E-mail lists maintained by the Department of Gerontology and Gerontology Research Centre at Simon Fraser University were also used to send recruitment notices and information. Additionally, friends and associates of the Researchers were asked to recruit from among people they knew who fit the criteria and “snow-balling” techniques were employed with participants.

All recruiting materials (see Appendix 1) included a general description of the study, described eligibility criteria and indicated that as an incentive to participate, the older adult volunteers would be paid a $50 honorarium, served refreshments and would be reimbursed up to $10 for transportation or parking costs.

Potential participants were telephoned within a week of contacting the Researcher and asked a series of questions in order to confirm that they met the eligibility criteria described in the recruiting materials. These criteria were: age 75 or over, living in their own house or apartment, fluent in English, able to hear normal talk with minimum difficulty (with a hearing aid if used), able to read letters the size of newspaper print (with glasses if used), had not had a hip fracture or been told by the doctor that they had CHF, a movement disorder (e.g. Parkinsons), or cognitive impairment (e.g. Alzheimer's
or other dementia), had not been the caregiver for a person recovering from a hip fracture or suffering from CHF and, had not been primarily employed as a health care professional prior to retirement.

English fluency, ability to hear normal speech and to read with minimal difficulty, and absence of cognitive impairment were selected as eligibility criteria in order to minimize barriers to learning. Excluding persons diagnosed with, or having been the caregiver for someone with either CHF or who had experienced hip fracture surgery and persons who had been primarily employed in healthcare was to avoid the influence of prior learning. Because the protocol required unattended transfer from chair to bed, and movement between two study rooms persons with movement disorders such as Parkinson’s were excluded for their own safety. Exclusion was also based on the possibility that persons with movement disorders might experience difficulty in using a computer touchscreen. Community-dwelling seniors were chosen because, unlike older adults in assisted living or in long-term care, they are unlikely to have professional or semi-professional assistance with care available on a 24 hour basis. To prevent hospital re-admission, the need for learning and retention of instructions to ensure appropriate self-care is thus heightened.

Once eligibility was confirmed, additional information was collected (during the same telephone call) regarding participant’s sociodemographic characteristics and health and functional status. Compliance with criteria as well as the background sociodemographic and health status information was based solely on self-report. While cognitive impairment (having a diagnosis of Alzheimer’s or another dementia), was also a self-report item, candidates were administered Form 2 of the Hopkins Verbal Learning
Test (HVLT-R) (Brandt & Benedict, 2001). Scores on this test served both as a screen for memory impairment and, among those who participated in the study, for later use as an independent variable. The HVLT-R has been shown able to identify normal elderly from those suffering from a variety of cognitive deficits (Krebs, 1994).1

Before ending the telephone conversation, an appointment was made with the eligible volunteer to come to Burnaby Hospital to participate in the study and transportation/parking options were discussed.

Random Assignment to Groups

Group assignment was determined by random draw. Prior to recruitment, nine sets of the numbers 1, 2, 3 4 were placed in a bag and then withdrawn one at a time. As each number was drawn it was sequentially assigned to the list of participant numbers (1-36). Potential candidates were telephoned and screened in the order in which they contacted the Researcher. If there was no answer when the Researcher called, the name remained in position on the list and the Researcher continued down the list until a possible candidate was contacted. After each call the Researcher returned to the name at the top of the list. As candidates were found eligible they were assigned sequentially to the list of participants and as such assigned to a group.

According to Vanderploeg et al., (cited in Hester, Kinsella, Ong & Turner, 2004) the HVLT is the most commonly used memory assessment tool used with older adults in clinical neuropsychological testing settings. Testing with older adults in Australia, the United Kingdom and the United States (Frank & Byrne, 2000; Hogervorst et al., 2001; Lacritz et al., 2001, cited respectively in Hester, et al., 2004) has shown the instrument to have sensitivity values ranging from .87 to .98 and specificity from .80 to .98 for assessing mild dementia. While validity and reliability research using a Canadian population was not found, there is no reason to expect that it would differ significantly from results obtained elsewhere. Further, the HVLT is advantageous for this study because of its brevity and because it is a test of verbal learning. As such, it measures skills and abilities similar in nature to those required for testing the learning/retention of verbally conferred post-discharge instruction.
Table 2 shows the recruitment source of the 36 individuals who took part in the study. As can be seen, most commonly they were recruited from the materials distributed to and the presentations made at seniors housing and senior centres in proximity to Burnaby Hospital.

Table 2: Study 3a Participants by Recruitment Source.

<table>
<thead>
<tr>
<th>Source</th>
<th>N=36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior's Housing</td>
<td>13</td>
</tr>
<tr>
<td>Seniors Recreation Centers</td>
<td>9</td>
</tr>
<tr>
<td>Burnaby Hospital Volunteers &amp; Auxiliary</td>
<td>1</td>
</tr>
<tr>
<td>Newspaper Article</td>
<td>4</td>
</tr>
<tr>
<td>Friends/Associates</td>
<td>2</td>
</tr>
<tr>
<td>SFU e-mail list</td>
<td>2</td>
</tr>
<tr>
<td>Participant Referrals</td>
<td>5</td>
</tr>
</tbody>
</table>

The Sample

In total, 44 potential candidates were screened in order to reach the target sample size of 36. Reasons for ineligibility among the eight who did not participate in the study were as follows: 1- poor English; 1- poor eyesight; 2- poor hearing; 1-previous hip fracture; 1- was a nurse prior to retirement; 2- probable memory impairment as suggested by their scores on the Hopkins test. Two additional older adults who met the criteria were placed on a list of alternates in case someone dropped out. They participated in the next phase of the larger study of which this was a part (i.e. Study 3b/c).

Participant Profile

Question categories and response alternatives in the Participant Profile were derived from the Minimum Data Set-Home Care (MDS-HC) (1995). As a standardized
tool, the MDS-HC has been found valid and reliable in a variety of settings (Hirdes, et al. 2004; Hirdes & Carpenter, 1997; Landi, et al. 2000). The MDS-HC was found to have excellent correlation ($r=.74$ to $.81$) with the Barthel Activities of Daily Living Index, Lawton’s Instrumental Activities of Daily Living scale and the Mini Mental State Examination, all “Gold Standard” measures (Landi, et al. 2000). Thus, it has been shown to be an appropriate measure to use with this sample group (community-dwelling elderly) and was suitable for creating the sociodemographic and functional status profile needed for this study.

The questions began with personal characteristics and support received. This category included the candidate’s sex, marital status, education and daily help in the home received. The next set of questions concerned physical function. These included asking candidates if they had difficulty getting around safely because of vision problems or difficulty completing instrumental activities of daily living (meal preparation, ordinary housework, managing finances, managing medications, using the telephone, shopping and transportation), whether they used mobility aids, average days per week they went out from their home and the average number of hours per day they were active. Questions in this section also asked if they required help to go up/down stairs, transfer from bed or chair or from sitting to standing, getting around the house or to use the toilet. Participants were then asked a series of questions regarding their health status. These included whether they felt that their health was poor, if they had been hospitalized or had had any falls in the last six months, (if so, how many), and if they limited their activities because of a fear of falling. They were asked how many prescription medications they were currently taking and whether these included the medications that were to be referred
to in the study protocol. This section also included a list of illnesses and disabilities common among Canadians aged 75+ (e.g. heart and circulation, neurological, musculo-skeletal, metabolic, sensory, psychiatric) and they were asked if they had ever been diagnosed with any of them by a physician.

The profile was pilot-tested on five individuals aged 73-78 and changes were made to the phrasing of questions to eliminate ambiguity or confusion. (See Appendix 2 for a copy of the Screening Interview/Participant Profile).

Comparison with Population Aged 65+ in British Columbia

Overall, the participants were healthy and active. The sample ranged in age from 75-90 (mean age= 80.17 yrs., s.d.= 4.45), 75% were female; only 14% were married and 86% lived alone. One-third of the sample had not completed high school, 28% had completed high school or had attended a trade or technical school and 39% had some level of university or college education. As shown in Table 3, compared with the population age 75+ in British Columbia, this sample had a greater proportion of females (75% vs. 61%), a smaller proportion of married people (14% vs. 45%), and a greater proportion who lived alone (84% vs. 44%) and it was more educated (Wister, Gutman, Adams & Chou, 2006).

While just over half (55%) reported some difficulty in hearing, response to the health and functional status questions revealed a generally high functioning, active sample. Of the seven instrumental activities of daily living (IADLs) participants were asked about, most reported needing no help in completing them, only 7 (19%) used mobility aids (e.g. cane, walker, scooter), 4 (11%) reported needing help using the stairs,
and none needed help rising from bed or chair, getting around the house or using the toilet. In this sample, only one person reported feeling that their health was poor. There were only two participants who had experienced a fall in the last six months (one fell twice). Only one person reported that they limit their activities because of a fear of falling, interestingly, this was not someone who had fallen. With respect to activity, 33 (92%) reported that they go out from home at least four times a week. They are also more active on a daily basis than most British Columbians aged 75+. For example, 94% of this sample group reported being active for two or more hours daily, compared with 36% in the general population aged 75+ (Wister, Gutman, Adams & Chou, 2006).

Only three (8%) of the participants had been hospitalized in the preceding six months. The average number of prescription medications being taken by this sample was 2.53 (s.d. = 1.93), seven (19%) took none at all. Only a small number of participants were taking any of the drugs mentioned in the instruction video (2=Metoprolol, 3=Calcium). One had previously taken Senna and another had been prescribed Tylenol 3 to take as needed. Indicative of the good health of this sample, a relatively low number of chronic illnesses were reported. For example, amongst females, 59% reported having less than three chronic conditions, compared with 39% of women their age in British Columbia. Among the males in this study, 89% reported having less than three chronic conditions compared with 53% in the population of males aged 75+ in British Columbia. With respect to specific conditions while, a greater proportion of this sample, compared with the general population aged 75+ in British Columbia, reported having arthritis (61% vs. 47%) and asthma (14% vs. 6%), fewer reported having high blood pressure (25% vs. 37%) and diabetes rates were similar (Wister, Gutman, Adams & Chou, 2006).
Table 3: Study Participants Compared with all British Columbians 75+ Years of Age

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study 3a Sample</th>
<th>Population 75+ in British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>75%</td>
<td>61%</td>
</tr>
<tr>
<td>Married</td>
<td>14%</td>
<td>45%</td>
</tr>
<tr>
<td>Live Alone</td>
<td>86%</td>
<td>44%</td>
</tr>
<tr>
<td>2+ Hours/day physically active</td>
<td>94%</td>
<td>36%</td>
</tr>
<tr>
<td>&lt;3 Chronic conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females:</td>
<td>59%</td>
<td>39%</td>
</tr>
<tr>
<td>Males:</td>
<td>89%</td>
<td>53%</td>
</tr>
<tr>
<td>Prevalence of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>61%</td>
<td>47%</td>
</tr>
<tr>
<td>Asthma</td>
<td>14%</td>
<td>37%</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>8%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Between Group Comparison

Table 4 shows the socio-demographic and health and functional status characteristics of the 36 participants presented separately for the four groups to which they were assigned. As is hoped for with randomly assigned groups, there were no statistically significant differences between the groups on any of the basic sociodemographic or health status variables enquired about.

Table 4: Sociodemographic, Health and Functional Status Characteristics of Study 3a Participants, by Group

<table>
<thead>
<tr>
<th></th>
<th>Gp 1 (n=9)</th>
<th>Gp 2 (n=9)</th>
<th>Gp 3 (n=9)</th>
<th>Gp 4 (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age yrs. (sd)</td>
<td>79.89 (4.89)</td>
<td>79.67 (4.85)</td>
<td>79.67 (3.54)</td>
<td>81.44 (4.93)</td>
</tr>
<tr>
<td>No. (%) Female</td>
<td>7(77.78%)</td>
<td>5(55.6%)</td>
<td>7(77.78%)</td>
<td>8(88.89%)</td>
</tr>
<tr>
<td>No. (%) Married</td>
<td>2(22.22%)</td>
<td>2(22.22%)</td>
<td>0</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td></td>
<td>Gp 1 (n=9)</td>
<td>Gp 2 (n=9)</td>
<td>Gp 3 (n=9)</td>
<td>Gp 4 (n=9)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>No. (%) by Highest Level of Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than High School Graduation</td>
<td>2(22.22%)</td>
<td>2(22.22%)</td>
<td>3(33%)</td>
<td>5(55.56%)</td>
</tr>
<tr>
<td>High School /Trade School Grad</td>
<td>3(33%)</td>
<td>3(33%)</td>
<td>3(33%)</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td>College/University</td>
<td>4(44.44%)</td>
<td>4(44.44%)</td>
<td>3(33%)</td>
<td>3(33%)</td>
</tr>
<tr>
<td><strong>No. (%) by Housing Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Housing (house, apt)</td>
<td>6(66.67%)</td>
<td>7(77.78%)</td>
<td>5(55.56%)</td>
<td>5(55.56%)</td>
</tr>
<tr>
<td>Seniors' Housing</td>
<td>3(33%)</td>
<td>2(22.22%)</td>
<td>4(44.44%)</td>
<td>4(44.44%)</td>
</tr>
<tr>
<td><strong>No. (%) Living Alone</strong></td>
<td>7(77.78%)</td>
<td>6(66.67%)</td>
<td>9(100%)</td>
<td>8(88.89%)</td>
</tr>
<tr>
<td><strong>No. (%) Hospitalized Last 6 Mo</strong></td>
<td>0</td>
<td>2(22.22%)</td>
<td>2(22.22%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Prescription Medications being Taken</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean No.(sd) Taken</td>
<td>1.78 (1.20)</td>
<td>2.89 (1.83)</td>
<td>3.33 (2.19)</td>
<td>2.11 (2.42)</td>
</tr>
<tr>
<td>Range</td>
<td>0 - 3</td>
<td>0 - 6</td>
<td>0 - 7</td>
<td>0 - 6</td>
</tr>
<tr>
<td>No. (%) Taking None</td>
<td>2(22.22%)</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>3(33%)</td>
</tr>
<tr>
<td>Mean No. (sd) Chronic Conditions</td>
<td>1.33 (1.13)</td>
<td>1.67 (1.80)</td>
<td>2.89 (1.50)</td>
<td>1.78 (1.27)</td>
</tr>
<tr>
<td><strong>No. (%) Diagnosed With Selected Conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>1(11.11%)</td>
<td>3(33%)</td>
<td>4(44.44%)</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td>Arthritis/Rheumatism</td>
<td>6(66.67%)</td>
<td>5(55.56%)</td>
<td>5(55.56%)</td>
<td>6(66.67%)</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>3(33%)</td>
</tr>
<tr>
<td>Cancer, in the past 5 years (not including skin cancer)</td>
<td>3(33%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1(11.11%)</td>
<td>0</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td>Emphysema, Chronic Obstructive Pulmonary Disease, Asthma</td>
<td>1(11.11%)</td>
<td>0</td>
<td>3(33%)</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td>Gastritis</td>
<td>1(11.11%)</td>
<td>0</td>
<td>1(11.11%)</td>
<td>0</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>0</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>0</td>
</tr>
<tr>
<td>Thyroid Disease</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>1(11.11%)</td>
<td>2(22.22%)</td>
</tr>
<tr>
<td>None of the above</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1(11.11%)</td>
</tr>
<tr>
<td><strong>No (%) by Level of Hearing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hears adequately</td>
<td>5(55.56%)</td>
<td>5(55.56%)</td>
<td>2(22.22%)</td>
<td>4(44.44%)</td>
</tr>
<tr>
<td>Minimal difficulty</td>
<td>4(44.44%)</td>
<td>4(44.44%)</td>
<td>7(77.78%)</td>
<td>5(55.56%)</td>
</tr>
<tr>
<td><strong>Mean No.(sd) of 7 IADLs Performed w/o Help</strong></td>
<td>6.78 (0.44)</td>
<td>6.44 (0.88)</td>
<td>6.67 (0.71)</td>
<td>6.78 (0.44)</td>
</tr>
</tbody>
</table>
Table 5 shows mean Hopkins Verbal Learning Test Scores for the four groups. As can be seen, only one of the four Hopkins measures yielded a statistically significant difference between the groups – the Recognition Discrimination Index ($F_{(3,32)} = 2.844, p<.053, \eta^2 = .21$). This index is based on the person’s ability to recognize (after twenty minutes) 12 words from the original list embedded within a list of 6 semantically related...
words and 6 semantically unrelated words. According to the HVLT-R Manual (Brandt & Benedict, 2001) the Recognition Discrimination Index assesses retention without a labourious memory search.

<table>
<thead>
<tr>
<th></th>
<th>Gp 1 (n=9)</th>
<th>Gp 2 (n=9)</th>
<th>Gp 3 (n=9)</th>
<th>Gp 4 (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Recall</td>
<td>51.89 (8.21)</td>
<td>54.33 (5.17)</td>
<td>49.67 (6.19)</td>
<td>44.22 (9.21)</td>
</tr>
<tr>
<td>Delayed Recall</td>
<td>52.00 (8.89)</td>
<td>54.00 (2.45)</td>
<td>50.44 (7.35)</td>
<td>45.11 (8.14)</td>
</tr>
<tr>
<td>Retention</td>
<td>53.56 (7.92)</td>
<td>53.67 (4.87)</td>
<td>52.33 (8.37)</td>
<td>50.56 (7.52)</td>
</tr>
<tr>
<td>Recognition Discrimination Index*</td>
<td>55.56 (7.32)</td>
<td>55.00 (4.50)</td>
<td>50.56 (10.13)</td>
<td>45.89 (6.89)</td>
</tr>
</tbody>
</table>

*p=.05

In summary, on almost all measures the groups appear to have been comparable at the outset of the study.

**The Study Setting**

This study took place in the southwest wing of the seventh floor of Burnaby Hospital, an area no longer being used for patients. The research area consisted of two four-bed patient rooms on the south side as well as the hallway adjacent to the rooms. As can be seen in Figure 2, there was a table and two chairs in the hallway across from and between the two patient rooms, this is where instruction retention was tested. In addition, at the entry to the area there was another table with two chairs where participants sat when they first came onto the floor and during their rest period. There was also a small cart in the hallway that held monitoring equipment.
“Patient” Rooms

The furniture in each room consisted of: four beds; four bedside tables; four overbed tables; and one chair located to the right side of the test bed. The physical placement of furniture and equipment was identical in the two test rooms except that the modified room contained a second chair, placed against the window, facing the entry door. Though not used directly in the study, its purpose was to make the room feel more
“friendly” - to offer a seat with a view to the outside. Both rooms had window coverings, curtains that could be drawn around each bed and lighting over each bed. The modified room included an extra task light on the wall directly above the head of the test bed and four “puck” lights that could be used as night-lights. As described below, the modified room also had a different flooring surface, a dropped ceiling and had fresh paint and wall decoration.

Each room contained identical equipment for delivering the post-discharge instructions and monitoring participants’ response that included: one computer, with monitor (on a rolling cart); a five-speaker sound system (attached to the computer); and two webcams. There was also one DVD camcorder, which was moved between the rooms and hallway as needed. The location of each piece of furniture and test equipment was measured from the window and door and its placement in the room marked to ensure consistency between rooms (See Figure 3 Room Layout, Figure 4 “Typical” Room and Figure 5 Modified Room).

Environmental Components of “Typical” Room

The room itself presented with terrazzo flooring, flat, plastered ceiling and walls, florescent tubes in light boxes (on the wall above the head of each of the four beds) and had no ceiling lights, as was typical of most patient rooms in FH (Gutman, Sarte, Parke, & Friesen, 2005).

Environmental Components of Modified Room

The initial presentation of this room was identical to that of the “typical” room. There were three primary factors considered when making product selections for the
modified room: ability to reduce auditory and/or visual distraction (of direct relevance to this study); facilitation of safe transfer within the patient room (of relevance to Study 3b and c of the broader project); and the suitability of the product for an acute hospital setting (e.g. infection control). Durability and ease of maintenance were also considered, as was financial practicality and aesthetics (i.e. more “home-like”). Recommendations made by the ACE units that participated in Study 1 of the larger research project (Gutman, Love, Parke & Friesen, 2006) were given special consideration. Where there was more than one suitable option, availability (i.e. the speed at which product could be obtained) or fit with the overall design aesthetic became the deciding factor.

**Ceiling**

Options for ceiling finish are minimal. Ceilings are generally plaster/drywall or a “dropped ceiling” with removable tiles. To control sound, acoustical foam can be sprayed to the surface, sound baffles can be hung from the ceiling or specially designed ceiling tiles can be used in a “dropped” ceiling. Each of these alternatives was considered and a dropped ceiling with acoustical tiles by USG Corporation was chosen.

Leaving the ceiling smooth would provide for easy maintenance and durability but does not contribute to sound reduction, as smooth, hard surfaces reflect sound; they exacerbate the problem of noise and as such did not meet our primary criteria. Spray-on acoustical foam was eliminated as it is not appropriate for use in hospitals (it tends to “flake-off” and cannot easily be cleaned), nor would it be aesthetically pleasing.

This study used a dropped ceiling with the specially designed acoustical tiles “Halcyon Climaplus” by USG. The tile is easily cleaned of dust and is treated to be stain-resistant, as well it has a noise reduction coefficient (NRC) of 1.0 (of a possible 1.0
maximum) and a light reflective value of .88 (.80 or higher is desirable for ceilings), thus fitting well with our criteria. The use of “Halcyon Climaplus” acoustic ceiling tiles is also supported by the long-term care design literature (Brawley, 2006). By comparison, standard gypsum board (drywall) typically has an NRC of .40, with special preparation this value can be as high as .63 (US Patents Office Data, 2002).

It was expected that the lowered ceiling, with tiles especially designed to control acoustic reverberation, would reduce the amount of distraction and interference of the background noise.

Flooring

Possible choices of flooring included: carpet, cork, wood (hardwood, laminate) and resilient surfaces (e.g. vinyl, rubber). Each of these surfaces was considered against the criteria noted above. The flooring used in this study was “Punti”, a 4mm rubber flooring, manufactured by MondoUSA.

Carpet was eliminated as a result of the feedback received from the ACE units in Study 1 of the broader project (Gutman, Love, Parke & Friesen, 2006). In particular, the “Gold Standard” ACE unit reported that carpeting had to be removed from patient rooms because of maintenance and durability problems. In their opinion, these problems outweighed the advantages that carpet conveys (i.e. aesthetics and “home-like” qualities). Cork flooring was also determined to be inappropriate because of its porous nature, making it a concern for infection control. While cork flooring can be sealed this adds to the on-going maintenance requirements of the product. Wood and laminate floors were not selected primarily because, as hard surfaces they reflect and echo sound, thus contributing to auditory distraction.
Resilient flooring comes in two varieties; it is made of either vinyl or rubber. Traditionally, vinyl flooring has been installed in hospitals because of its smooth surface and because it is easy to clean and maintain and is durable. However, vinyl’s smooth surface also means that it is slippery and reflective, producing glare, which creates difficulty for aging eyes. The last option, the one selected, is rubber that is a relatively new flooring material for hospital settings and which, like vinyl, is non-porous, durable and is easy to clean and maintain. Thicker iterations have been used in playgrounds, in rehabilitation facilities and as the surface for sporting activities (e.g. running tracks) to provide cushioning and increase safety in the event of a fall. Additionally, rubber flooring offers other advantages, namely it is antibacterial and antimicrobial, non-glare, non-slip and will help to absorb sound (because it is soft). The particular flooring we chose, (4mm “Punti” by MondoUSA) has been shown to reduce sound levels by up to 22 decibels (“Mondo Healthcare Environments,” 2006). While this flooring can be made thicker to increase safety, this would also add to cost and as well make it more difficult to move heavy wheeled objects (e.g. beds). According to the manufacturer’s representative (Scott MacRury, personal communication, June 6, 2006), the 4mm thickness best balanced our needs. The one disadvantage to adoption of this flooring would be its initial cost, as it is more expensive than other flooring choices. However, it has a longer expected life, making it a comparable long-term choice. For practical purposes, choice of floor colour and pattern was based primarily on what supply was currently in stock (and so could be delivered quickly) balanced with age friendliness (i.e. having a minimal pattern, to reduce distraction or visual distortion). Selecting the floor was the first step in creating the colour palette for this project.
The expected outcome of using this flooring was a reduction in distraction caused by noise in the room.

**Bed Curtains**

Sound Control (1995) noted that increasing the density of materials and the use of soft surfaces would moderate air-borne noise by decreasing reverberation and by restricting the flow of air. Based on that, there are multiple ways in which bed curtaining can be enhanced to help reduce auditory and visual distraction including: increasing the number of folds, increasing coverage, using heavier (i.e. denser weave) fabrics and/or adding layers. Folds will “capture”, rather than reflect, sound. Increasing coverage by adding to the length (height) blocks sightlines and can help to block the transmission of air-borne sound, as will the use of heavier fabrics and/or multiple layers of fabric.

Westport Manufacturing Company Ltd. was contacted to help design a more sound insulating bed curtain. This company designs, manufactures and installs textile furnishings (e.g. draperies, blinds, bed linens) for hospitality, care and residential settings and is the current supplier of textiles to FH. One heavier fabric option considered was stage/theatre curtain; however, while this can effectively reduce noise transfer, it only comes in black (which would not be aesthetically desirable) and would not withstand regular washings which would not provide for suitable for infection control.

The curtain used was made from fabric by Fantagraph (style “Bezel”). This fabric is appropriate for healthcare settings as it is stain, splash, bacterial and flame resistant. As well, it has a heavier weight than the fabric typically used in FH, this helps to block visual distraction. The curtain length was extended past the normal to 6 inches from the
floor. In addition, it was 20% (10% is standard) wider than the measurement of the track surrounding the bed in order to increase the number of folds.

It was expected that the thicker, longer curtain would help reduce both visual and auditory distraction.

Lighting

Most commonly, patient room lighting consists of two fluorescent bulbs, in a box on the wall above each patient bed. Overhead lights are often kept off so as not to disturb sleeping patients; unfortunately this also means that ambient lighting is insufficient. This can contribute to distraction through shadows or dark areas. An additional light, with a dimmer switch, was added over the head of the test bed to provide more and controllable lighting to the study participant.

Furniture

The bed, bedside and overbed table as well as chairs in the test area were provided, on-loan, by Stryker. The bed (Model: FL14E3) was selected because it could be lowered to twelve inches from the floor; was easily adjustable and had automatic night-lights underneath. The first two characteristics were those most frequently recommended by the ACE units surveyed earlier. While it had not been part of the basic criteria, it was deemed desirable that the furniture look more “home-like” and less institutional than that typically seen in hospitals. With rails that fold completely underneath the bed and a wood-look finish on the bed, bedside table as well as overbed table surface this was accomplished.
Figure 3: Room Layout

Sound Test Points:
1. SE Corner
2. SW Corner
3. NW Corner
4. Bedside
5. Center

Sound readings recorded here

Additional lighting, modified room

Bed, Overbed table, light, bedside table

Test Cubicle

Computer cart with monitor

Curtain track

Chairs, modified room

Camera Positions
A. Camcorder
B. Webcam
C. Webcam

Window
Figure 4: “Typical” Room

Figure 5: Modified Room
Manipulation Check

In order to determine if the steps taken to reduce auditory distraction had been effective, a sound meter was placed on an overbed table in the approximate position of a patient's head while lying in bed. In this manner the Researcher could record sound as the patient would hear it. The sound that was used was the ringing of the alarm on a cell phone placed at five different points in the room. The five positions, shown in Figure 3, were chosen in consideration of typical sources of sound in a multi-bed patient room (e.g. the head of the other three beds - Points 1, 2 & 3; a visitor to the test-bed patient - Point 4; and a staff member in the center of the room - Point 5). Measurements were recorded before any modifications had taken place and again after completion of each modification. During each measurement phase, measures were taken in both rooms; this was done to account for any outside factors that may influence testing on a given day, the average of three trials was recorded. Decibel readings were taken using a Vellman sound meter (Model DVM401). All windows and the door to the room were closed while the test was taking place to minimize uncontrolled, outside noise. As shown in Table 6 readings taken at baseline (T1), before any changes were made, were comparable for the two rooms. The next set of readings, taken after the ceiling was installed in the modified room (T2), showed a reduced decibel level in the modified that ranged from 5.71dB to 16.84 dB. Readings taken after the flooring was installed (T3) showed a further drop in decibel level for four of the five measurement points ranging from 1.60dB to 5.36dB. Then the “typical” and modified curtains were separately installed and sound levels tested in the modified room. As can be seen by comparing the measures T3 with T4a, the addition of “typical” curtains did reduce the noise level in the room (1.57dB to 8.17dB) however; the reduction was much greater with the modified curtains (3.07dB to
18.46dB. The same pattern can be seen in the comparison between T3 and T4b (only test cubicle curtains closed). When all the furniture was placed in the rooms a final set of decibel readings were taken. As can be seen in the comparison between T4 and T5 adding furniture led to an increase in decibel level for three of the five measurement points. This is presumably attributable to the addition of hard surfaces (e.g. on bedside table, overbed tray, head and foot board). Overall however, if comparisons are made between T1 and T5a what we see is that the modifications made led to a substantially greater reduction in decibel levels in the modified room (6.36dB to 32.40dB) compared with the “typical” room (3.83dB to 19.46dB). To give these readings perspective, it should be noted that because decibels are a logarithmic, not linear, measure, a 12 point reduction in decibels equates to a perceived reduction similar to that of the voices of 16 people dropping to that of a single person (Ahuja, 1999).
Table 6: Average Decibel Readings Taken Before and After Modifications

<table>
<thead>
<tr>
<th></th>
<th>Point 1 SE Corner</th>
<th>Point 2 SW Corner</th>
<th>Point 3 NW Corner</th>
<th>Point 4 NE Corner (Bedside)</th>
<th>Point 5 Room Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T1- Baseline: Rooms “As-Is”</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified room</td>
<td>59.90</td>
<td>59.50</td>
<td>59.17</td>
<td>59.93</td>
<td>59.47</td>
</tr>
<tr>
<td>“Typical” room</td>
<td>60.30</td>
<td>59.03</td>
<td>60.63</td>
<td>60.63</td>
<td>58.43</td>
</tr>
<tr>
<td><strong>T2- Modified Ceiling Installed, “Typical” Room Unchanged</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Modified room</td>
<td>47.97</td>
<td>45.73</td>
<td>42.33</td>
<td>52.80</td>
<td>49.33</td>
</tr>
<tr>
<td>“Typical” room</td>
<td>60.90</td>
<td>58.90</td>
<td>59.90</td>
<td>60.10</td>
<td>58.50</td>
</tr>
<tr>
<td><strong>T3- Floor Installed, “Typical” Room Unchanged</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified room</td>
<td>46.37</td>
<td>47.33</td>
<td>40.17</td>
<td>50.57</td>
<td>43.97</td>
</tr>
<tr>
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<td>60.50</td>
<td>58.70</td>
<td>61.20</td>
<td>60.90</td>
<td>58.60</td>
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<td><strong>Comparison of Curtains in Modified Room Only</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>T4a All Curtains Closed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Curtains</td>
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<td>28.87</td>
<td>27.67</td>
<td>47.50</td>
<td>27.70</td>
</tr>
<tr>
<td>“Typical” Curtains</td>
<td>38.20</td>
<td>40.80</td>
<td>38.60</td>
<td>48.97</td>
<td>39.93</td>
</tr>
<tr>
<td><strong>T4b Only Test Cubicle Curtains Closed</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Curtains</td>
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<td>34.53</td>
<td>28.67</td>
<td>47.87</td>
<td>28.43</td>
</tr>
<tr>
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<td>35.43</td>
<td>35.57</td>
<td>48.07</td>
<td>35.83</td>
</tr>
<tr>
<td><strong>T5a- Fully Furnished, All Cubicle Curtains Closed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified room</td>
<td>33.33</td>
<td>27.10</td>
<td>27.07</td>
<td>53.57</td>
<td>40.47</td>
</tr>
<tr>
<td>“Typical” room</td>
<td>43.67</td>
<td>39.57</td>
<td>48.10</td>
<td>56.80</td>
<td>42.70</td>
</tr>
<tr>
<td><strong>T5b- Fully Furnished, Only Test Cubicle Curtains Closed</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified room</td>
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<td>27.47</td>
<td>27.13</td>
<td>54.33</td>
<td>41.17</td>
</tr>
<tr>
<td>“Typical” room</td>
<td>47.70</td>
<td>46.33</td>
<td>45.67</td>
<td>59.20</td>
<td>46.83</td>
</tr>
</tbody>
</table>

**Equipment**

Equipment employed in monitoring and recording participants and their feedback included a video camera, 5 webcams, a portable electrocardiograph (EKG), desktop and laptop computers and a touchscreen monitor. As well, the chair participants sat in while in the modified or “typical” room was equipped to detect movement (i.e. fidgets) while seated. Designed for this study, these were dubbed “fidget chairs”. Accelerometers
attached to the chair recorded vibrations caused by movement. Any vibration above a resting threshold of 0.05V was counted as one “fidget unit”.

The video camera (CANON, Model: DC40) was positioned at the foot of the bed on the side opposite to the “fidget chair”. Each room was also equipped with two webcams (Creative Technology, Model: WebCam Live! Pro). One was positioned on top of the computer monitor to capture facial expressions and the second was set on the curtain rod above and in front of the “fidget chair”, to capture gross body movement. An addition webcam was located in the hallway on top of the touchscreen monitor used in testing retention to capture facial expressions while taking the test.

Each participant was outfitted with an EKG (Corscience, Model: BT3/6) to monitor and record heart rate. The data from this device as well as the accelerometers (Freescale Semiconductor, Models: MMA 6260 & MMA 1260D) attached to the “fidget chair” (one on each side, one on the back) were collected and stored on the laptop computer on the cart in the hallway.

In each room, participants watched the post-discharge instruction video on a desktop computer monitor situated on a wheeled cart. Speakers (Logitech, Model: Z-5300e) attached to this computer projected a soundscape of “typical” hospital noises during the video presentation. The soundscape and video started synchronously. Prior to installation in the rooms, the speakers were tested to verify equitable performance by averaging three decibel readings of a sample sound. The two sets of speakers varied by less than .10 of a decibel.

The retention test was administered using a laptop computer (Sony Vaio, Model: PCG-792L) with a touch-screen monitor (GVision, Model: P17BH). Answers to
qualitative questions were recorded verbatim by the Researcher on the same laptop (See Figures 1 and 2 for positioning of all stationary equipment).

**Soundscape**

The soundscape was recorded at Eagle Ridge Hospital, another hospital in FH. After consultation with hospital staff, it was decided that the Researcher would record the sounds between 10:00 a.m. and 12 noon, as this was the time when patients were most often being readied for discharge. A tape recorder was placed on the pillow at the head of one of the beds and left to record for two continuous hours (flipping the tape once to record on both sides). Later, the recording was copied to the computer, where it was synchronized with the video recording of post-discharge instructions. This was similar to the procedure used by Baker, Garvin, Kennedy and Polivka (1993) where one microphone was placed on the wall above the patient’s head and a second on the bedside table to approximate what the patient would hear. They were unable to record from the pillow because all beds were occupied whereas in the present study only three of four beds were filled.

**Post-discharge Instruction Video**

It was decided to develop post-discharge instructions for CHF and hip fracture surgery based on FH data which indicated that these are the most commonly seen conditions on medical or surgical units. As there were no standardized post-discharge instructions in use in FH hospitals for either condition, the first step was to develop a set of instructions. Information was gathered from multiple sources including the internet.
(CHF Handbook, 2004; Special Discharge Instructions), SUMMA Health (Heat Failure, 2004) and published material (Priest, 2006; Staywell Corp., 2004).

Three categories of post-discharge instruction common to both CHF and hip surgery patients were identified: 1) activity restrictions; 2) 'call the doctor if...'; and 3) medications. The next step was to construct parallel sets of instructions for each condition and to verify their typicality and comprehensibility. The latter was accomplished by having them reviewed by Phyllis Hunt (British Columbia Hip Fracture Collaborative) and two members of the clinical staff at Eagle Ridge Hospital.

With the instructions completed and verified, a video recording was made. The Researcher read the pre-scripted instructions and after each section (activity restrictions, 'call the doctor if...', medications) the instructions were shown in point form and the Researcher read out each point. The first two sections, activity precautions and 'call the doctor if...' each had five instruction points to remember. The last section, medications, had 18 (three medications with five points each). The video ended with a complete review of the point form instructions, so that in total each participant saw/heard each instruction three times. In each set of instructions three points were illustrated with a graphic, this was done to allow the Researcher to assess the impact on retention of adding a graphic.

The two videos were almost identical in length (CHF: 6 min 23 sec, HIP fracture: 6 min, 12 sec), and the literacy level required for comprehension was comparable. See Appendix 3 for details of the development of the instructions, a transcript of the videos and for a copy of the PowerPoint slides used.
Retention Tests

The three sections of the instructions videos (activity restrictions, ‘call the doctor if…,’ medications), were used to design the retention tests. The first section, activity restrictions, contained four multiple choice questions. The second section, call the doctor if..., consisted of eight true or false questions. The third section, medications, also had eight multiple choice questions. The medication questions followed the format of identifying: the name of the medication; why it was being taken; and three possible side effects. The format was similar to questions used by Makaryus and Friedman (2005) in their study of the learning and retention of post-discharge instructions. In all, there were 20 separate questions; four required multiple answers so that participants were “graded” out of a total of 28. In designing the test correct answers were distributed evenly through the possible choices (i.e. ‘a’, ‘b’, True, False, etc.). The literacy level was checked and assessed as at a 5.9 Flesch-Kincaid grade level for readability.

The decision to use a multiple choice format rather than free recall, which would have been more ecologically valid, was to maximize the opportunity for the older adult participant to demonstrate retention of the information they had been presented. It is widely accepted that cued recall tests yield higher scores than free recall tests, which can possibly mask learning.

It was also a consideration, although secondary, that the test was to be administered via touchscreen computer. Cued recall/recognition as a means of testing is more amenable to this type of technology. Test questions were given to the CIBER lab in the School of Engineering Science at Simon Fraser University to write the computer program. They were directed that the ‘buttons’ on the touchscreen and fonts used were to
be as large as possible and that colour combinations would have to display a sharp contrast. It was also requested that the question not only appear in written form on the screen but that the participant would also hear the question. For this, a recording was made of the Researcher stating each question. Participants were allowed to re-hear the question by pressing ‘repeat’ on the screen. Proceeding at their own pace, once a question was answered, the participant would press ‘next’ to go to the next question but was not allowed to go back and change answers.

The design of the delayed test intentionally copied that of the immediate test in that participants heard and could read the question, were able to read the answer choices and respond at their own pace. In addition, they were not allowed to change an answer once they had gone on to the next question. The main differences between the tests were the location (at home) and that they spoke their answer instead of using the touchscreen computer.

**Procedure**

**Preparation of Study Setting Prior to Arrival of Participants**

Prior to each participant’s arrival, the Researcher and an assistant with a graduate degree in engineering (EA) conducted a walk-through of the research area and, using a checklist, verified that all equipment was in place and operating properly. (See Appendix 4 for a copy of the Preparation Checklist)

**Participation**

Upon arrival at Burnaby Hospital, each participant was welcomed at the main entry by the Researcher and brought up the public elevator to the seventh floor. Once at
the seventh floor, the participant was introduced to the EA. Next, the participant and Researcher sat at the entry table to review the study procedures, discuss any questions the participant might have and review and sign the informed consent form (a copy of the consent form was later given to the participant to take home). After this, each participant was outfitted with a wireless EKG device (4 surface affixed contacts - 2 on upper chest, 2 above hip bones) to monitor heart and respiration rates as physiological indicators of stress; the EA confirmed proper operation of this equipment.

When ready, the participant was escorted by the Researcher to the first room, as per their assigned group, and directed to sit on the chair next to the bed in the cubicle closest to the door. This cubicle was selected as the test site because it is in the position that experiences the greatest level of auditory and visual distraction, as it is closest to hallway traffic. Once seated, the participant was told to imagine having been hospitalized for several days as the result of hip fracture surgery (or CHF depending on group assignment) and that it was time to be discharged to home. A computer (on a cart) was then wheeled in and placed in front of and facing the participant. The EA verified that the EKG and “fidget chair” signals were being received and then pressed ‘play’ on the camcorder. Next, the Researcher started the instruction video on the computer. At the outset the screen was dark but turning on the video activated a pre-recorded soundscape of hospital sounds which played from five speakers positioned around the room) and started the webcams recording. Participants were told that at the end of the video there would be a message on the screen telling them to lie down on the bed and that the Researcher would return after they had been lying down for a few minutes. They

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2 Ethics approval was applied for and obtained from Simon Fraser University and Fraser Health Ethics Boards
were told that the screen would be blank until the Researcher and EA had checked (outside the room) that everything was working properly and that the video would be started remotely. The Researcher then drew the curtain around the bed and left the room, repeating that she would return when the participant had been lying down for a few minutes. The participant then waited, for ten minutes, listening to the hospital room soundscape, but not knowing when the video would start. This procedure was followed to approximate the usual situation (confirmed by nursing staff at Burnaby Hospital) in which the about-to-be-discharged patient waits, without knowing when someone in authority will process their discharge. It also gave the participant time to observe the ambiance of the room. For safety purposes, at all times that a participant was alone in the room they were monitored by the Researcher or EA via camcorder connected to a television monitor in a room across the hall.

When the video instructions began the second section “Reasons to Call Your Doctor” (1 min., 45 sec.), the Researcher entered the room and walked past the participant’s closed curtain to the far side of the room. The Researcher then opened and re-closed the cubicle curtain diagonally across from the participant, as a hospital staff member or visitor might do. Thus, a number of the usual visual and auditory distractions that occur in a patient room in a medical or surgical unit in a hospital while instructions are being given were approximated.

Five minutes after the instruction video ended, the Researcher re-entered the room, drew the bed curtain back into the open position, turned off the computer and pulled it back, away from the bedside. The participant was asked to remain lying on the bed while the EA placed a ballistocardiograph (BKG) on their sternum and one-minute
readings of resting heart rate and vibration were recorded. This intervening activity lasted for approximately five minutes or until the soundscape stopped, indicating that ten minutes had passed from the end of the video and that it was time to bring the participant to the hallway for the retention test. The participant was asked to get off the bed, exit the room and take a seat at the table in the hallway; the participant was directed to the chair in front of the touchscreen monitor. The Researcher repositioned the camcorder in the hallway to record the participant at the table. The participant was instructed in the use of the touch-screen and given a test question as practice. The participant was informed that the test was self paced and that the program was designed so that it would not proceed until an answer was selected and that they would not be able to go back to change answers. The test program also included an audio component that broadcast the test question; this could be repeated if the test-taker needed it to be. The retention test itself consisted of 20 multiple choice and yes/no questions. See Appendix 5 for an example of a touchscreen question and a copy of the take-home test.

If the participant had no questions, the Researcher turned on the camcorder, moved to stand behind the participant (out of view) and then told the participant to begin. The Researcher stood, available, to give help as requested. At the completion of this test, the Researcher asked the participant a number of qualitative questions to gain insight into their likes/dislikes in each room, suggestions for improving the room to facilitate the learning and retention of instruction and foster independence. They were also asked for feedback regarding the video. Participants were asked about likes/dislikes and ways to improve the transfer of information. The questions asked also solicited feedback as to the
pace, clarity, comprehensibility and amount of instruction. See Appendix 6 for the complete set of qualitative questions.

When complete, the participant was offered refreshments and an opportunity for a short (10-minute) break, while the Researcher positioned the camcorder in the second room. When the break was over, the participant was brought to the second room where the procedures used in the first room were repeated.

After their second room, they were also asked to evaluate the testing format and procedure (e.g. likes/dislikes, comprehensibility), tell about their previous experience with computers and if they liked using the touchscreen for the test. Lastly, they were asked whether, had they been a “real” patient, would they have been comfortable receiving their post-discharge instructions by video and in what format they would prefer to have take-home instructions.

When all of this was done, the participant was brought back to the entry table. There the EKG was removed, a follow-up phone call (to occur within the next 24 hours) was scheduled, the participant was reimbursed for parking (if applicable) and given their copy of the information, informed consent and retention test (in a sealed envelope) to take home. They were then escorted back to the main entrance.

**Delayed Testing**

At the agreed upon time the following day, the Researcher telephoned to the participant and who was asked to open the envelope containing the test questions. The Researcher then asked the participant the same questions, in the same test order (HIP/CHF or CHF/HIP), as they had completed the day before. At the end of the
conversation, arrangements were made to deliver the honourarium cheque to the participant. When the cheque was delivered, the participant signed a receipt and the protocol was complete\(^3\).

---

\(^3\) The protocol and test questions were pilot-tested on five volunteers. No changes were needed as the instruction video; test questions and test procedure were well-received.
RESULTS

The primary dependent variables for this study were the four retention scores (two immediate and two delayed) from the post-discharge instructions tests. Secondary measures included physiological indicators of stress (data from EKG, “fidget chair”) and participants’ subjective response to the rooms as reflected in the answers to a series of qualitative questions. Independent variables included sociodemographic characteristics, health and functional status, and cognitive function, as measured by the Hopkins Verbal Learning Test.

Retention Scores

Table 7 shows mean retention scores. It is quite clear from examination of these that retention of HIP instructions was greater than CHF instructions (maximum possible score for each was 28). This holds true for all groups and in both immediate and delayed test conditions. Further, as would be expected, scores for both HIP and CHF were lower in delayed testing.

Table 7: Mean Retention Scores for Each Test by Group, for Immediate and Delayed Condition

<table>
<thead>
<tr>
<th>Group</th>
<th>Immediate HIP</th>
<th>CHF</th>
<th>Delayed HIP</th>
<th>CHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24.00</td>
<td>21.33</td>
<td>22.67</td>
<td>19.78</td>
</tr>
<tr>
<td>2</td>
<td>23.33</td>
<td>20.67</td>
<td>20.56</td>
<td>19.56</td>
</tr>
<tr>
<td>3</td>
<td>23.44</td>
<td>21.33</td>
<td>22.89</td>
<td>20.67</td>
</tr>
<tr>
<td>4</td>
<td>21.78</td>
<td>19.89</td>
<td>19.89</td>
<td>18.78</td>
</tr>
</tbody>
</table>
To determine the statistical significance of the apparent differences, the instruction retention scores were analyzed using SPSS version 15.0. A MANOVA with one within (room type) and two between subject factors (room order, instruction type) was the initial analysis performed. The MANOVA was then repeated for the delayed test. While these analyses yielded no significant main effects it did identify a significant room type x instruction type x order interaction (Immediate: \( F_{(3,32)}=19.99, p<.000, \eta^2 = .384, \)) (See Table 8).

**Table 8: Summary of MANOVA of Retention Scores**

<table>
<thead>
<tr>
<th>Source</th>
<th>Immediate SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Type</td>
<td>.056</td>
<td>1</td>
<td>.056</td>
<td>.011</td>
<td>.916</td>
</tr>
<tr>
<td>Room Type x Order</td>
<td>.056</td>
<td>1</td>
<td>.056</td>
<td>.011</td>
<td>.916</td>
</tr>
<tr>
<td>Room Type x Instruction</td>
<td>2.00</td>
<td>1</td>
<td>2.00</td>
<td>.408</td>
<td>.528</td>
</tr>
<tr>
<td><strong>Room Type x Order x Instruction</strong></td>
<td><strong>98.00</strong></td>
<td>1</td>
<td>98.00</td>
<td><strong>19.99</strong></td>
<td><strong>.000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Delayed SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Type</td>
<td>.68</td>
<td>1</td>
<td>.68</td>
<td>.146</td>
<td>.704</td>
</tr>
<tr>
<td>Room Type x Order</td>
<td>10.13</td>
<td>1</td>
<td>10.13</td>
<td>2.18</td>
<td>.150</td>
</tr>
<tr>
<td>Room Type x Instruction</td>
<td>.35</td>
<td>1</td>
<td>.35</td>
<td>.075</td>
<td>.786</td>
</tr>
<tr>
<td><strong>Room Type x Order x Instruction</strong></td>
<td><strong>58.68</strong></td>
<td>1</td>
<td>58.68</td>
<td><strong>12.63</strong></td>
<td><strong>.001</strong></td>
</tr>
</tbody>
</table>

In order to understand the factors contributing to this interaction, paired t-tests were performed comparing results for the two rooms, instruction types and possible order effects (See Table 9). These analyses revealed a statistically significant difference in retention between the two types of post-discharge instructions, with CHF instruction retention scores being significantly lower than HIP fracture scores for both immediate (\( t_{(35)}=-4.645, p<.000, r=.456 \)) and delayed (\( t_{(35)}=-3.585, p<.001, r=.497 \)) test conditions, suggesting that overall, CHF instructions were more difficult than HIP. As would be expected, the delayed retention scores for both sets of instructions were significantly
lower than immediate scores (CHF - $t_{35}=2.570$, $p<.015$, $r=.477$; HIP fracture - $t_{35}=4.810$, $p<.000$, $r=.804$).

Table 9: Summary of t-tests Comparing Paired Difference Scores, Retention Scores Study 3a

<table>
<thead>
<tr>
<th>Scores:</th>
<th>t</th>
<th>df</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF - HIP (Immed)</td>
<td>-4.645**</td>
<td>35</td>
<td>.456</td>
</tr>
<tr>
<td>CHF - HIP (Delayed)</td>
<td>-3.585**</td>
<td>35</td>
<td>.497</td>
</tr>
<tr>
<td>CHF (Immed) - CHF (Delayed)</td>
<td>2.570*</td>
<td>35</td>
<td>.477</td>
</tr>
<tr>
<td>HIP (Immed) - HIP (Delayed)</td>
<td>4.810**</td>
<td>35</td>
<td>.804</td>
</tr>
<tr>
<td>Modified - “Typical” (Immed)</td>
<td>-.087</td>
<td>35</td>
<td>.241</td>
</tr>
<tr>
<td>Modified - “Typical” (Delayed)</td>
<td>.331</td>
<td>35</td>
<td>.351</td>
</tr>
<tr>
<td>1st - 2nd (Immed)</td>
<td>.087</td>
<td>35</td>
<td>.243</td>
</tr>
<tr>
<td>1st - 2nd (Delayed)</td>
<td>1.304</td>
<td>35</td>
<td>.370</td>
</tr>
</tbody>
</table>

*p<.05  **p<.001

Influence of Socio-demographic and Health Characteristics

Lawton and Simon’s (1968) Environmental Docility Hypothesis and Lawton and Nahemow’s (1973) ecological model suggest that as competency declines, the influence of environmental stressors (press) increases. That being the case, it was of interest to determine if any of the participants’ socio-demographic characteristics or health status indicators predicted their performance on the retention tests.

Correlational analysis revealed no significant relationship between any of the health status indicators and retention scores and all but one of the sociodemographic characteristics. As Table 10 shows, there were significant correlations between age and both immediate ($r_{35} = -.365$, $p<.028$) and delayed test scores ($r_{35} = -.355$, $p<.034$) when
post-discharge instructions were received in the “typical” room and between age and CHF scores, both immediate \( r_{(35)} = -.338, p<.044 \) and delayed \( r_{(35)} = -.386, p<.02 \) but not between age and modified room or age and HIP scores. These findings suggest that the oldest participants had the most difficulty when faced with learning the more difficult instructions in the less supportive room.

Table 10: Pearson Correlations Between Age and Retention Test Scores (Immediate and Delayed) for Instructions Received in Each Room Type (Modified and “Typical”) and by Instruction Type (CHF and HIP)

<table>
<thead>
<tr>
<th></th>
<th>Age (Imm.)</th>
<th>Typ (Imm.)</th>
<th>Typ (Del.)</th>
<th>Mod (Imm.)</th>
<th>Mod (Del.)</th>
<th>CHF (Imm.)</th>
<th>CHF (Del.)</th>
<th>HIP (Imm.)</th>
<th>HIP (Del.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typ (Imm)</td>
<td>-0.365*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typ (Del)</td>
<td>-0.355*</td>
<td>0.761**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod (Imm)</td>
<td>-0.163</td>
<td>0.241</td>
<td>0.180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod (Del)</td>
<td>-0.135</td>
<td>0.249</td>
<td>0.351*</td>
<td>0.651**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF (Imm)</td>
<td>-0.338*</td>
<td>0.591**</td>
<td>0.381*</td>
<td>0.714**</td>
<td>0.382*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF (Del)</td>
<td>-0.386*</td>
<td>0.473**</td>
<td>0.681**</td>
<td>0.335*</td>
<td>0.661**</td>
<td>0.477**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIP (Imm)</td>
<td>-0.252</td>
<td>0.773**</td>
<td>0.643**</td>
<td>0.606**</td>
<td>0.560**</td>
<td>0.456**</td>
<td>0.411*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIP (Del)</td>
<td>-0.185</td>
<td>0.622**</td>
<td>0.793**</td>
<td>0.470**</td>
<td>0.692**</td>
<td>0.349*</td>
<td>0.497**</td>
<td>0.804**</td>
<td></td>
</tr>
</tbody>
</table>

N=36 for each correlation
*p<.005
**p<.01

Figure 6 shows a scatter plot of CHF retention scores by age. There is a clustering of scores into three age categories: 75-78, 79-83, 84-90.
Subsequent data analysis using the means of these three age groupings revealed a significant main effect for age in the delayed condition when participants received CHF post-discharge instructions in the “typical” room ($F_{(2,33)}=3.905, p<.031, \eta^2 = .207$). While there was no main effect for room type, there was a significant interaction effect for room x age group ($F_{(2,33)}=4.611, p<.018, \eta^2 = .235$).
Physiological Data

Wireless EKG

Collecting data using the wireless EKG device proved to be difficult in the test setting. While the device worked well in pilot-testing and as long as participants were in close proximity to the computer receiving the signal, problems were encountered when they moved between rooms and when signals encountered barriers (e.g. walls). Upon examination of the EKG data, it was apparent that recordings from five of the study participants were incomplete while those of twenty-five participants had values that were outside the expected range. For example, some participants were reported as having as low as .06, 1 or 10 average beats per min (bpm) or as high as 279, 285 or 302 bpm, when this occurred the complete EKG data set for that individual was considered suspect and as such was deemed unusable. Given the very small sample that remained, it was decided that the data needed to be discarded.

“Fidget Chair”

Data from the fidget chair were collected for a total of 15 minutes. The first 10 minutes corresponded to the time that the participant waited for the post-discharge instruction video to begin; the last five minutes were recordings made while the video was being watched. The webcam and camcorder data showed that common movements during the first two time periods include adjusting clothing/glasses/hair, checking the time on a wristwatch, and turning to look around the room. Common movements while watching the video include adjusting in the chair (leaning forward) or head turning (orienting an ear to the speaker) - presumably, these movements were an attempt to hear/see better. These actions (fidgets) may reflect anxiety or nervousness, possibly
impatience and/or the frustration of having difficulty hearing the information being presented.

For purposes of analysis, the first 10 minutes were divided into two blocks; the first five minutes were considered to be a period of “acclimatizing”; the second five minutes were considered as a period during which the participant was “acclimatized”. In total, each participant had six fidget scores, one for each time period in each room. Means for each of these scores are shown in Table 11.

Table 11: Mean Fidget Scores by Room and Time Period*

<table>
<thead>
<tr>
<th></th>
<th>1st 5-Minutes</th>
<th>2nd 5-Minutes</th>
<th>Video</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Room</td>
<td>16.07</td>
<td>5.30</td>
<td>8.63</td>
</tr>
<tr>
<td>“Typical”</td>
<td>16.27</td>
<td>8.83</td>
<td>15.57</td>
</tr>
</tbody>
</table>

*Due to equipment problems, there were only 30 participants included in this analysis.

Analyses of variance of the fidget scores revealed no main effect for rooms in the first or second five-minute intervals. However, there was a main effect for room during the video ($F_{(2,26)}= 5.97$, $p<.021$, $\eta^2 = .176$). Further examination of the data revealed a consistent pattern of change in fidgeting in both rooms across time periods, dropping from first to second and rising again during the video. As shown in Table 11 and Figure 7, during the video, fidgeting in the “typical” room returned to near initial levels. This was confirmed by paired t-tests, which revealed (see table 12) that there was no significant difference between the first five minutes and during the video in the “typical” room. However, in the modified room fidgets remained significantly lower than the
initial level \((t_{29})=-3.083, \eta^2 = .503\). If fidgeting is taken as an indicator of stress, then our participants were as stressed during the video as when they first entered the room. A return to high stress levels was not seen in the case of the Modified room during the video. The data from the “fidget chair” thus suggest that while receiving instruction in the modified room, participants were less stressed than was the case in the “typical” room, supporting Hypothesis 2.

Table 12: Paired t-tests of the Three Fidget Measurement Periods by Room Type

<table>
<thead>
<tr>
<th>Scores:</th>
<th>t</th>
<th>df</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st vs 2nd 5 minutes (Mod)</td>
<td>4.292**</td>
<td>29</td>
<td>.437</td>
</tr>
<tr>
<td>1st vs 2nd 5 minutes (Typ)</td>
<td>3.055**</td>
<td>29</td>
<td>.665</td>
</tr>
<tr>
<td>2nd 5 minutes vs video (Mod)</td>
<td>-2.407*</td>
<td>29</td>
<td>.414</td>
</tr>
<tr>
<td>2nd 5 minutes vs video (Typ)</td>
<td>-3.013*</td>
<td>29</td>
<td>.623</td>
</tr>
<tr>
<td>1st 5 minutes vs video (Mod)</td>
<td>3.083*</td>
<td>29</td>
<td>.503</td>
</tr>
<tr>
<td>1st 5 minutes vs video (Typ)</td>
<td>.288</td>
<td>29</td>
<td>.689</td>
</tr>
</tbody>
</table>

N=30
*p<.05
**p<.001
Figure 7: Mean Fidget Levels in the Modified and "Typical" Rooms for Each Measurement Period.

As can be seen Table 13, and Figures 8 and 9, the pattern of decrease in fidgeting after the first five minutes with a noticeable increase during the video in the "typical room" was evident in all three age groupings. A lesser increase in the modified room was also evident in all age groups.

Table 13 Mean Fidget Scores by Age Grouping, Time Period and Room Type

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Fidget A Typical Rm</th>
<th>Fidget B Typical Rm</th>
<th>Fidget C Typical Rm</th>
<th>Fidget A Modified Rm</th>
<th>Fidget B Modified Rm</th>
<th>Fidget C Modified Rm</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-78</td>
<td>24.90</td>
<td>11.20</td>
<td>22.50</td>
<td>16.40</td>
<td>6.20</td>
<td>8.40</td>
</tr>
<tr>
<td>n=10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79-81</td>
<td>15.64</td>
<td>9.00</td>
<td>13.27</td>
<td>21.00</td>
<td>6.91</td>
<td>8.91</td>
</tr>
<tr>
<td>n=11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82-90</td>
<td>7.44</td>
<td>6.00</td>
<td>10.67</td>
<td>9.67</td>
<td>2.33</td>
<td>8.56</td>
</tr>
<tr>
<td>n=9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16.27</td>
<td>8.83</td>
<td>15.57</td>
<td>16.07</td>
<td>5.30</td>
<td>8.63</td>
</tr>
<tr>
<td>n=30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fidget A = The first five minutes in the room
Fidget B = The second five minutes in the room
Fidget C = During the video
Figure 8: Mean Fidget Scores by Time Period and Age Group in the "Typical" Room

Figure 9: Mean Fidget Scores by Time Period and Age Group in the Modified Room
Retention and Fidget Scores

In immediate testing, there was a significant correlation between retention scores and fidgeting in the “typical” room during the video ($r_{(29)} = .391, p<.033$), but not in the modified room ($r_{(29)} = -.055, p<.775$). This positive relationship could be a result of increased movement in an attempt to hear the video, an effort that was not required in the modified room. This interpretation is supported by actions recorded on the videos. Common movements recorded during the first five minutes are those easily associated with boredom or impatience. For example, participants would be looking around the room, adjusting watches/checking time or tapping fingers. During the video however, most participants managed to stay physically focused on the video monitor but displayed movements that would orient them closer to the monitor. For example, moving forward in the seat or tilting one ear towards the speaker while still watching the video. The relationship between fidgeting during the video and retention scores was not significant for either room in the delayed testing condition.

There were no significant correlations found between retention score and fidgeting in the modified room (see Table 14).
Table 14: Correlation Between Retention Scores and Fidgeting During the Video in the Modified and “Typical” Rooms

<table>
<thead>
<tr>
<th></th>
<th>Immediate Score</th>
<th>Fidget During Video</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Modified Room</td>
<td>“Typical” Room</td>
</tr>
<tr>
<td>Immediate Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Room</td>
<td></td>
<td>.241</td>
</tr>
<tr>
<td>“Typical” Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget During Video</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Room</td>
<td>-.055</td>
<td>-.049</td>
</tr>
<tr>
<td>“Typical” Room</td>
<td>-.008</td>
<td>.391*</td>
</tr>
</tbody>
</table>

N=30 for each correlation
*p<.005

Retention, Fidget Scores and Experience with Computers

In order to address the concern that the exposure to IT was the source of stress for participants, after their final retention test they were asked, “Have you had any previous experience with computers?” This question yielded a wide range of responses, from none at all to the frequent use of a variety of programs and the internet on their own computer. To enable these responses to be used as an independent variable, each participant was assigned an IT Experience Score based on whether, in the Researcher’s judgement, the participant had an experience level that could be described as minimal (e.g. Transit, bank machine, no PC), moderate (e.g. uses PC for card games or word processing) or extensive (e.g. uses variety of PC programs and internet).

The first analysis performed on the data was to compare groups. Table 15 shows the distribution of IT experience scores across the groups. Although Group 4 had fewer participants categorized as having extensive experience, a Chi-square test indicated that there were no statistically significant differences between the groups.
Table 15: Experience Scores by Group

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Minimal</th>
<th>Moderate</th>
<th>Extensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Group 2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Group 3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Group 4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

There were no significant correlations between computer experience and any of the sociodemographic or health status data collected.

Next, each individual’s IT Experience Score was intercorrelated with instruction retention scores and fidget scores. There were no statistically significant relationships between the IT Experience Score and retention scores (see Table 16). However, there were statistically significant negative correlations (see Table 17) between experience with computers and amount of fidgeting in the “typical” room in all three measurement periods (1st 5-Minutes: \( r(29) = -0.366, p < .05 \); 2nd 5-Minutes: \( r(29) = -0.486, p < .01 \); Video: \( r(29) = -0.368, p < .05 \))

No such relationship was found for the modified room. This suggests that the less institutional ambiance of the modified room may have helped mitigate the stress experienced by those less familiar with technology.
Table 16: Correlation Between IT Experience and Retention Scores

<table>
<thead>
<tr>
<th></th>
<th>Immediate</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>IT Exp</td>
<td>Mod Rm</td>
<td>&quot;Typ&quot; Rm</td>
<td>CHF</td>
<td>HIP</td>
<td>1st</td>
<td>2nd</td>
<td>Mod Rm</td>
<td>&quot;Typ&quot; Rm</td>
<td>CHF</td>
<td>HIP</td>
<td>1st</td>
<td>2nd</td>
<td>Mod Rm</td>
<td>&quot;Typ&quot; Rm</td>
<td>CHF</td>
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<td>IT Exp</td>
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<tr>
<td>Modified Room</td>
<td>.143</td>
<td></td>
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<tr>
<td>&quot;Typical&quot; Room</td>
<td>.157</td>
<td>.241</td>
<td></td>
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<tr>
<td>CHF</td>
<td>.184</td>
<td>.714**</td>
<td>.591**</td>
<td></td>
<td></td>
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<tr>
<td>HIP</td>
<td>.145</td>
<td>.606**</td>
<td>.773**</td>
<td>.456**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1st Room</td>
<td>.083</td>
<td>.651**</td>
<td>.649**</td>
<td>.564**</td>
<td>.824**</td>
<td></td>
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<tr>
<td>2nd Room</td>
<td>.230</td>
<td>.553**</td>
<td>.624**</td>
<td>.754**</td>
<td>.543**</td>
<td>.243</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified Room</td>
<td>.147</td>
<td>.651**</td>
<td>.249</td>
<td>.382*</td>
<td>.560**</td>
<td>.679**</td>
<td>.165</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Typical&quot; Room</td>
<td>.079</td>
<td>.180</td>
<td>.761**</td>
<td>.381*</td>
<td>.643**</td>
<td>.560**</td>
<td>.393*</td>
<td>.351**</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CHF</td>
<td>.063</td>
<td>.335*</td>
<td>.473**</td>
<td>.477**</td>
<td>.411*</td>
<td>.513**</td>
<td>.284</td>
<td>.661**</td>
<td>.681**</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>HIP</td>
<td>.154</td>
<td>.470**</td>
<td>.622**</td>
<td>.349*</td>
<td>.804**</td>
<td>.745**</td>
<td>.322</td>
<td>.692**</td>
<td>.793**</td>
<td>.497**</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1st Room</td>
<td>.116</td>
<td>.438**</td>
<td>.443**</td>
<td>.327</td>
<td>.604**</td>
<td>.791**</td>
<td>.030</td>
<td>.765**</td>
<td>.665**</td>
<td>.720**</td>
<td>.770**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Room</td>
<td>.104</td>
<td>.343*</td>
<td>.644**</td>
<td>.454**</td>
<td>.616**</td>
<td>.409*</td>
<td>.609**</td>
<td>.507**</td>
<td>.769**</td>
<td>.624**</td>
<td>.732**</td>
<td>.370*</td>
<td></td>
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</tr>
</tbody>
</table>

N=36
*p<.005
**p<.01
Table 17: Correlation Between IT Experience Score with Computer Score and Fidgeting While in the Modified and “Typical” Rooms.

<table>
<thead>
<tr>
<th></th>
<th>IT Exp</th>
<th>Fidget A (Mod)</th>
<th>Fidget B (Mod)</th>
<th>Fidget C (Mod)</th>
<th>Fidget A (Typ)</th>
<th>Fidget B (Typ)</th>
<th>Fidget C (Typ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget A (Mod)</td>
<td>-0.059</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget B (Mod)</td>
<td>-0.337</td>
<td>0.437*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget C (Mod)</td>
<td>0.188</td>
<td>0.503**</td>
<td>0.414*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget A (Typ)</td>
<td>-0.366*</td>
<td>0.337</td>
<td>0.365*</td>
<td>0.137</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget B (Typ)</td>
<td>-0.486**</td>
<td>0.196</td>
<td>0.114</td>
<td>0.198</td>
<td>0.665**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidget C (Typ)</td>
<td>-0.368*</td>
<td>0.348</td>
<td>0.352</td>
<td>0.264</td>
<td>0.689**</td>
<td>0.623**</td>
<td></td>
</tr>
</tbody>
</table>

N=30 for each correlation
*p<.005
**p<.01

Fidget A = The first five minutes in the room
Fidget B = The second five minutes in the room
Fidget C = During the video

Qualitative Assessment

Participants’ comments in response to the question “What three words would you use to describe the room you were just in?” suggest that the overwhelming majority preferred the modified room to the “typical”. Support for this interpretation comes from two separate analyses, the first of which categorized the individual words used as positive, neutral or negative. As shown in Table 18, the majority of words used to describe the modified room were positive whereas the majority of words used to describe the “typical” room were negative. This pattern held regardless of the order in which the rooms were seen.
Table 18: Affect of Words Used to Describe the “Typical” and Modified Rooms

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Typical” Room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When Seen First</td>
<td>11</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>When Seen Second</td>
<td>10</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>Modified Room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When Seen First</td>
<td>28</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>When Seen Second</td>
<td>45</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

Clearly noise was perceived as a problem in the “typical” room and a number of individuals found its décor to be bleak and depressing whether they were exposed to it before or after seeing the modified room (See Table 19). In contrast, the décor of the modified room was described as comfortable and relaxing regardless of order of exposure to it.

Table 19: Most Common Responses to the Question “What three words would you use to describe the room you were just in?”

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Typical” Room</td>
<td>Comfortable (4) Tidy/clean (4) Bright, pleasing, efficient (1 ea.) Bright/well-lit (6) Comfortable (2)</td>
<td>Dull/plain (13) Depressing/non-cheery (10) Noisy, small/cramped (8 ea) Bleak/stark (12) Excessively noisy (10)</td>
</tr>
<tr>
<td>When Seen First</td>
<td>Comfortable/cozy/relaxing (18) Bright (4) Comfortable/cozy/soothing (22)</td>
<td>Small (5) Colours too dark (2) Dark (2) Dull (b/c of drapes), stuffy, oppressive, inhospitable, lonely, darker, noisier (1 ea.)</td>
</tr>
<tr>
<td>When Seen Second</td>
<td>Quiet, nice, coordinated (4 ea.)</td>
<td></td>
</tr>
</tbody>
</table>

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In further analysis, paired comparisons were made using each participant’s descriptors for each of the two rooms. For the vast majority of participants (n=31) the preference was clear. For example, one participant described the “typical” room as “dull, boring, monotonous” and the Modified room as “beautiful, soothing, homey”. There were only three participants whose descriptors indicated a preference for the “typical” room and two for whom there was no clear preference.
DISCUSSION

Many studies, including those comparing ACE with traditional hospital units, have combined modifications to the physical environment with changes in staffing, and/or in care policies and procedures; as a result, they have not been able to isolate the contribution made by the individual factors to the outcomes being analyzed. What is unique about this research is that strict attention was paid to limiting the cause of potential differences in the learning/retention of post-discharge instructions to differences in the physical environment in which they were delivered. In addition, the counterbalanced design in which half of the participants received their first set of instructions in the modified room and the other half in the “typical” room meant that the effects of room order could be examined during data analysis. The study also used two different types of instruction (HIP, CHF) in order to minimize transfer effects.

The data collected partially supported the first hypothesis which predicted that the learning/retention of post-discharge instructions (immediate and delayed) would be greater when older adults receive the instructions in a hospital setting modified to have fewer auditory and visual distractions than in a “typical” FH hospital room. It had been hoped that the room effect would be sufficiently powerful that regardless of room order or instruction type, participants would retain instructions better if they were received in the modified room. Instead, what was found in the MANOVA was an interaction between room type and instruction type and order, with learning/retention scores only differing significantly between rooms in the delayed test (after 24 hours). The absence of
differences between rooms in the immediate retention test may have been because of
ceiling effects. That is, the test was not sufficiently difficult to allow differences in the
degree to which the information was learned (i.e. in the depth of encoding) to become
apparent. Alternatively, the time interval between learning and testing may have been
too short for differences in learning to be reflected. The significant difference between
rooms in the delayed test does however; suggest that greater learning occurred in the
modified room.

Age effects became apparent in the correlational analyses. There were significant
negative correlations between age and instruction retention scores in both immediate and
delayed tests when post-discharge instructions were received in the “typical” room. Age
was also negatively correlated with retention scores for the CHF instructions. What these
data suggest is that for seniors in the oldest-old category (over 80 yrs of age), having to
learn and retain complex post-discharge instructions in a room that has visual and
auditory distraction (such as in the “typical” room) is problematic.

This interpretation is consistent with Lawton and Simon’s (1968) Environmental
Docility Hypothesis and Lawton and Nahemow’s (1973) Ecological model, both of
which suggest that as a person’s competence decreases (as with age or illness), so too will
their ability to adapt to pressures from the physical environment.

The increased influence of the environment with age is also consistent with Hall
and Buckwalter’s (1987) Progressively Lowered Stress Threshold Model. This model
would predict that because tolerance for stress decreases as dementia advances, the more
stressful environment would have a greater negative impact on persons with greater
degrees of cognitive impairment. It is commonly known that the prevalence of dementia

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increases with age. And while there was no significant correlation between age and scores on the Hopkins Verbal Learning Test (used in participant screening to test for dementia and as an independent variable in the analysis of retention scores) it is possible, that some cognitive impairment, that the Hopkins test was not sensitive enough to detect, had occurred in the oldest participants. If this were the case, it would explain the result illustrated in Figure 6, that for the oldest participants, learning the more difficult instruction set (CHF) was more difficult in the less supportive ("typical") room.

The second hypothesis predicted that participants' stress level, as demonstrated by physiological indicators (heart rate, fidgeting), would be lower when instructions were received in the modified hospital room rather than in a "typical" FH hospital room. Unfortunately, the heart rate data were unusable. However, the "fidget chair" data provided strong support for the hypothesis. The older adult participants in this study fidgeted significantly more while watching the post-discharge instructions video in the "typical" room than when watching the video in the modified room. In the case of the "typical" room, fidget rates while watching the video approached those seen when study participants first entered the room. If fidgeting is taken as an indicator of stress, then study participants were as stressed during the video as when they first entered the room.

In an attempt to determine if the stress was due to lack of familiarity with information technology, rather than difficulty in attending to the video due to the auditory and visual distractions of the "typical" room, IT experience Scores were intercorrelated with fidget scores. There was no relationship between IT experience and fidgeting in the modified room. There were, however, significant negative correlations between experience with IT and amount of fidgeting in the "typical" room in all three
measurement periods. If IT experience is considered as a competency again, findings are consistent with the Environmental Docility Hypothesis and Ecological Model in showing that those with less competency are impacted more by the negative conditions in the physical environment.

The third hypothesis predicted a negative correlation between retention test scores and physiological stress, on the assumption that stress acts as a moderating/intervening variable. Interestingly the relationship between fidgeting and retention in the “typical” room was positive. Here, movement during the video may have been the result of attempts to better hear the spoken components of the video, as opposed to stress per se.

**Implications for Future Hospital Design and Renovation**

As noted earlier, there were several modifications made to the environment of the Modified room, each with differing degrees of impact on noise reduction. As incremental sound measurements indicated, the greatest reduction in noise occurred with the installation of the dropped ceiling with acoustical tiles. The curtains, made from a heavier weighted fabric and with 10% greater yardage than standard curtains to provide more folds, also worked very well at reducing both auditory and visual distraction. Both of these modifications gave very good noise reduction value for the dollar cost and were aesthetically pleasing. It is recommended that both be given serious consideration when new construction or renovations are planned.

While the rubber flooring was aesthetically pleasing, its contribution to noise reduction was minimal. As the initial cost of this flooring product is greater than other flooring options, installing it primarily for the purpose of noise abatement does not make
economic sense. There are however, other important factors, such as long-term maintenance and durability, to be considered in choosing flooring that were not included in this research. It is possible that an evaluation including these considerations would reach a different conclusion.

The changes made to improve the aesthetics of the room (co-ordinated colour scheme, wood laminate finishes on the furniture, pictures on the wall, wall sconce) were of minimal cost but appear to have had a positive impact on participants’ reaction to the room. On the strength of the responses to the subjective questions alone, a shift in the environmental design philosophy for hospitals towards a more “home-like” ambiance would appear to be justified.

**Limitations**

Although this study yielded data suggesting that modifications to the physical environment of hospital patient rooms that reduce noise and distraction may aid older adults in the learning and retention of post-discharge instructions, the findings related mainly to the oldest participants. It is possible that room effects may have been muted by the fact that the participants of this pilot study were non-hospitalized older adult volunteers, not “real” patients. That is, it is possible that the sample was too healthy to maximally benefit from the modifications undertaken.

Further, considerable time and attention was devoted to creating an instruction set that capitalized on theory and research findings with respect to both learning and the common needs of older adults (e.g. it included repetition, multiple cueing, graphics, high colour contrast, large type font). While it was considered important to create a set of
instructions that would provide participants with well-constructed, valid information, this may in the end have attenuated the impact of the modifications. That is, the presentation format may have been too good. Certainly, it was not indicative of the typical hospital-discharge scenario where instructions are delivered orally by a live person, without benefit of repetition or multiple cuing. It is further possible that the decision to administer a cued recall/recognition test instead of free recall contributed to a ceiling effect.

While the utmost of care was taken to vary only the physical environment in presenting post-discharge instructions, there remains the possibility that other factors influenced the result. For example, the small sample size and unequal age subgroups or the possibility that the measures of learning and memory and/or health and functional status were not sensitive enough to detect age differences.

A second assumption that warrants some discussion is whether fidgeting is an appropriate indicator of stress. It could be argued that fidgeting is not strictly the result of a negative stress state such as nervousness, anxiety or boredom but that it could in also result from a positive stress state such as excited anticipation. In addition, stress can be a difficult and multifaceted state to define. It would seem a reasonable presumption that in this type of situation (i.e. waiting alone and uninformed in a hospital room), fidgeting is likely the result of nervousness or anxiety. Participant actions, as captured by the webcams and DVD recorder, show a definite distinction between the fidgeting recorded prior to the instruction video from the fidgeting that occurred while watching the video. Typical movements in the first five minutes include checking the time, looking around the cubicle, and tapping of fingers/feet. These suggest agitation or anxiety as they waited
without knowing whether there was a problem with the video equipment that was supposed to come on; whether the researcher would return and/or disconcerted by being in a hospital environment. In the second five minutes they appeared to settle down. In the third five minutes movement again occurred. However, while watching the video, movements were more purposeful than they had been in the first five minutes; they typically included actions that would orient the participant closer to the monitor, presumably to improve their ability to hear. The greater number of such movements in the “typical” room is consistent with an attempt to cope with the noisy surroundings. It is a reasonable assumption that the frustration of not being able to hear the instructions, even after having moved closer, combined with the knowledge that their learning would be tested, would be a source of stress for participants in the “typical” room.

### Recommendations for Future Research

This pilot study has yielded promising findings with respect to the role of the physical environment in facilitating or impeding the learning and retention of post-discharge instruction. The participants in this research were healthy, independent living seniors; real hospital patients would likely present with co-morbidities and more pronounced cognitive impairment. Real patients would also introduce mood as a possible moderator of effect. Where the participants of this study were generally happy, commenting that they were having fun, real patients faced with the anxiety of real illness and real discharge may behave differently. The inclusion of a measure to assess mood would be important to consider in the design of future research. Depression as well as disease and/or disability would, according to theory, contribute to lower competency and increased susceptibility to stress and a greater likelihood of benefit from modifications
made to the physical environment. Thus, the recommended next steps for research include implementing the recommendations and evaluating their impact on “real” patients.

In addition, in the present study we controlled for differences in personal variables such as hearing ability via the screening criteria. The study needs to be repeated with a more heterogeneous group.

As was mentioned earlier, the correlation between age and decreased learning/retention could be attributed to the presence of cognitive impairment that the Hopkins Verbal Learning Test was not sensitive enough to detect. Primarily, this test was chosen for its brevity; however, it also has demonstrated reliability and validity. In future research consideration should be given to either supplementing this measurement tool with additional tests or to replacing it with a more extensive test.

Within the video data collected for this study there is still much that could be explored. For example, a detailed analysis could be undertaken of verbal utterances while alone in the two rooms, facial expressions and the physical and verbal response to specific portions of the soundscape such as the background beeps or conversation between the other (fictitious) occupants of the four-bed room. Often the participants ‘talked’ themselves through the touchscreen retention test; analysis of their flow of conversation could provide insight into their use of schemas to facilitate learning of the post-discharge instructions. The data collected during this study also included a series of questions designed to determine study participants’ subjective reactions to use of IT to deliver post-discharge instructions (see Appendix 5). Additionally, a second version of the touchscreen test was developed (not yet tested) in which participants are forced to
keep answering each question until they produce a correct response. It is only when “correct” is shown by a change in the colour of the button that was pressed, that they may move on to the next question. While in the present study a participant was never informed if their answer was right or wrong nor told their total score on the touchscreen test, the method of construction of the alternate touchscreen test could facilitate deeper learning that would have “payoff” when the patient went home. In the present study, our thinking in only allowing participants one chance to select the correct answer and never revealing their total score was that a high score could give a false sense of security about their ability to learn and so reduce motivation and effort to attend when watching the second set of instructions. Conversely, a low score could cause a feeling of hopelessness leading to a lower level of effort in the second room.

It will be important in future studies to go beyond verbal testing of retention of instructions following hospital discharge, to determine the impact of alternate modes of delivering instructions on behaviour in the home. Presumably, better learning and retention of instructions prior to discharge will translate into better self-care and compliance with treatment regimens post-discharge.

Like much of the previous research on the physical environment, many components created the “whole” of the Modified room. An obvious division can be made between the aesthetic and the structural changes. It would be interesting in future research to compare retention of instructions given in four hospital rooms: a “typical” room, an aesthetically modified room, a room with structural modifications only; and a room with both aesthetic and structural modifications. It will also be important to explore the influence of personal preferences and associations with various of the
aesthetic changes implemented (for example in the present study, one participant associated the colour green in the “typical” room, with her experience of being an “army brat” – i.e. a child whose father was in the military). The concept of “home-like” as it applies to hospital rooms also needs to be explored across a variety of cultural and socioeconomic groups to determine if there are any ‘universal’ symbols of ‘home’ that could be incorporated into future design. An interesting comment made by several participants in Study 2 of the larger project (RN’s, LPNs, care aides) was that they did not want to see the hospital patient room made more “home-like” as it would encourage patients to linger as opposed to wanting to go home as soon as possible. It would be interesting to compare actual length of stay and re-admittance rates of patients with similar diagnoses in relation to how “homey” they would rate the room in which they had stayed.

Noise in the “typical” room was clearly a problem; this was apparent from the feedback given by participants. While it is believed that modifying the patient room to lessen the distraction and interference caused by noise was the major factor in making the environment more suitable for the learning and retention of post-discharge instructions, it was not possible in this study to determine the relative contribution of the individual modifications made to the room. Clearly, the modified room was preferred by the vast majority of participants (many stated that they felt “comfortable”, “relaxed” or “calm” in the modified room). However, the feelings expressed by participants could have resulted from the lessened noise, they may have been inspired by the décor, or the whole may have been greater than the sum of the parts. The direct contribution and the interaction of the individual modifications to learning and other possible outcomes warrant future
research. This could be explored in future studies for example by asking participants to rate the importance of the individual modifications.

Response to our use of IT in delivering the post-discharge instructions and in the immediate retention testing was more positive than expected given the stereotype that older people are technology averse. It would be interesting to further explore the use of technology in teaching older adults about post-hospital self-care. The participants in this study were all quick to learn how to use the touchscreen monitor and unanimously declared liking using it. In addition, most of the participants agreed that, had they been a “real” patient, they would have been comfortable receiving their post-discharge instruction via video. This suggests that the development of IT-mediated post-discharge instructions for use by older adults may be a useful endeavour. However, the efficacy of this method compared to standard delivery of instructions remains to be established.

The research design had included multiple means to assess stress (EKG, fidget chair, video recording), unfortunately the EKG data proved unreliable and thus unusable. The wireless EKG technology that had worked during pilot tests simply could not live up to its “billing” in actual testing. Another method of measuring stress that had been considered in designing the research was to assess cortisol levels. This indicator was rejected however because, it was thought that there would be insufficient time during the protocol to collect a sufficient number of saliva samples to yield meaningful results, and that saliva collection was too intrusive. Additionally, the cost of having the samples analyzed was determined to be prohibitive. However, in a hospital setting, with real patients, taking multiple samples would not be difficult, nor would it be any more intrusive than collecting blood or urine samples. Another alternative to EKG that should
be considered, and that was used in Studies 3b & 3c is a pulse oximeter, which measures heart rate via a clip attached to the participant’s finger. Initial analysis of data from Studies 3b and 3c indicates that this is a more reliable tool that the wireless EKG used in Study 3a. It would be advantageous in future research to also include some questions that would elicit a qualitative assessment of stress.

The innovative “fidget chair” proved to be an unobtrusive and inexpensive way of collecting data. Further exploration of the fidget/stress relationship as well as further refinement of the chair itself should also be undertaken.
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Critical Path Network. ACE unit seeks to reduce elderly functional decline: Interdisciplinary team determines interventions (2002). *Hospital Case Management; the Monthly Update on Hospital-Based Care Planning and Critical Paths, 10*(5), 71-73.


Human Resources and Skills Development Canada. (2005). Building on our Competencies: Canadian Results of the International Adult Literacy and Skills Survey (Catalogue No. 89-617-XIE). Ottawa, Canada: Ministry of Industry.


APPENDIX 1 - PARTICIPANT RECRUITMENT MATERIALS

a) Information Letter
b) *Burnaby Now* Newspaper Article
c) Recruitment Poster
Appendix 1a): Information Letter

TOWARDS MORE ELDER FRIENDLY ACUTE CARE HOSPITALS STUDY
Information for Potential Study Participants

This is an invitation to participate in a study that is being conducted by the Gerontology Research Centre at Simon Fraser University for the Fraser Health Geriatric Clinical Services Planning and Delivery Team. The purpose of the study is to develop recommendations to improve the elder friendliness of the physical environment of medical and surgical units in hospitals in Fraser Health (FH). An “Elder Friendly” environment is one that takes into consideration the special safety, physical, social and psychological needs of older adult patients. The physical environment includes the room layout (e.g. where the ensuite bathroom is located in relation to the patient beds and the door to the room). It also includes the furniture in the patient rooms and how it is arranged as well as other interior design components such as the colour and texture of bed curtains, wall and window treatments, flooring, the types/levels of lighting, furniture fabrics, etc.

If you choose to participate in the study, you will be asked to come to Burnaby Hospital where we will take you into two differently designed patient rooms. In each, we will ask you to play the role of an older adult patient who has just spent several days in hospital recovering from a hip fracture or as a result of congestive heart failure. In your role as patient, we will ask you to listen to a set of self-care post-discharge instructions. The instructions will be given to you by a research assistant who is playing the role of a nurse. During the time the “nurse” is giving you the instructions, you will be seated in a chair with the bed curtains drawn. While you are waiting for the nurse to arrive, during and after listening to the instructions we will monitor your response to distractions (noise; movement in the room) and for indicators of stress. This will be done using non-invasive wireless technology that will record your vital signs (e.g. heart and respiration rate; blood pressure). With your permission, we would also like to videotape you as you interact with the “nurse”. There will be a break between the time you go into room 1 and the time you go into room 2. During the break, and again after you have been in room 2, we will test your comprehension and recall of the instructions the “nurse” gave you. We will also ask your opinion about ways the room’s layout or interior design components could be improved to make it easier for you to receive and remember post-discharge instructions. At a prearranged time in the next week we will telephone you to again test your comprehension and retention of the post-discharge instructions.

Participation will take approximately 2 hours (1.5 hours for the Burnaby Hospital session and 0.5 hours for a preliminary phone call and for the telephone follow-up). Participants will receive refreshments at the hospital, a transportation/parking allowance of up to $10 and a $50 honourarium as a ‘thank-you’ for taking part in the study.

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We are seeking older adult volunteers who meet the following criteria:

1) age 75 or over
2) living in their own house or apartment
3) fluent in English
4) able to hear normal talk with minimum difficulty (with a hearing aid if used)
5) able to read letters the size of newspaper print (with glasses if used)
6) have not had a hip fracture or been told by your doctor that you have Congestive Heart Failure (CHF), a movement disorder (e.g. Parkinson's), or cognitive impairment (e.g. Alzheimer's or other dementia).
7) have not been the caregiver for a person recovering from a hip fracture or suffering from CHF.
8) were not primarily employed as a health care professional during their working years.

Please note that CONFIDENTIALITY IS ASSURED. While your opinions about the rooms will be communicated to Fraser Health, your name will not appear on any reports or be linked to any specific statements. You do not have to answer any questions you are not comfortable answering and may end your participation in the study at any time.

We hope that you will choose to participate in the study. A recent literature review commissioned by Fraser Health (Gutman, 2005) determined that there is little research examining how the physical environment of hospitals impacts the prevalence of accidents and loss of function during hospital stays beyond what is expected from the admitting diagnosis of older persons. Given the substantial number of older adults that currently are hospital patients and their growing numbers as the population ages, it is important to further develop this area of research. This study, funded by Fraser Health, serves as a step towards improving the elder friendliness of the physical environment of hospital medical and surgical units and thus the well-being of senior citizens.

If you are interested in participating in the study, please telephone 604-412-6168 or email tmlove@sfu.ca.

BE SURE TO LEAVE THE FOLLOWING INFORMATION:

1. Your name
2. Your contact telephone number(s).

The project’s Principal Investigator is Dr. Gloria Gutman from the Gerontology Research Centre at Simon Fraser University. Co-investigators are Kathleen Friesen – a member of the Fraser Health Geriatric Clinical Services Planning and Delivery Team and Teena Love a graduate student at SFU. Teena will be the person who contacts you to schedule your visit to the Burnaby Hospital study rooms. Before doing so, however, she will also ask you some questions about your socio-demographic characteristics (e.g. age, sex, marital status, housing and living arrangements), about your functional status and health. This information is needed for two reasons: first, to determine eligibility for the study and secondly, so that we can clearly describe study participants in our reports. Teena will be using the data from this study for her Master’s thesis.
If you have any questions about the study you can contact one of us at the phone numbers provided below.

Sincerely,

Gloria M. Gutman, PhD
Tel: 604-291-5063

Kathleen Friesen, BSN, MA
Tel: 604-587-4640

Teena Love, BA,
MA Candidate (Gero)
Tel: 604-412-6168
Appendix 1b): Burnaby Now Newspaper Article

(Hitchcock, November 22, 2006)

Study looks at senior-friendly hospital care

By Karen Hitchcock, Wednesday, November 22, 2006

Researchers from the Fraser Health Authority and Simon Fraser University hope a study will help them find out what makes hospitals "middle-friendly."

New research being done at Simon Fraser University could help health care providers look at their hospitals "from a middle-aged perspective."

"This study looks at some of the environmental factors they [middle-aged people] have to deal with when visiting the hospital," said Dr. Steve Giegen of Simon Fraser University, who is heading the study.

"This project will look at how things are different in the hospital from a middle-aged person's perspective," said Giegen.

"There are a lot of environmental factors that you have to deal with when visiting the hospital," said Giegen.

"We hope to find out what makes hospitals middle-friendly."

Researchers are looking for participants to take part in the study, and those who do will get a $50 honorarium for their participation.

The study is open to the public, and anyone interested in participating can contact the researchers at

research@fraserhealth.ca

or

604-660-5000, ext. 3800

The researchers are looking for participants to take part in the study, and those who do will get a $50 honorarium for their participation.

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Friendly space: Brandon Ngai, left, and Leona Yong, two SFU psychology students helping to conduct a research study that aims to make Burnaby Hospital "middle-friendly."

"We are looking for people to participate in this study," said Giegen.

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Appendix 1c): Recruitment Poster

Elder Friendly Hospitals Research

Simon Fraser University is conducting a study for the Fraser Health Geriatric Clinical Services Planning and Delivery Team. We are recruiting older adults to spend approximately 2 hours in 2 differently designed patient rooms at Burnaby Hospital. You would be asked to complete some typical patient activities such as walking from the bed to the bathroom, sitting and rising from a chair or listening to post-discharge instructions. Afterwards, you would be asked about your experience and the rooms. During the research your heart rate will be monitored and you will be video-taped.

Minimum Criteria:
- Aged 75 or older
- Living independently or semi-independently in their own home
- Fluent in English
- Able to see and hear with minimum difficulty
- Were not primarily employed as a health care professional during their working years

$50 for Participation

For more information call Teena Love, 604-412-6168
Introduction: In order to be able to describe who took part in this study I need to ask you some questions about yourself and your health and functional status. Please note that the information that you give will be kept strictly confidential and will be reported in the aggregate only (e.g. the study participants ranged in age from 75-; ___% were female.

Part A: Selection Criteria

My first questions are to confirm that you meet the criteria for participating in our study.

1. Your age at last birthday __________
2. Are you fluent in English? ___Yes ___No
3. Which of the following describes your current housing?
   ___Private home/apt. with no home care services
   ___Private home/apt. with home care services
   ___In home of family member
   ___Unit in a Senior’s housing project. If so, name of project
   ______________________________________________________________
   ___Board and care/assisted living/group home. If so, name of home
   ______________________________________________________________
   ___Other, please specify
   ______________________________________________________________
4. What was your main occupation for most of your adult life?
   Primary _______________________________________________________
   Secondary _____________________________________________________
5. Have you ever been a caregiver for a person with Congestive Heart Failure?
   ___Yes ___No
6. Have you ever been a caregiver for a person recovering from a hip fracture?
   ___Yes ___No
7. Which of the following best describes your current level of hearing (with hearing aid if used)?
   ___ Hear adequately (e.g. talk, phone, TV, doorbell all at normal volume)
   ___ Minimal difficulty (e.g. background noise interrupts)
   ___ Need some help (e.g. speakers need to adjust tone and speak distinctly)
   ___ Highly impaired (e.g. absence of useful hearing without aid)

8. With glasses, if used, do you have difficulty seeing letters the size of newspaper print or doing close work? ___ Yes ___ No.

9. How many prescription medications are you currently taking? _____
   Can you please name them:
   ______________________
   ______________________
   ______________________
   ______________________
   ______________________
   ______________________
   ______________________

Part B: – Hopkins Verbal Learning Test (Part 1-Immediate Recall)

I do have more questions about you, but first I’d like to do a short word exercise. First, I’ll read you a list of words and then ask you to repeat back to me as many as you can remember. You don’t have to repeat them quickly or in the same order; I’m only counting the number of words you that tell me. We will go through the list 3 times. After that I will read you another list of words, after each word I will want you to tell me if it was on the original list. This will measure how well you can remember some common English words and give me something to compare your study result to later. Do you have any questions? [Answer if any] Okay, I’ll start the list if you are ready.

Read list, record answers
Part C: Personal Characteristics and Supports

The next questions give me general information that I can use to describe the participant group.

10. Gender _____ M _____ F
11. Marital Status _____ Never Married
   _____ Married
   _____ Divorced
   _____ Separated
   _____ Widowed
12. Which of the following describes your current living arrangement?
   ____ Live alone
   ____ Live with spouse only
   ____ Live with spouse and others
   ____ Live with child (not spouse)
   ____ Live with others (not spouse or child)
   ____ Live in group setting with non-relative(s)
13. What was your highest level of education? (select one)?
   ____ No schooling
   ____ 8th grade or less
   ____ 9-11 grades
   ____ High school graduation
   ____ Technical or trade school
   ____ Some college/university
   ____ Bachelor’s degree
   ____ Graduate degree
14. Over the last week, please tell us the average amount of help you have received from others (rounded to the nearest 30 minutes).

- Help from family, friends and neighbours on weekdays
  _____ Hours  _____ Minutes
- Help from family, friends and neighbours on weekends
  _____ Hours  _____ Minutes
- Help from others (e.g. homemakers, home health aids, volunteers) on weekdays
  _____ Hours  _____ Minutes
- Help from others (e.g. homemakers, home health aids, volunteers) on weekends
  _____ Hours  _____ Minutes

**Part D: Physical Function**

These next questions will give me a description of your general level of physical function.

15. Do you have difficulty getting around safely due to visual difficulties?
   _____ Yes  _____ No

16. Please describe your performance of each of the following activities during the last week:
   a. Meal Preparation (e.g. planning, cooking assembling ingredients, setting our food and utensils)
      _____ Did without help
      _____ Needed some help or help sometimes
      _____ Needed help all the time
      _____ Done by others
      _____ Activity did not occur
b. Ordinary house work (e.g. dishes, dusting, making bed, tidying up, laundry)
   ___ Did without help
   ___ Needed some help or help sometimes
   ___ Needed help all the time
   ___ Done by others
   ___ Activity did not occur

c. Managing finances (e.g. how bills are paid, cheque book balanced, household expenses balanced)
   ___ Did without help
   ___ Needed some help or help sometimes
   ___ Needed help all the time
   ___ Done by others
   ___ Activity did not occur

d. Managing medications (e.g. remembering to take medication, opening bottles, taking the right dosage, giving injections, applying ointment)
   ___ Did without help
   ___ Needed some help or help sometimes
   ___ Needed help all the time
   ___ Done by others
   ___ Activity did not occur

e. Phone use (how calls are made e.g. using assistive devices such as larger numbers or telephone amplification)
   ___ Did without help
   ___ Needed some help or help sometimes
   ___ Needed help all the time
   ___ Done by others
   ___ Activity did not occur
f. Shopping (for food or household items, how are items selected, managing money)

___ Did without help
___ Needed some help or help sometimes
___ Needed help all the time
___ Done by others
___ Activity did not occur

g. Transportation (getting to places beyond your walking distance)

___ Did without help
___ Needed some help or help sometimes
___ Needed help all the time
___ Done by others
___ Activity did not occur

17. If you answered ‘Activity did not occur’ for any of the above activities, please estimate how difficult you feel the activity would have been for you.

a. Ordinary house work

___ Not difficult
___ Some difficulty (e.g. need some help, are very slow or you become fatigued)
___ Great difficulty (e.g. little or no involvement with the activity is possible)

b. Managing finances

___ Not difficult
___ Some difficulty (e.g. need some help, are very slow or you become fatigued)
___ Great difficulty (e.g. little or no involvement with the activity is possible)
c. Managing medications
   ______ Not difficult
   _____ Some difficulty (e.g. need some help, are very slow or you become fatigued)
   _____ Great difficulty (e.g. little or no involvement with the activity is possible)

d. Phone use
   ______ Not difficult
   _____ Some difficulty (e.g. need some help, are very slow or you become fatigued)
   _____ Great difficulty (e.g. little or no involvement with the activity is possible)

e. Shopping
   ______ Not difficult
   _____ Some difficulty (e.g. need some help, are very slow or you become fatigued)
   _____ Great difficulty (e.g. little or no involvement with the activity is possible)

f. Transportation
   ______ Not difficult
   _____ Some difficulty (e.g. need some help, are very slow or you become fatigued)
   _____ Great difficulty (e.g. little or no involvement with the activity is possible)

18. Do you regularly use a cane, walker or crutch? _____No_____Yes
   (Specify) ________

19. Is a wheelchair your primary method of locomotion? _____Yes _____No
20. Over the last week, which of the following best describes your ability to go up and down stairs?

- ___ Up and down stairs without help
- ___ Up and down stairs with help
- ___ Did not use stairs but could have without help
- ___ Did not use stairs but would have needed help
- ___ Did not go up or down stairs and could not have

21. During the last month, how many days a week on average did you leave the house or building in which you live?

- ___ Every day
- ___ 4 to 6 days
- ___ 2 to 3 days
- ___ 1 day a week
- ___ No days

22. In the last week, how many hours per day (on average) were you physically active (e.g. walking, cleaning house, exercising)?

- ___ 2 or more hours
- ___ Less than 2 hours

23. In the last week, did you require help with the following activities of daily living?

a. Transfer (e.g. moving to/from bed, chair or wheelchair, moving to sit or stand)

- ___ Did without help
- ___ Needed some help or help sometimes
- ___ Needed help all the time

b. Getting around the house (including while using a cane, walker, crutches or wheelchair)

- ___ Did without help
- ___ Needed some help or help sometimes
- ___ Needed help all the time
c. Toilet use (including transfer on/off toilet or commode chair, self-cleaning, changing pad, adjusting clothes)
   ____Did without help
   ____Needed some help or help sometimes
   ____Needed help all the time

Part E: – Hopkins Verbal Learning Test (Part 2-Delayed Recall)

Before the last couple of questions, I’d like you to think back to the list of words that I had you repeat back to me earlier. Can you try one last time to tell me as many of them as you can remember?

Part F: Health Status

The final questions I am going to ask concern your health status

24. Overall, do you feel that your health is poor? ____Yes ____No
25. In the past 6 months how many times have you fallen? __________
26. Do you limit your activities because of a fear of falling? ____Yes ____No
27. Have you been diagnosed, or hospitalized in the last 6 months, with any of the following conditions?

<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnosed</th>
<th>Hospitalized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heart/Circulation</strong></td>
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<tr>
<td>Congestive Heart Failure</td>
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<tr>
<td>Coronary Artery Disease</td>
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<tr>
<td>Hypertension</td>
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<td>Peripheral Vascular Disease</td>
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<td><strong>Neurological</strong></td>
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<tr>
<td>Alzheimer’s Disease or other dementia</td>
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<tr>
<td>Parkinsonism</td>
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<tr>
<td>Stroke</td>
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<tr>
<td><strong>Musculo-Skeletal</strong></td>
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<tr>
<td>Arthritis/Rheumatism</td>
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<td>Hip Fracture</td>
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<td>Other Bone Fracture</td>
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<tr>
<td>Osteoporosis</td>
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<td><strong>Senses</strong></td>
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<td>Cataract</td>
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<td>Glaucoma</td>
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<td><strong>Psychiatric/Mood</strong></td>
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<td>Any Psychiatric diagnosis</td>
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<td><strong>Infections</strong></td>
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<td>HIV Infection</td>
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<td>Pneumonia</td>
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<td>Tuberculosis</td>
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<td>Condition</td>
<td>Diagnosed</td>
<td>Hospitalized</td>
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<tr>
<td>Urinary Tract Infection (in last 30 days)</td>
<td>(Check below if 'Yes')</td>
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<tr>
<td>Other Diseases</td>
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<td>Cancer, in the past 5 years (not including skin cancer)</td>
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<td>Diabetes</td>
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<td>Emphysema, Chronic Obstructive Pulmonary Disease, Asthma</td>
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<td>Gastritis</td>
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<td>Renal Failure</td>
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<td>Thyroid Disease</td>
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<td>None of the above</td>
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<tr>
<td>Other current diagnoses, please specify</td>
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</tbody>
</table>
APPENDIX 3 - HIP AND CHF POST-DISCHARGE INSTRUCTIONS

a) Development of Post-Discharge Instructions
b) Instruction Slides HIP
c) Instruction Slides CHF
Appendix 3a:

Development of Post-Discharge Instructions

Internet: When it became apparent that there were no standard post-discharge instructions in use in Fraser Health hospitals for common conditions experienced by elderly persons admitted to a medical unit (e.g. chronic heart failure) or to a surgical unit (e.g. hip fracture) the first step was to conduct an internet search. The search led to the discovery of a set of instructions given to CHF patients upon discharge from hospital developed and used by The Iowa Foundation for Medical Care (IFMC). These instructions discussed diet, medications and symptoms to be aware of, amongst other information. However, while discharge instructions were found for total hip replacement patients (e.g. Evanston Northwestern Healthcare) none were found for hip fracture patients.

Consultation with Eagle Ridge Hospital: Debbie Davis, Patient Care Coordinator (PCC) in Medical Unit C2B, was asked to examine the IFMC instructions found for CHF patients in the internet search and to provide feedback regarding their pertinence to what typically happens in Fraser Health (FH). It was learned that the procedure in FH differed from that of the IFMC. In FH patients do not receive “discharge instructions” per se as they are leaving hospital but instead receive education for homecare throughout their hospital stay. As a result, at the time they leave the hospital the only thing they are given is a sheet to take to their family doctor that provides a record of the hospital treatment.

Consultation with “Gold Standard” ACE Unit: Acute Care for Elders (ACE) Units, the “Gold Standard” in acute care for the elderly, were the focus of Study 1, the first phase of this project. The information gained regarding their physical environment is important to the design of the ‘ideal’ room to be used in Study 3. It was thought that their experience with post-discharge instructions might be equally informative. We contacted SUMMA Health, the “Gold Standard” ACE unit, to find out what its discharge instructions for CHF and hip fracture or hip replacement included. Carolyn Holder, Coordinator of Senior Services, forward a copy of a two-page document entitled Heart Failure Survival Skills that goes home with patients hospitalized for CHF. It included information regarding weight monitoring, medications, diet and smoking.

Procedures Followed in Vancouver Coastal Health: In the process of exploring whether standardized post-discharge instructions were given to hip surgery patients in VCH, it was learned that there was a Clinical Pathway Documentation Tool for Fractured Hip Surgery Acute Phase that was in use at St. Paul’s Hospital. A copy of the tool was obtained from Michelle Bech, Orthopedic Nurse Practitioner/Clinical Nurse Specialist. However, the tool was found to be directed to staff rather than patients, documenting the various procedures to be followed in providing care in the hospital pre-and post-surgery.
Construct Hypothetical Instructions?: Being unable to find standard discharge instructions for hip fracture, we considered the possibility of constructing a set of instructions for a fictitious condition, such as was done in the case of medications in a study conducted by Neupert and McDonald-Miszczak (2004). However, this procedure was decided against, as it would take away from the ‘realistic’ type scenario that we are aiming to create. We continued to seek “real” instructions.

Consultation with The B.C. Hip Fracture Collaborative: Subsequent to seeing an article about the Collaborative (Priest, 2006), Phyllis Hunt, Clinical Practice Leader, Gerontology, Vancouver Community Health, was contacted to determine if the Hip Fracture Improvement Project included a standard set of patient post-discharge instructions. She indicated that each program in the Collaborative used information in the pamphlet After a Hip Fracture produced by the StayWell Company, which was then supplemented with information about local resources.

Using this pamphlet, the CHF information researched from the internet and the material sent by SUMMA, we determined three categories of post-discharge instruction common to both CHF and hip surgery patients: 1) activity restrictions, 2) ‘call the doctor if...’, and 3) medications. The next step was to construct a parallel set of instruction in terms of number and complexity for CHF and hip fracture. When completed, the instructions were reviewed by Phyllis Hunt and two members of the clinical staff at Eagle Ridge Hospital to verify their typicality. These form the basis of the attached instructions which were used in Study 3 to compare the comprehension and retention of instructions given in typical and more ideal patient rooms with participants who will role play CHF and hip surgery patients.

References


Appendix 3b: Instruction Video HIP

Post-Discharge Instruction Video

Instructions were presented in three sections by a speaker. There was a review after each section and at the end using PowerPoint slides.

Activity Precautions & Recommendations

- Don't bend over so that your upper body is lower than your waist.
- Keep your thighs apart, don't cross your operated leg over your other leg.

Activity Precautions & Recommendations

- Don't bend over so that your upper body is lower than your waist.
- Keep your thighs apart, don't cross your operated leg over your other leg.
- Don't turn your operated leg inwards.
Activity Precautions & Recommendations

• Don't bend over so that your upper body is lower than your waist.
• Keep your thighs apart don't cross your operated leg over your other leg.
• Don't turn your operated leg inwards.
• Don't bend forward from your seat to stand or pick-up something off the floor.

Call Your Doctor If...

• You have severe or increasing hip pain.
• You have a large amount of swelling in the hip or calf.

Call Your Doctor If...

• You have severe or increasing hip pain.
• You have a large amount of swelling in the hip or calf.
• You see redness or drainage at the incision site.
• You have a fever over 101°F (38.3°C).
• You experience shortness of breath or chest pain.
Know Your Medications and Possible Side Effects

- Tylenol 3
  - An analgesic.
  - Relieve the pain.
  - Possible side effects:
    - Constipation
    - Drowsiness
    - Liver damage

- Senna
  - A laxative.
  - Treat constipation.
Know Your Medications and Possible Side Effects

• Senna
  - A laxative.
  - Treat constipation.
  - Possible side effects:
    - Nausea
    - Diarrhea
    - Cramps

Know Your Medications and Possible Side Effects

• Calcium
  - A mineral.
  - Reduce osteoporosis.
  - Possible side effects:
    - Difficulty swallowing
    - Irritated esophagus
    - Ulcers

Activity Precautions & Recommendations

• Don’t bend over so that your upper body is lower than your waist.
• Keep your thighs apart don’t cross your operated leg over your other leg.
• Don’t turn your operated leg inwards.
• Don’t bend forward from your seat to stand or pick-up something off the floor.
• Always sit with your hips higher than your knees.

Post-Discharge Instruction Review

Call Your Doctor If...

• You have severe or increasing hip pain.
• You have a large amount of swelling in the hip or calf.
• You see redness or drainage at the incision site.
• You have a fever over 101°F (38.3°C).
• You experience shortness of breath or chest pain.
Know Your Medications and Possible Side Effects

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Know Your Medications and Possible Side Effects

• Senna
  - A laxative.
  - Treat constipation.
  - Possible side effects:
    - Nausea
    - Diarrhea
    - Cramps

Thank You

The End
Instructions were presented in three sections by a speaker. There was a review after each section and at the end using PowerPoint slides.

Activity Precautions & Recommendations

- Talk with your doctor about the best activities for you.
- Minimize activity for 30 to 60 minutes after meals.
- Avoid becoming too hot or too cold (dress appropriately).

Activity Precautions & Recommendations

- Talk with your doctor about the best activities for you.
- Minimize activity for 30 to 60 minutes after meals.
- Avoid becoming too hot or too cold (dress appropriately).
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<td>• If you have pounding and fast heart beats.</td>
</tr>
<tr>
<td>• If your feet, ankles or legs become swollen.</td>
</tr>
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Know Your Medications and Possible Side Effects

• Ramipril
  - ACE inhibitor.
  - Reduce the workload on the heart.
  - Possible side effects:
    - Dizziness
    - Back pain
    - Stuffy nose

Know Your Medications and Possible Side Effects

• Metoprolol
  - A beta blocker.
  - Control your heart rate.
Know Your Medications and Possible Side Effects

• Metoprolol
  - A beta blocker.
  - Control your heart rate.
  - Possible side effects:
    - Cold hands
    - Depression
    - Tiredness

Know Your Medications and Possible Side Effects

• Lasix
  - A diuretic.
  - Remove excess water from your body.
  - Possible side effects:
    - Nausea
    - Cramps
    - Ringing in the ears

Know Your Medications and Possible Side Effects

• Lasix
  - A diuretic.
  - Remove excess water from your body.

Activity Precautions & Recommendations

• Talk with your doctor about the best activities for you.
• Minimize activity for 30 to 60 minutes after meals.
• Avoid becoming too hot or too cold (dress appropriately).
• Do not lift heavy items (that cause strain).
• Weigh yourself daily and keep a record of your weight.

Call Your Doctor If...

• If you have weight gain of 3-5 pounds in 2-3 days.
• If you have increased shortness of breath with regular activity or even at rest.
• If you have pounding and fast heart beats.
• If your feet, ankles or legs become swollen.
• If you have chest pain
Know Your Medications and Possible Side Effects

• Ramipril
  - ACE inhibitor.
  - Reduce the workload on the heart.
  - Possible side effects:
    - Dizziness
    - Back pain
    - Stuffy nose

• Lasix
  - A diuretic.
  - Remove excess water from your body.
  - Possible side effects:
    - Nausea
    - Cramps
    - Ringing in the ears

• Metoprolol
  - A beta blocker.
  - Control your heart rate.
  - Possible side effects:
    - Cold hands
    - Depression
    - Tiredness

Thank You
## Study Setting Preparation Checklist

**Date:**

<table>
<thead>
<tr>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-testing Set-up</td>
</tr>
<tr>
<td>Typical</td>
</tr>
<tr>
<td>Blinds positioned at right height, shutters open</td>
</tr>
<tr>
<td>Curtains open, cracked window covered</td>
</tr>
<tr>
<td>Windows closed</td>
</tr>
<tr>
<td>All bed curtains (except around test bed) closed</td>
</tr>
<tr>
<td>Test cubicle curtain on corner, ready to close</td>
</tr>
<tr>
<td>Chair legs on &quot;dots&quot; (bedside)</td>
</tr>
<tr>
<td>Chair legs on &quot;dots&quot; (window)</td>
</tr>
<tr>
<td>Speakers positioned on &quot;dots&quot; (sub, 4 surround)</td>
</tr>
<tr>
<td>All wires are plugged in</td>
</tr>
<tr>
<td>Turned on set at first notch of 4th light</td>
</tr>
<tr>
<td>All lights are turned on, including task light above test bed</td>
</tr>
<tr>
<td>If beginning in this room, camcorder is positioned on &quot;dots&quot;</td>
</tr>
<tr>
<td>Camcorder is turned on</td>
</tr>
<tr>
<td>Verify in video mode</td>
</tr>
<tr>
<td>New, labelled disk in camcorder</td>
</tr>
<tr>
<td>View is verified</td>
</tr>
<tr>
<td>All Fidget chair wires are plugged in, turned on</td>
</tr>
<tr>
<td>Verify data is collecting</td>
</tr>
<tr>
<td>Instruction computer is turned on</td>
</tr>
<tr>
<td>Verify webcams are recording</td>
</tr>
<tr>
<td>Webcam views (2) verified</td>
</tr>
<tr>
<td>All wires are plugged in</td>
</tr>
<tr>
<td>Participant ID has been entered (G#, P#)</td>
</tr>
<tr>
<td>Cued to CHF/CHIP video</td>
</tr>
<tr>
<td>Cursor not on ‘TV’ screen</td>
</tr>
</tbody>
</table>

**Misc.**

<table>
<thead>
<tr>
<th>Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer times synchronized</td>
</tr>
<tr>
<td>BKG operational</td>
</tr>
<tr>
<td>All visible areas tidy</td>
</tr>
<tr>
<td>Schedule posted to verify group, order of rooms/videos</td>
</tr>
</tbody>
</table>

**2. Transition from Room to hallway**

<table>
<thead>
<tr>
<th>Turn off webcams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop camcorder recording</td>
</tr>
<tr>
<td>Move camcorder to dots in hallway</td>
</tr>
<tr>
<td>Verify camera view, zoom on participant</td>
</tr>
<tr>
<td>Restart recording</td>
</tr>
<tr>
<td>Verify webcam view</td>
</tr>
<tr>
<td>Move EKG laptop</td>
</tr>
<tr>
<td>Verify EKG collecting data</td>
</tr>
</tbody>
</table>

**3. 10 Minute Break for Participant**

**4. Transition hallway to room**

<table>
<thead>
<tr>
<th>Flip DVD in camcorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move camcorder to dots</td>
</tr>
<tr>
<td>Verify camera view</td>
</tr>
<tr>
<td>Move EKG laptop</td>
</tr>
<tr>
<td>Verify EKG still collecting data</td>
</tr>
</tbody>
</table>

**2. Transition from Room to hallway**

<table>
<thead>
<tr>
<th>Turn off webcams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop camcorder recording</td>
</tr>
<tr>
<td>Room tidy, no misc. items left lying in view etc.</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td><strong>Hallway</strong></td>
</tr>
<tr>
<td>Test operation of the touchscreen</td>
</tr>
<tr>
<td>TV (camcorder monitor) turned on</td>
</tr>
<tr>
<td>Check volume on laptop</td>
</tr>
<tr>
<td>Open qualitative question files (3)</td>
</tr>
<tr>
<td>Partition in place</td>
</tr>
<tr>
<td>Curtains, doors closed</td>
</tr>
<tr>
<td><strong>Reception/Refreshment Table</strong></td>
</tr>
<tr>
<td>Coffee made</td>
</tr>
<tr>
<td>Water in kettle to boil</td>
</tr>
<tr>
<td>Cups, spoons, napkins</td>
</tr>
<tr>
<td>Tea bags, cream, sugar,</td>
</tr>
<tr>
<td>Informed consent form, procedure review sheet,</td>
</tr>
<tr>
<td>screening pkg</td>
</tr>
<tr>
<td>Envelope with take home test, study information,</td>
</tr>
<tr>
<td>copy of informed consent</td>
</tr>
<tr>
<td>BKG sensor on table to show</td>
</tr>
<tr>
<td>EKG ready, verified as collecting data, 4 electrodes</td>
</tr>
</tbody>
</table>
APPENDIX 5 - IMMEDIATE AND DELAYED RETENTION TESTS

a) HIP Immediate (Sample Question)
b) CHF Immediate (Sample Question)
c) Delayed Test - Telephone Script
1. Which of the following instructions were you given regarding bending? (Choose one)

- Only bend from a seated position
- Don't bend upper body below waist
- Don't bend until your doctor says OK
- Only bend if necessary
1. Suitable activities were to be selected by consulting with your? (Choose One)

- Physiotherapist
- Doctor
- Personal trainer
- Yourself based on how you feel
Appendix 5c: Delayed Test - Telephone Script

CHF Delayed Test (Telephone Administered)*

*Participant’s take-home version omitted the oral script.

Oral script: Yesterday, you watched two sets of post-discharge instruction videos. The videos gave you instructions regarding activity precautions; reasons to call your doctor and about the medications you were being prescribed after being in the hospital for Congestive Heart Failure and for hip fracture surgery. Today I would like to re-test your learning of those instructions.

I would like you to open the envelope I gave you yesterday and take out the test inside. Like yesterday, there are a total of 20 questions for each, I will read each question to you and have you tell me your answer. Do you have any questions before we start?

Activity Precautions

1. Suitable activities were to be selected by consulting with your?
   - [ ] Physiotherapist
   - [ ] Personal trainer
   - [ ] Doctor
   - [ ] Yourself based on how you feel

2. You were to minimize activity for how long after meals?
   - [ ] 30-60 minutes
   - [ ] 60-90 minutes
   - [ ] 15-30 minutes
   - [ ] 2 hours

3. You were told to avoid becoming too hot or cold by
   - [ ] Staying indoors
   - [ ] Dressing appropriately
   - [ ] Drinking lots of fluids
   - [ ] Moving to a moderate climate

4. Which of the following were you told to refrain from doing?
   - [ ] Lifting heavy items
   - [ ] Walking up/down stairs
   - [ ] Rising quickly
   - [ ] Vigorous arm movements

Call Your Doctor If...

5. Was increased shortness of breath a reason to call the doctor? [YES] [NO]
6. Was irritability a reason to call the doctor? [YES] [NO]
7. Was pounding and fast heart beats a reason to call the doctor? [YES] [NO]
8. Were mood swings a reason to call the doctor? [YES] [NO]
9. Was insomnia a reason to call the doctor? [YES] [NO]
10. Was diarrhea a reason to call the doctor? [YES] [NO]
11. Was a weight gain of 3-5 pounds in 2-3 days a reason to call the doctor? 
   YES  NO

12. Was swelling in feet, ankles, legs a reason to call the doctor? YES  NO

Medications

13. How many medications were you prescribed?
   ____1  ____2  ____3  ____4

14. What were the names of the medications were you prescribed?
   (Check all that apply)
   ___Ramipril  ___Lasix  ___Reminyl
   ___Mediprin  ___Metoprolol  ___Lamisil

15. You were prescribed Ramipril, what is this medication for? (Select one)
   ___Control your heart rate  ___Remove excess water from your body
   ___Reduce inflammation  ___Reduce the workload on the heart

16. What are the possible side effects of Ramipril? (Check all that apply)
   ___Nausea  ___Back pain  ___Stuffy nose
   ___Tiredness  ___Depression  ___Cold hands
   ___Ringing in the ears  ___Dizziness  ___Cramps

17. You were prescribed Metoprolol, what is this medication for? (Select one)
   ___Control your heart rate  ___Remove excess water from your body
   ___Reduce inflammation  ___Reduce the workload on the heart

18. What are the possible side effects of Ramipril? (Check all that apply)
   ___Nausea  ___Back pain  ___Stuffy nose
   ___Tiredness  ___Depression  ___Cold hands
   ___Ringing in the ears  ___Dizziness  ___Cramps

19. You were prescribed Lasix, what is this medication for? (Select one)
   ___Control your heart rate  ___Remove excess water from your body
   ___Reduce inflammation  ___Reduce the workload on the heart

20. What are the possible side effects of Ramipril? (Check all that apply)
   ___Nausea  ___Back pain  ___Stuffy nose
   ___Tiredness  ___Depression  ___Cold hands
   ___Ringing in the ears  ___Dizziness  ___Cramps
Hip Fracture Post-Discharge Instructions Quiz

[Oral script] Yesterday, you watched two sets of post-discharge instruction videos. The videos gave you instructions regarding activity precautions; reasons to call your doctor and about the medications you were being prescribed after being in the hospital for Congestive Heart Failure and for hip fracture surgery. Today I would like to re-test your learning of those instructions.

I would like you to open the envelope I gave you yesterday and take out the test inside. Like yesterday, there are a total of 20 questions for each, I will read each question to you and have you tell me your answer. Do you have any questions before we start?

Activity Precautions

21. Which of the following instructions you were given regarding bending?
   ___ Only bend from a seated position
   ___ Don’t bend until your doctor tells you it is okay
   ___ Don’t bend so that your upper body is lower than your waist
   ___ Only bend if necessary

22. What were you told about crossing your legs?
   ___ Don’t cross your legs
   ___ It is okay to cross your legs
   ___ Don’t cross your good leg over your operated leg
   ___ Don’t cross your operated leg over your good leg

23. What were you told about turning your operated leg?
   ___ Don’t turn it inwards
   ___ Don’t turn it outwards
   ___ Don’t turn it quickly
   ___ Don’t turn it inwards or outwards

24. Where should your hips be when you are sitting?
   ___ Higher than your knees
   ___ Lower than your knees
   ___ Level with your knees
   ___ Tilted forward slightly

Call Your Doctor If...

25. Was a dull ache in the hip a reason to call the doctor? YES  NO
26. Was swelling in the hip or calf a reason to call the doctor? YES  NO
27. Was sudden, severe headache a reason to call the doctor? YES  NO
28. Were chills a reason to call the doctor? YES  NO
29. Was severe or increasing hip pain a reason to call the doctor? YES  NO
30. Was shortness of breath or chest pain a reason to call the doctor? YES  NO
31. Was vomiting a reason to call the doctor? YES  NO
32. Was redness or drainage at the incision site a reason to call the doctor? YES  NO
Medications

33. How many medications were you prescribed?
   __1   __2   __3   __4

34. What were the names of the medications were you prescribed?
   (Check all that apply)
   ____Sensorcain   ____Calcium   ____Tylox
   ____Tylenol 3   ____Calcimar   ____Senna

35. You were prescribed Tylenol 3, what is this medication for? (Select one)
   ____Relieve constipation   ____Reduce swelling
   ____Relieve pain   ____Combat osteoporosis

36. What are the possible side effects of Tylenol 3? (Check all that apply)
   ____Cramps   ____Ulcers   ____Constipation
   ____Drowsiness   ____Diarrhea   ____Difficulty swallowing
   ____Liver damage   ____Nausea   ____Irritated esophagus

37. You were prescribed Senna, what is this medication for? (Select one)
   ____Relieve constipation   ____Reduce swelling
   ____Relieve pain   ____Combat osteoporosis

38. What are the possible side effects of Senna? (Check all that apply)
   ____Cramps   ____Ulcers   ____Constipation
   ____Drowsiness   ____Diarrhea   ____Difficulty swelling
   ____Liver damage   ____Nausea   ____Irritated esophagus

39. You were prescribed Calcium, what is this medication for? (Select one)
   ____Relieve constipation   ____Reduce swelling
   ____Relieve pain   ____Combat osteoporosis

40. What are the possible side effects of Calcium? (Check all that apply)
   ____Cramps   ____Ulcers   ____Constipation
   ____Drowsiness   ____Diarrhea   ____Difficulty swallowing
   ____Liver damage   ____Nausea   ____Irritated esophagus
APPENDIX 6 - QUALITATIVE QUESTIONS

a) Impressions/Recommendations for Patient Room and Instructional Video (Content)
b) Impressions/Recommendations for Improvement of Touchscreen Retention Test and Instructional Video (Format)
Appendix 6a:

Impressions/Recommendations for Improvement of Patient Room and Instructional Video (Content)

Participant ID #: _____________
Group #: ______________
Room # ___________

1. What three words would you use to describe the room you were just in?
2. I’d like to know what you liked best and least about the room. Let’s start with what, if anything, you liked.
3. What, if anything, did you not like about the room?
4. From the older patient’s perspective, how could the room and its furnishings, (e.g. lighting, sound proofing, interior décor etc.) be improved to make it easier for you to understand the post-discharge instructions?
5. From the older patient’s perspective, how could the room be improved to encourage independence. For example, what, if anything, would encourage you to get out of bed to go to the bathroom on your own, to sit in a chair, to walk in the hall or to socialize in the lounge with your visitors.

If second room,
6. What, if anything, did you like better in this room than the first?
7. What, if anything, did you like less in this room than the first?

Now I’d like to ask you some questions about the instructions that were presented to you.

1. I’d like to get your feedback regarding the instruction video:
   a. What, if anything, did you like about the video?
   b. What, if anything, did you not like about the video?
   c. What, if anything, could have been done to improve the presentation of information?
2. The overall language level used was: __ too simple  ___adequate ___too difficult
   If “too difficult”, what was difficult?
3. The amount of information given was: __ not enough ___ enough ___too much
   If “too much”, what would you have excluded or how would you have changed the delivery of post-discharge instructions?
4. The narrator on the instruction video spoke
   ___ not loud enough
   ___ loud enough
   ___ too loud
5. The narrator spoke
   ___ too quickly
   ___ at a good pace
   ___ too slowly
Appendix 6b:

Impressions/Recommendations for Improvement of Touchscreen Retention Test and Instructional Video (Format)

(After second room)

Participant ID #: ______
Group #: __________
Room # __________

1. The overall language level of the test questions was:
   ___ too simple  ___ appropriate  ___ too difficult

2. Have you had any previous experience with computers?  Y  N
   If yes, describe?

3. What, if anything, did you like about the test format?
   What, if anything, did you not like about the test format?
   What, if anything, could be done to improve the ease of taking the test?

4. Did you like using the touch screen?  Y  N
   Why?

5. When you gave your answers on the touch screen, it did not tell you if your
   answers were right or wrong. Do you think you made any mistakes?  Y  N.
   If yes, which questions were you unsure of?

6. If you were a real patient, would you be comfortable receiving your post-
   discharge instructions by video?  Y  N
   Why?

7. The video we showed you did not allow you to stop and go back if you didn’t
   understand something, or needed more time to think about how to remember the
   information. Do you think people should be able to stop and go back or is the
   video OK as is (that is, with the summary at the end?)

   ___ would prefer stop and go back switch
   ___ OK with summary at end

8. If you were given instructions to take home would you prefer that they were
   ___ On paper  ___ Recorded on Video  ___ Recorded on a DVD
   ___ Both on paper and on a video or DVD