BENEFITS AND LIMITATIONS OF A REMINDER DEVICE FOR OLDER ADULTS WITH MEMORY LOSS

by

Amanda L. Shintani

Bachelor of Science in Occupational Therapy, University of Western Ontario, 1987

RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

In the

GERONTOLOGY PROGRAM

of the

Faculty of Arts

SIMON FRASER UNIVERSITY

July 2004

APPROVAL

Name: **Amanda Shintani**

Degree: **MASTER OF ARTS (GERONTOLOGY)**

Title of Research Project: BENEFITS AND LIMITATIONS OF A REMINDER DEVICE FOR OLDER ADULTS WITH MEMORY LOSS

Examining Committee:

Chair: _____

Dr. Norm O'Rourke
Assistant Professor, Gerontology Program, Simon Fraser University

_____

Dr. Gloria Gutman
Senior Supervisor
Professor, Gerontology Program, Simon Fraser University

_____

Dr. Alex Mihailidis
Examining Committee Member
Assistant Professor, Department of Occupational Therapy, University of Toronto, Adjunct Professor, Gerontology, Simon Fraser University

_____

Dr. William Miller
External Examiner
Assistant Professor, Department of Occupational Therapy, University of British Columbia

Date Defended/Approved: July 6th, 2004

SIMON FRASER UNIVERSITY

Partial Copyright Licence

ABSTRACT

Prospective memory, which has been shown to decline with age, is the ability to remember to perform a task at a specific time and is a key component of function in daily tasks. The purpose of this research was to identify the benefits and limitations of a newly developed verbal reminder device designed to compensate for prospective memory impairment among community dwelling older adults with respect to performing activities of daily living (ADL) and instrumental activities of daily living (IADL). A literature review found limited research directed towards determining the efficacy of such devices for older adults with cognitive limitations. Lifeline's Reminder Device (LRD), the focus of the study, was of interest because it had the capability to provide both an external cue (chime sound) for time-specific functional tasks and used individualized verbal reminders. Applying the Ecological Theory of Aging, it was expected that by providing verbal reminders, the LRD would reduce the demands of remembering tasks and enable the older adult to function more independently, and thereby reduce caregiver burden.

A pre-post (baseline-intervention) design was chosen to determine if there was a change in client's ability to perform ADL/IADL and in caregiver burden/stress as perceived by the subscriber (client-participant) and/or a designated caregiver. Although 39 referrals were made, only six client-participants agreed to have the LRD installed with recorded reminders. Of these, only one client-participant and their caregiver reported the LRD to be beneficial in terms of improving ability in ADL/IADL and reducing caregiver burden/stress. Due to the small sample and complex study design, which may have lead to the low completion rate of some measures, results are tentative. However, the high rate of refusal to accept the LRD and limited use of this device, suggests that it has limited appeal for this client population. Devices that are simpler, directed to a single task for short-term use or technological sophisticated enough to monitor and guide performance or accommodate to the changing cognition of the user over time are recommended for the future development of devices for use by older adults with cognitive limitations.

ACKNOWLEDGEMENTS

I would like to sincerely thank Dr. Gloria Gutman for her patience, support and guidance, Dr. Alex Mihailidis for his ideas and feedback and Dr. William Miller for his recommendations as the external examiner on my committee. My sincere appreciation to the managers and health care professionals at the Vancouver Coastal Health Authority North Shore Community Health Centre for giving me the opportunity to conduct my research project at the Centre. I would like to acknowledge Lifeline Systems Inc. and their staff at the Vancouver office who funded the use of the Lifeline's Reminder Devices and assisted with recruitment. I feel blessed to have the love and support from my children, Keegan and Keiko Shintani-Patterson, my mother and father; Mary and George Shintani, my sisters and their respected partners; Jaye Shintani, Philip Brearton, Claire Shintani, Gary Strevett, my friends including; Karyn Lewis, Branko Stojkovic, Dave Hayeems, Nicki Florey, and Graham Watts.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

STATEMENT OF THE RESEARCH PROBLEM

Health care professionals (myself included[1]) at the Vancouver Coastal Health Authority North Shore Community Health Centre recognized the negative impact that memory loss had on our clients' independence and that it also contributed to caregiver burden. However, there was limited awareness and recommendation of home environmental strategies, particularly those devices with technological capabilities, as compensatory techniques. Typically, home environmental strategies prescribed to assist older adults with memory impairment included written lists, calendars, daily schedules, cue cards, timers and medication dossettes. However, it appeared that many clients forgot to look at these cues at the time the task was to be performed. As such, these strategies appeared to have limited benefit and the need for reminders was often not addressed adequately. This resulted in family members and care attendants cueing clients through visits and telephone calls, as a task may not have had the desired outcome if the clients had completed it themselves.

One reason these commonly used strategies may have had limited use was because they only provided a cue to address retrospective memory (remembering what should be done). Important instrumental activities of daily living (IADL) such as medication management, meal preparation and appointment attendance also require prospective memory, the element of time (remembering what needs to be done at a particular moment). Huppert, Johnson & Nickson (2000), concluded that since prospective memory impairment increases linearly with increasing age, this loss of ability

---

[1] The researcher is an occupational therapist at the Vancouver Coastal Health Authority North Shore Community Health Centre in which this study was conducted

resulted in many older adults living in the community at risk. Studies have found that missed appointments hindered medical treatment and illness may have progressed at a greater rate without adequate medical attention (Barron, 1980; Macharia, Leon, Rowe, Stephenson & Haynes, 1992). Medication non-adherence and errors were found to have serious health consequences for the elderly resulting in the hospitalization of thousands of seniors in the United States and Canada (Cooper, Love & Raffou, 1982; Touminen, 1988).

Lifeline's Reminder Device (LRD) was selected for examination in this study because it was a new assistive device that was developed as a way to compensate for memory loss. Specifically, the LRD had a compensatory mechanism that helped with prospective memory impairment by providing up to six daily-individualized reminders. The reminders were preset to alert the recipient at the time the task should have been initiated. It was expected that this device would have been acceptable to older adults because it appeared to be relatively simple to use, it was incorporated into a familiar household appliance (an adapted telephone) and it was part of a personal emergency response system, which is already widely used and familiar to older adults (Watzke, 1994). To date, there is only one small pilot study that examined LRD users. The pilot study focused on the use of LRD by ten physically impaired adults (Polfuss-Schmidt, 2002). This study suggested the LRD was beneficial in terms of providing care more effectively, improving independence and quality of life. The objective of the present study was to examine the benefits and limitations of the LRD as a compensatory mechanism for memory loss with an older-adult sample. A second feature of this research was to include the primary caregivers of the client-participants to determine if the LRD would reduce caregiver burden.

LITERATURE REVIEW

Prospective Memory Impairment and Aging

The ability to perform IADL, such as meal preparation, medication management and to attend appointments is dependent upon a component of memory referred to as prospective memory. Prospective memory has been described as the memory for future intentions (Henry, MacLeod, Phillips & Crawford, 2004). Safety and independence in daily tasks, such as medication management is dependent, for example, on both the individual's ability to remember what medications should be taken and also to initiate the task of taking one's medications at the appropriate time.

Studies on prospective memory have distinguished between time based prospective memory (TBPM) and event based prospective memory (EBPM). TBPM studies require the participant to complete a task at a specified time, while in EBPM studies the task is prompted by an external cue (Einstein, McDaniel, Richardson, Guynn & Cunfer, 1995). Both TBPM and EBPM are required in the performance of daily tasks. Most studies performed in the laboratory suggested age related deficits were associated with EBPM (Maylor, 1993; Maylor, 1996) and TBPM (Moscovitch & Wincour, 1992; Einstein et al., 1995). TBPM studies reported more consistent age related deficits than EBPM. However, studies have found that older adults perform as well or better than younger participants in TBPM tasks in naturalistic rather than laboratory settings (Maylor, l990a; Moscovtich & Wincour, l992; Henry et al., 2004). This may have been explained by Maylor's (1990a) finding that when the use of external strategies or cues was prevented, the age related benefits were reduced.

The Medical Research Council Function and Ageing Study (MRC CFAS) was an important population based longitudinal study of cognitive aging that examined event

based prospective memory (EBPM) task performance by both the community dwelling and institutionalized older adults (Huppert et al., 2000). It consisted of a representative sample of 11,956 participants aged 65 and older. The results of the MRD-CFAS study indicated that EBPM test performance was significantly and linearly related to age, decreasing years of education and lower socio-economic status. Only 54% of the subjects were able to perform the tasks successfully. Age-related differences were found with 68% of the younger older adults (65-69 years) successfully completing the tasks compared with only 19% of those in the older group (90+).

Prevalence of Prospective Memory Impairment among Older Adults

No specific information was available on the prevalence of prospective memory impairment within the older adult population. However, studies of older adults with dementia or cognitive impairment with no dementia (CIND) may provide some insight into the prevalence of prospective memory loss. According to the results of the MRC CFAS (Huppert et al., 2000) high rates of prospective memory impairment were found in people with probable, very mild and early onset dementia. In these groups, only 8% of subjects with dementia were able to perform prospective memory tests successfully. According to the Canadian Study of Health and Aging (1994), the largest population based study on cognitive function of older adults in Canada, dementia affects 8% of all Canadians over the age of 65, with the rate of dementia increasing linearly with age.

While it was logical to expect people with dementia to have prospective memory impairment, it also present in older adults with CIND. In some studies, cognitive impairment had been measured using the Mini Mental Status Examination (MMSE). The MMSE assigns points for domains of cognitive function including orientation, attention, concentration, recent memory, naming, comprehension and other aspects of global

function. A perfect score on the MMSE is 30 points (Teny & Chang-Chui, 1987). Results of the MRC CFAS aging study (Huppert et al., 2000) showed a strong relationship between MMSE scores and prospective memory ability, such that for every single point increase in MMSE, there was a 20% increase in the odds of succeeding on the prospective memory tasks. Using the Modified Mini Mental Status Examination (3MS), an expanded version of the MMSE, Graham and Rockwood (1997) found the prevalence of CIND is 16.8% in Canada.

Research on Home Environmental Strategies for Older Adults with Cognitive Limitations

Common home environmental strategies used as reminder techniques included: calendars, medication organizers, timers and cue cards (Nochajski, Tomita & Mann, 1996). Research found on the use of these strategies by older adults with cognitive limitations was limited, particularly regarding the efficacy of devices for reminders in daily tasks (Gitlin, Corcoran, Winter, Boyce & Hauck, 2001). With the exception of a large scale study by Gitlin et al., (2001), the research on home environmental strategies of this type has been primarily descriptive, exploratory or pilot intervention studies with small samples. Findings of the study by Gitlin et al., (2001) (n=171) demonstrated a modest effect on maintaining functional decline in instrumental activities of daily living (IADL) for older adults with dementia.

Impact of Home Environment Strategies with Caregivers of Older Adults with Cognitive Limitations

Studies have found that caregivers experience significant burden in caring for older adults with cognitive limitations (Mittelman, Ferris, Steinberg, Shulman, Mackell, Ambinder & Cohen, 1993; Schultz, O'Brien, Bookwala & Fleissner, 1995). The burden on the caregiver could be direct, such as poor health and reduced quality of life, or

indirect, such as lost wages and time spent from other responsibilities. Gitlin et al. (2001) studied the effect of home environment strategies on caregivers of older adults with dementia and found that they reduced spousal upset and enhanced the self-efficacy of female caregivers for managing behaviours and functional decline. In a review of the literature, no other study was found that examined the impact of device use on caregiver burden.

Ecological Theory of Aging

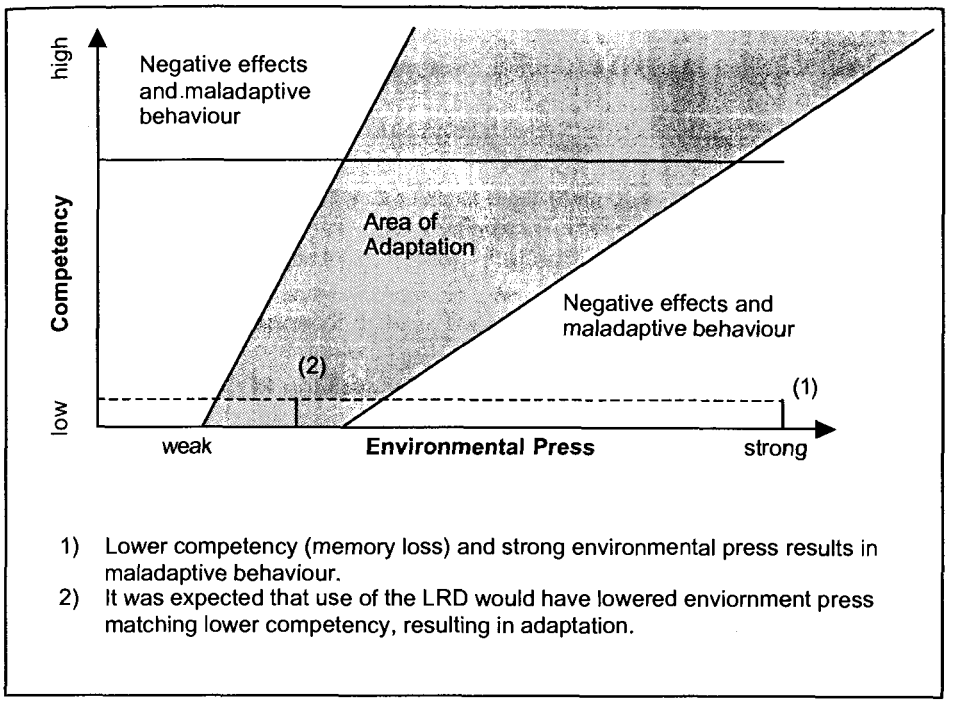
The Ecological Theory of Aging (Lawton, 1998) was the theoretical foundation for this research project. This theory described the relationship between an individual's ability to cope with age-related changes and their environment. The Competence-Press theory, as it was also known, suggested that adaptation or successful coping occurs when there is a match between competence and environmental press. Competence referred to the individual's skill level or functional capability to perform daily tasks, while press referred primarily to the subjective perception of the complexity of tasks within the individual's physical, social and cultural surroundings (Messecar, 2000). If changes associated with aging resulted in lower competency or there was an increase in environmental press outside the range of the older adult's ability to cope, maladaptive behaviours would result. Lawton (1989) also proposed that if the environmental press was too low to match the older adult's competency level, this could result in the lack of adequate stimulation for coping with the changes associated with aging.

In applying this theory to the research project, it was assumed, older adults with memory loss had lower competency, and if the demands of a time-specific task exceeded their level of competency, the individual would not be able to cope. This research project proposed that by providing verbal cueing at the appropriate time,

Lifeline's Reminder Device (LRD) would have acted as a compensatory mechanism for prospective memory impairment. Thus, it was anticipated that the LRD would have reduced the demands of daily tasks on memory and assisted the older adult user to initiate and execute tasks, resulting in adaptation (Figure 1).

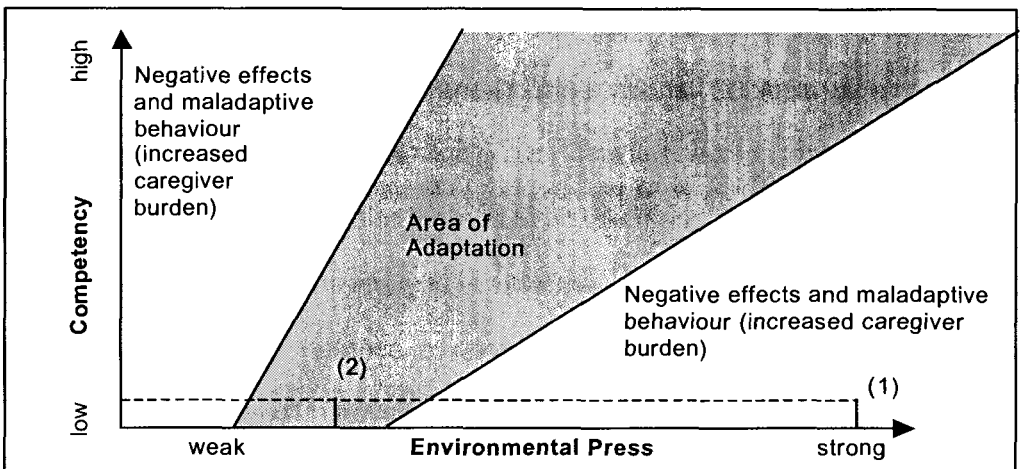
This model was also applied to caregiver burden/stress. As older adults with memory loss have more difficulty coping with the demands of their environment, they likely become more reliant on caregivers which can result in increased caregiver burden. It was assumed that improved performance by these older adults with the use of the LRD would have reduced the need for reminders from caregivers and thus would have also reduced caregiver burden/stress (Figure 2).

Figure 1. Application of the Ecological Theory of Aging to the Use of Lifeline's Reminder Device (LRD) with Older Adults with Memory Loss. Source: Lawton, 1998.



1) Lower competency (memory loss) and strong environmental press results in maladaptive behaviour.
2) It was expected that use of the LRD would have lowered enviornment press matching lower competency, resulting in adaptation.

Figure 2. Application of the Ecological Theory of Aging to the Use of Lifeline's Reminder Device (LRD) as a Means of Reducing Caregiver Burden. Source: Lawton, 1998.



1) Lower competency (memory loss) and strong environmental press results in maladaptive behaviour and increased reliance on caregiver.
2) It was expected that use of the LRD, would have reduced environmental press resulting in adaptation and lower reliance on the caregiver.

Research on Telephone Reminders

Leirer, Morrow, Pariante and Doksum (1989) found that the use of voice messaging increased attendance at an influenza clinic at a senior centre. The TeleMinder-TBC System (an automated telephone messaging system) reduced non-adherence for attendance by 30.7% in a sample of 3,158 patients in a rural tuberculosis clinic (Leirer, Tanke & Morrow, 1993). Patients of the clinic were from a variety of ethnic groups with a wide range of ages. Another study examining the TeleMinder, conducted with a sample of 2008 patients with a wide age range, both genders, and a variety of ethnic groups, found that attendance at appointments at a tuberculosis clinic increased from 52% to 62% (Tanke & Leirer, 1994). There were no significant relationships between age, sex, ethnicity or content of the message. Patients in this study reported the telephone message was helpful, easy to understand and that they were open to receiving another telephone reminder.

Only one study (Leirer, Morrow, Tanke & Pariante, 1991) was found that had a sample comprised of older adults (n=16). The study examined the effectiveness of voice mail reminders for improving adherence to medications. Subjects were randomly assigned to a control and intervention group. The intervention group received voice mail reminders each time the medication was to be taken and it also indicated the type and amount of medication. The study found that the voice mail reminder significantly improved medication adherence in two ways: the reminders increased the consistency of taking medications and improved the punctuality of medication management. Non-compliance in the control group was 12.6% compared to 2.1% for the intervention group.

Personal Emergency Response Systems

The LRD was a type of Personal Emergency Response system (PERs) with a reminder feature. The PERs consisted of the subscriber wearing a small waterproof help button as a necklace or wristband with a home communicator that was connected to their residential telephone line. In the event of an emergency, the subscriber pressed the help button and was connected to an emergency response centre. Research related to PERs provided some insight into the characteristics of users of the LRD and some of the potential benefits.

Several researchers have examined the characteristics of PERs users. The most detailed demographic analysis of PERs users was by Stafford and Dibner (1984, cited in Watzke, 1994). Their data showed that 85%-95% of PERs users were over the age of 60 with an average age of 74. A Canadian study showed that PERs users were generally female (proportions of females ranged from 75% to 87%) and 70% resided in seniors housing and care homes (Rodriguez, I991).

Several research studies have evaluated the benefits of PERs in terms of reduced hospital admissions, inpatient days and use of emergency services. Roush, Teasdale, Murphy and Kirk (1995) found subscribers (n=106) had a significant decrease in both hospital admissions and inpatient days, with no significant differences in emergency admissions. A study by Koch (1984) found a 26% reduction in hospital stay, while Dibner, (1985, cited in Watzke, 1994) found a 26.4% decrease in admissions to hospitals and a reduction of 6.5% in emergency visits. However, a more recent study by Roush and Teasdale (2002) of 300 community dwelling older adults reported contradictory results. Roush and Teasdale (2002) found no reductions in clinic visits or hospitalization among PERs users and a modest increase in use of emergency visits.

Researchers also found that PER users reported a heightened feeling of security, improved vitality and mental health (Roush & Teasdale, 2002; Sherwood & Morris, 1980, cited in Watzke, 1994).

Assistive Technology for Cognitive Rehabilitation

An extensive literature review by LoPresti, Mihailidis and Kirsch (2004) provided a summary of research on assistive technology for cognitive rehabilitation (ATC). ATC was defined in their paper as (a) computer technology for rehabilitation purposes, (b) assisted in the performance of activities of daily living and instrumental activities of daily living and (c) was customized to the individual (Cole, 1999, cited in LoPresti et al., 2004).

In the literature review, LoPresti et al. (2004) indicated that research on the efficacy of electronic prospective memory aids showed that they improved function. For example, Zanetti, Zanieri, Vreese, Frisoni and Binetti (2000, cited in LoPresti et al., 2004) studied the efficacy of an electronic agenda to enable participants (n=5) with mild to moderate dementia to perform seven memory tasks at a specific time. The ability to complete tasks was compared with and without the device. Results showed statistically significant improvements in the completion of memory tasks for those with the device compared to those without it. Willkomm and LoPresti (1997) conducted a pilot study comparing the Voice Organizer, a device that played verbal messages at a specified time, to a written list, among students with attention deficits and learning disability (n=5) and found an improvement in punctuality. A study by Hersch and Treadgold (1994, cited in LoPresti et al., 2004) of the NeuroPage paging system and a study by Hart, Hawkey and Whyte, (2002, cited in LoPresti et al., 2004) on the Parrot Voice Mate III, a portable voice organizer, demonstrated that these devices facilitated the performance of prospective memory tasks.

LoPresti, Mihailidis and Kirsch (2004), provided an in-depth summary of research of computer-based software with reminding capabilities. These included studies of computer-based systems by the Institute for Cognitive Prosthetics (Bala Cynwyd, PA) that reported increased independence in managing home finances by a 54 year old woman with post traumatic brain injury (Cole & Dehdashti, 1990, cited in LoPresti et al., 2004); improved visual scanning and neuromotor skills related to ADL by a 33 year old woman with neurological deficits (Cole, Petti, Matthews & Dehdashti, 1994, cited in LoPresti et al., 2004); and increased ability to follow a daily schedule with completion of priority tasks and to initiate a selected activity following a cue by three subjects with traumatic brain injury (Cole, Dehdashti, Petti, & Angert, 1994, cited in LoPresti et al, 2004. Bergman (1997, cited in LoPresti et al., 2004) studied the Essential Steps software, which provided prompts presented on a screen or by a computer-generated voice reminding about ADL tasks at home, school and vocational settings. This study found increased task performance for people with cognitive impairments (n=54). Flannery and Rice (1997, cited in LoPresti, et al., 2004) studied the efficacy of Easy Alarm software (Nisus Software, Inc) and found fewer reminders were required from the caregiver for a subject aged 17 with short-term memory loss.

Finally, LoPresti et al. (2004) provided an overview of studies on ATCs with reminder capability for ADL/IADL completion. Kirsch, Levine, Lajiness-O'Neill, & Schneider (1992, cited in LoPresti et al., 2004) found two out of four subjects with traumatic brain injury were able to perform janitorial tasks more accurately. In another study, one participant with limitations in planning and problem solving demonstrated an improvement in the ability to cook when using the electronic reminder compared to using written instructions only (Kirsch, Levine, Lajiness, Mossaro, Schneider & Donders, 1988, cited in LoPresti et al., 2004). A system developed by Steele, Weinrich and Carlson

(1989, cited in LoPresti et al., 2004) for sequential cues of task, improved performance in meal preparation for a subject with severe aphasia. Mihailidis, Fernie and Cleghorn (2000, cited in LoPresti et al., 2004) conducted a pilot study with a system that provided prompting through a recorded voice and found that the subject who had severe dementia was able to independently perform approximately 22% more steps in hand washing. However, the study found that the system became frustrating for some subjects as it only provided cueing based on a set sequencing routine and did not take into consideration the user's own method of hand washing.

THE PRESENT STUDY

The present study set out to evaluate a device designed to assist older adults with mild cognitive limitations to perform ADL/IADL and therefore, reduce caregiver burden. Lifeline's Reminder Device (LRD) was selected for this study as it was developed to address limitations related to prospective memory loss and it appeared to have several advantages over other reminder devices (Appendix B). For example, the LRD was incorporated into an adapted telephone and had the capacity to play up to six daily reminders, recorded by the subscriber or caregiver. It also provided verbal prompting at the time the ADL/IADL should have been initiated.

While commonly used reminding strategies such as calendars, cue cards and medication organizers were familiar, inexpensive and readily available, they were limited in their ability to provide cueing at the specified time required for tasks such as meal preparation, medication management and appointments. Timers and alarm systems may have provided an auditory cue (chime sound) at the time a specified task was required to be performed, however, these devices did not provide information on which tasks were to be performed (LoPresti et al., 2004). It was anticipated that the LRD would have been more effective because it alerted the individual with an auditory cue at a predetermined time and it also provided information to direct the user to the intended task.

Other potential benefits of the LRD over automated telephone messaging systems and other voice mail systems were that the reminders on the LRD could be individualized to the user's specific needs for any ADL/IADL and they employed the familiar voice of the user and/or caregiver. Gitlin and Corcoran (1993) concluded that

home environment strategies might be used more readily if individualized to the client, the style of the caregiver and the home environment.

While the LRD had some features that are similar to other ATCs, the LRD was different in that it was incorporated into a home telephone, which was a familiar device to older adults and was found in almost every household. Another advantage was that the technology of the LRD appeared to be less complex than other ATCs and therefore might have been more acceptable to older adults who were not as familiar with technical devices. The LRD also had the capacity of a PERs, which was readily accepted and used by older adults (Watzke, 1994).

Mann, Hurran and Tomita (1993) suggested that dissatisfaction with assistive devices by older adults with cognitive impairments might have been due to the difficulty of using the device and the inability of the device to compensate for other physical and sensory limitations. The LRD had been designed to be user friendly for older adults with the following features: raised buttons and contrasting colours to compensate for visual limitations, and a volume amplifier to compensate for hearing loss. Therefore it was expected that these design features would have increased satisfaction of and compliance with the LRD among older adults.

It was anticipated that the LRD would be particularly appropriate for older adults with memory loss or cognitive impairment with no diagnosis of dementia (CIND). Potential client-participants were excluded from the study if they had a diagnosis of dementia according to their current medical file. It was anticipated that the LRD would not be appropriate for older adults with dementia, as it required that the user had the cognitive ability to learn to use a new device and was also able to remember the content of the reminder long enough to initiate the task.

Past Research on the Lifeline's Reminder Device

The present study was built on research by Polfuss-Schmidt (2002) who conducted a pilot study on the LRD with a sample of ten participants ranging in age from 20 to 65 years. The objective of the study was to determine the use, perceived benefits and limitations of the LRD with clients and their coordinators from the Guelph Services for Persons with Disabilities. Clients in the Polfuss-Schmidt (2002) pilot study had primarily physical limitations. The following types of message were programmed into the LRD; medication use, medical and care attendant appointments, transportation, agency meetings, range of motion exercises, changes in schedules, wake up alarms, reminders to tape TV programs and greetings from family members. Based on interviews with the clients and their coordinators, Polfuss-Schmidt, herself a Lifeline Program Manager, concluded the LRD was beneficial in terms of providing care more effectively, improving care adherence and independence, and enhancing quality of life. However, Polfuss-Schmidt (2002) did note that the LRD may have not have been appropriate for all disabilities as some of the participants felt uncomfortable recording the messages and found the system was not flexible to all lifestyles.

The Present Study

The present research project was initially designed to examine the benefits and limitations of the LRD with a larger sample consisting exclusively of older adult LRD subscribers and their primary caregivers.

Expectations were that;

1) The caregiver and the client-participant would perceive that improvement in the client-participant's ability to perform activities of daily living (ADL)/ instrumental activities of daily living (IADL) occurred as a result of LRD cues.

2) The caregiver and the client-participant would perceive a reduction in burden/stress on the primary caregiver in terms of the care required for the ADL/IADL, to which LRD reminders were directed to.

The first expectation was based on the assumption that the caregiver was providing reminders to the older adult using written lists, calendars, alarms, telephone calls and/or in- person visits. At the Vancouver Coastal Health Authority North Shore Community Health Centre, it was regular practice for health care professionals to use written lists to remind clients about daily tasks. Since the LRD provided time specific cueing, it was anticipated it would have been more effective than written lists, calendars and/or alarms which did not cue at the time the task should have been initiated or provided information about the task.

Based on the researcher's clinical observations, some clients found it intrusive, demeaning and were uncomfortable with receiving reminders from caregivers. Therefore, it was anticipated that some client-participants might have been more accepting of reminders from a device. Also, it was observed that telephone calls and visits by caregivers were not always consistently provided at the time the task should have been performed. Thus, it was anticipated that the LRD might have proven to be a more reliable reminding source than the reminder system that was already in place.

As the LRD had some features similar to automated telephone messaging systems and ATCs, which have demonstrated some effectiveness in improving attendance in appointments (Tanke & Leirer , l994), medication management (Leirer et al., 1991), performance of prospective memory tasks and ADL/IADL (LoPresti et al., 2004), it was anticipated that the LRD might have also improved the performance of the ADL/IADL, to which reminders were directed.

The rationale for the second expectation was the assumption that prospective memory loss in older adults would increase caregiver burden/stress because of the constant need to provide reminders and cueing to the care recipient. It was anticipated that the use of the LRD would have replaced the need for caregivers to provide specific directives through written lists, telephone calls or in person reminders, and thus would reduce the burden of care. It was hoped that reduced burden might have altered their interactions with the care recipient, resulting in increased time for more socially orientated activities and presumably, more constructive and positive time together.

METHOD

Study Participants

The study was intended to be conducted with 15 new LRD subscribers (client-participants) and their primary contact persons (PCPs). The primary contact person referred to the relative, friend, caregiver, or health care worker who the client-participant anticipated would place the majority of reminders on the LRD.

Only client-participants who met the following criteria were included in the study:

-Aged 59 or older

-Lived in the community

-Supported by a primary English speaking caregiver who was also willing to participate in the study

-Demonstrated the ability to converse in English

-Cognitively impaired as suggested by results of cognitive screening tests or reported and/or displayed memory loss or reported and/or displayed difficulty with remembering to perform some aspect of an ADL/IADL during the initial home visit. Reports of memory loss or impaired function were accepted from caregivers and/or health care professionals

-Demonstrated the ability to visually identify and physically manipulate the feature buttons on the LRD as displayed during the home visit.

Criteria for exclusion in the study included:

-A diagnosis of dementia in the potential client-participant's medical file.

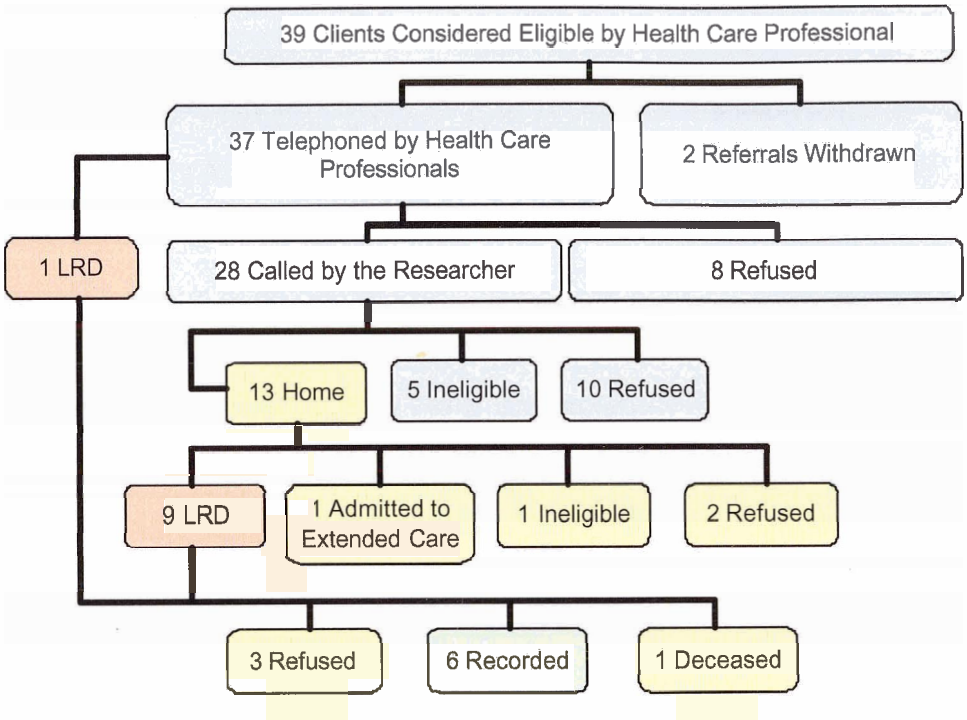
Participant Recruitment

Once ethics approval was received from Simon Fraser University (Appendix A), the researcher promoted the LRD study by making presentations to co-workers (e.g. occupational therapists, physiotherapists, nurses and long term care case managers) at the Vancouver Coastal Health Authority (VCHA). The researcher requested their assistance to recruit client-participants who met the study criteria and to record any reasons for refusing to participate (Appendix C). The VCHA North Shore Community Health Centre determined that clients that were previously seen by the researcher or were on the researcher's present caseload would not be asked to participate in the study, as they may have felt obligated to do so simply by knowing the researcher.

During the time period between September 15, 2003 and February 20, 2004, health care professionals identified a total of 39 potential client-participants and their PCPs as having met the inclusion criteria (Figure 3). Two potential client-participants subsequently withdrew, one because he did not want to pay the monthly fee for the LRD after the study was over, and the second because health care professionals decided the client's family situation was too complicated. Of the 37 remaining potential participants, one already had the LRD installed directly by Lifeline prior to the initial home visit with the researcher, eight (potential client-participants or PCPs) refused to participate, leaving 28 potential participants who were willing to be contacted by the researcher. When the researcher contacted the 28 potential participants via telephone to discuss the study, only 13 agreed to a home visit. Of the remainder, five potential client-participants were deemed to be ineligible and 10 (potential client-participants or PCPs) refused to participate.

The researcher contacted the 13 client- participants who agreed to a home visit in which the goals and benefits of the study and requirements for participation were discussed. The initial sessions were then scheduled with the client-participants.

Figure 3. Referrals and Participants in the Study



Study Design

This section will outline the study design and procedures used with the two participant groups in this study: the client-participants and the primary-contact persons.

The study proposed to examine the benefits and limitations of the LRD by using a pre-post (baseline-intervention) study design over a five-week period. The specific objective was to determine if there was a change as perceived by both the client-participant and the primary contact person (PCP) in a) the client-participants' ability to perform one or more ADL/IADL cued by the LRD and (b) a reduction in caregiver burden/stress in those same tasks.

Procedure: Client-Participants

Table 1 summarizes the study design and procedure employed with all client-participants who agreed to home visits (n=13). The study was designed to take place over five weeks. A description of the tasks involved in each of the five weeks follows.

Table 1. Overview of the Study Design: Client-Participants

Week 1		Week 2	Week 4	End of Week 5
Baseline		**Intervention**		
Home Visit *(n=11)	**Comparison Task**	**LRD Installed**	**Comparison Task**	**Follow Up**
Cognitive Screening Tests (n=9) Rating Scales (n=11) Interview (n=11)	Telephone tasks cued by Written List (5 days) (n=7)	LRD installed (n=9)**	Telephone tasks cued by LRD (5 days) (n=4)	LRD with Recorded Reminders (n=6) Rating Scales (n=2) Interview (n=8)

*Two home visits were terminated at the outset.

**One additional client-participant had an LRD installed, but this was done directly by Lifeline before the home visit. She was then admitted to the hospital. She subsequently refused to place reminders on the LRD and withdrew from the study during week one. No home visit was conducted.

Week 1: Home Visit - Cognitive Screening Tests, Rating Scales and Interview.

During the initial home visit all client-participants were asked by the researcher to complete two cognitive screening tests: the Modified Mini Mental Status Examination (3MS) and the Clock Drawing Test. Questions on socio-demographic characteristics (Appendix D), their initial impression and anticipated use of the LRD were asked by the researcher (Appendix E). The client-participant was also asked to rate their perception of their caregiver's burden/stress and to rate their self-perceived ability to perform the ADL/IADL for which they anticipated they would need reminders (Appendix E).

The initial session or parts of it were completed by 11 of the 13 client-participants who received home visits. The remaining two client-participants decided early in the home visit that they would not trial the LRD and so the interview was terminated.

Of the remaining 11 client-participants who had a home visit, eight completed the cognitive screening tests, two refused to do so and one client-participant was too visually impaired to perform the tests. Tests used to screen client-participants were the Modified Mini Mental State Examination (3MS) and the Clock Drawing Test. Cut off points for the 3MS for this sample group ranged from 82.6 to 90.7 based on age and education. For example, if a client-participant was 91 years old and had a high school education, the cut score assigned for her age and education was 85.6 according to the scoring system developed by Bravo and Hebert (1997). Cut off point for the Clock Drawing Test was a score of two or higher up to a score of six (Shulman, Shedletsky & Silver, 1986). Cognitive impairment was suggested if the client-participant scored below cut-off for both tests or failed one test and had also displayed during the home visit or had been reported as having impaired function related to memory by caregivers or health care professionals.

All 11 client-participants completed the initial rating scales and interview. The client-participant who was visually impaired, however, was unable to identify the buttons on the LRD and was therefore deemed ineligible to participate.

Week 1: Comparison Task - Telephone Tasks Cued by a Written List.

The 10 remaining client-participants received instructions at the end of the home visit, on how to complete daily telephone tasks that they were asked to undertake for the next five days (Appendix F). Client-participants were provided with written instructions on a specific time each day that they were to call the researcher. Only seven of the 10 client-participants performed the telephone tasks. Of the three who did not, one was admitted to an extended care facility soon after the home visit, one refused and one died before he completed the telephone tasks.

Week 2: Intervention - Instalment of the LRD

During week two of the study, client-participants had the LRD installed in their home. As mentioned, the LRD was incorporated into an adapted telephone that also acted as a personal emergency response system (Appendix B). The device had the capability of playing six verbal reminders per day at a predetermined time. The subscriber or caregiver was able to record reminders from any telephone. Lifeline Canada Inc. covered the cost of the installation and monthly charges of the LRDs used during this research project. A Lifeline volunteer provided training on the use of the personal emergency response aspect of the LRD to the client-participant and in some cases, to the PCP as well (approximately 20 minutes of training). A manual was provided on the use of the reminder feature. In total, 10 LRDs were installed, which included the nine client-participants who had received a home visit as well as the client-participant who had the LRD installed directly by Lifeline. For the next three weeks, the client-participants and the PCPs were requested to record reminders on the LRD at their own discretion.

Week 4: Comparison Task - Telephone Tasks Cued by the LRD

The client-participants were asked to call the researcher as cued by the LRD. Four of the six client-participants who allowed reminders to be recorded performed the telephone tasks cued by the LRD, one refused to do the tasks and one was unable to do so due to her deteriorating physical status.

Week 5: Follow-Up Rating Scales and Interview

By the end of week 5, only six of the 10 client-participants consented to recording reminders on their LRD, one died, and three refused to record reminders.

During the fifth week, the researcher conducted another home visit or telephone follow-up interview, with client-participants who had recorded reminders (n=6). Client-participants again rated their caregiver's stress/burden and their own perceived ability to perform ADL/IADL cued by the LRD (Appendix G). They were also questioned about the benefits and limitations of the LRD in the interview (Appendix H). Only two of the six client-participants who had recorded reminders completed the scales at both the baseline and intervention phases of the study. Of the remaining four, one refused, one had been admitted to an extended care unit, one could not remember receiving any reminders and one client-participant became too agitated and confused to complete the rating scales. The follow up interview was conducted with eight of the 10 client-participants who had the LRD installed, in which at least some or all of the interview was completed.

Procedure: Primary Contact Persons (PCPs)

Table 2 summarizes the study design and procedure for the five weeks of the study for PCPs of the client-participants who received a home visit (n=11) and of the one client-participant whom had the LRD installed directly by Lifeline.

Table 2. Overview of the Study Design: Primary Contact Persons

Week 1		Week 2	Week 4	End of Week 5
Baseline		**Intervention**		
Home Visit or Telephone (n=10)**		**LRD Installed**		**Follow Up**
Rating Scales (n=10) Interview (n=10)	Caregiver Contact Sheets (n=2)	LRD Installed (n=9)	Caregiver Contact Sheets (n=2)	LRD with Recorded Reminders (n=6) PCP recorded reminders on the LRD at his/her own discretion (n=2). Researcher recorded reminders (n=3). Client-participant recorded reminder (n=1) Rating Scales (n=3) Interview (n=8)

** Two home visits were terminated at the outset. One PCP was not interviewed as the client participant had died.

Week 1: Home Visit or Telephone Call - Interview and Rating Scales

The PCPs either met with the researcher during the initial home visit with the client-participant or an interview was conducted via telephone at a separate time. The PCPs rated their own level of stress/burden and the perceived ability of the client-participant to perform the ADL/IADL that were anticipated to require LRD reminders (Appendix I). The PCPs answered questions about their initial perception of the LRD and anticipated the type of reminders that they would place on the LRD (Appendix I). At the end of the interview, the PCPs were asked to keep a daily record of their contact with the client-participant for the next five days (Appendix J).

Of the 11 PCPs of client-participants who had home visits and wanted to trial the LRD, 10 PCPs completed the rating scales and interview questions. One PCP was not asked to complete the baseline session or caregiver contact sheets as the client-participant had died. The PCP of the client-participant who had the LRD installed directly by Lifeline with no home visit, stated she was too busy with other caregiving issues.

Only two PCPs of the 10 client-participants who had the LRD installed completed their daily caregiver contact sheet and one of these were filled incorrectly. The most common reasons for not completing the contact sheet were that the PCPs realized the client-participant was going to refuse reminders (n=3) or the PCPs were too busy to fill in the forms (n=5)

Week 2: Intervention Instalment of the LRD

The LRD was installed and PCPs were asked to record reminders at their own discretion for the next three weeks.

Week 4: Caregiver Contact Sheets

As shown in Table 2, in week four, the PCPs were again asked to complete caregiver contact sheets, however the daily caregiver contact sheets used in week four also included any use of the LRD (Appendix K). The same two PCPs who completed the contact caregiver sheets in week one also did so in week four. One of the PCP again completed the contact sheets incorrectly. Three PCPs indicated they were too busy for "personal reasons" to complete the form and one stated she was too busy due to her mother's recent health decline.

Week Five: Follow-Up Rating Scales and Interview

At the end of week five, of the six client-participants who had an LRD installed and accepted recorded reminders, only two had PCPs who recorded any reminders. One client-participant recorded her own reminders, while the researcher recorded reminders for the other three client-participants at their request.

During this week the PCPs completed the same rating scales they had completed in the initial session (Appendix L) and an interview was conducted on the actual use of the LRD, perceived limitations and benefits of the LRD (Appendix M).

Of the six PCPs of client-participants who had LRD reminders recorded, only three completed the rating scales. Two PCPs were too busy for personal reasons and one did not feel the rating scales were applicable, as her mother's cognitive status had declined significantly. Five out of these six PCPs completed some aspect of the follow-up interview, as one PCP was too busy for personal reasons. The PCPs of the client-participants who had the LRD installed but refused reminders completed some aspect of the interview.

MEASUREMENT TOOLS

Cognitive Screening Tests

The Modified Mini Mental State Examination (3MS) and the Clock Drawing Test along with the scoring systems by Bravo and Hebert (1997) for the 3MS and Shulman et al. (1986) for the Clock Drawing Test were selected for this study because these tests and scoring systems are used by the health care professionals in the setting in which this project was conducted. Bravo and Hebert (1997) determined cut off points for the 3MS according to age and education. For this study, the cut off points ranged from scores between 82.6 to 90.7. The cut off point for the Clock Drawing Test was a score of two or higher up to a score of six (Shulman et al., 1986). In this study, client-participants were categorized as cognitively impaired if they scored below the cut off points in both tests or if they failed one test and also displayed during the home visit or had been reported as having impaired function related to memory by caregivers or health care professionals.

Clients were ineligible for the study if they already had a diagnosis of dementia in their current medical file. For those client-participants who refused cognitive testing, their cognitive status was estimated using the assessments recorded in their health file at the VCHA North Shore Community Health Centre.

The Mini Mental Status Examination (MMSE) was widely used as a screening tool for cognitive impairment in studies of older persons (Shulman et al., 1986; Teng & Chang-Chui, 1987). However, the Modified Mini Mental State Examination (3MS) was more extensive than the MMSE and provided an extended scoring scale and tested a wider range of cognitive domains (Teng & Chang-Chui, 1987). Research indicated that the 3MS was a reliable and valid test of cognitive function and compared to the MMSE, it

demonstrated a slight improvement in validity for psychiatric patients in a general hospital (Lamarre & Patten, 1997), had shown increased sensitivity (Tombaugh, Hubley, McDowell & Kristjansson, 1996), higher internal consistency (McDowell, Kristjansson, Hill & Hebert, 1997), and was a better predictor of functional outcome in stroke populations (Grace, Nadler, White, Guilmette, Giuliano, Monsch & Snow, 1995). The Clock Drawing Test was selected to be used in conjunction with the 3MS by the VCHA North Shore Community Health Centre, to increase the sensitivity and specificity of testing to determine the need for further testing for cognitive impairment. The Clock Drawing Test consisted of writing the numbers found on the face of a clock with the hands indicating 10 after 11. This test had been found to be easily accepted by the elderly, had less cultural and educational bias than other tests, was quick to administer and tested cognitive abilities not included in the 3MS such as visual-spatial abilities, abstract thinking and planning, and numerical knowledge (Shulman et al., 1986; Tuokko, Hadjistravropoulos, Miller & Beattie, 1992).

Despite the validity and ease of use of these cognitive tests, there were several limitations to the 3MS and the Clock Drawing Test. Both were limited to being used only as screening tools for identifying individuals who required further testing for cognitive impairment. While several studies have utilized the 3MS as an initial screening tool for cognition, participants were further assessed with several neuropsychological tests for diagnostic purposes (Canadian Study of Health and Aging, 2000; Graham & Rockwood, 1997).

Measurement Tools for Dependent Variables

The two main dependent variables selected for this study were client-participant's independence in ADL/IADL and caregiver burden/stress.

Perceived Independence in ADL/IADL

Three sets of tools were developed by the researcher to identify change in the client-participant's perceived level of independence in performing ADL/IADL.

a) Rating Scales

Rating scales designed by the researcher were used to measure the perception of the client-participant's ability to perform the ADL/IADL that they anticipated needed to be cued by the LRD. Both client-participants and the PCPs completed the scales (Appendix E, G, I & L). For example, at both baseline and at the intervention phase, if it was anticipated that the device would be used to cue appointments, both the client-participant and the PCP were asked how frequently the client-participant forgot appointments (e.g., *"never", "almost never", "occasionally", "frequently", "always"*). Client-participants and PCPs were also asked to rate their confidence in the client-participant's ability to attend appointments using a 5-point scale where 1 = *"not at all confident"* and 5 = *"extremely confident"*.

Several standardized scales for ADL/IADL were considered, specifically the Functional Independence Measure (Granger, Hamilton, Keith, Zielezny, & Sherwin, 1986), Klein-Bell Activities of Daily Living (Klein & Bell, 1982), and the Instrumental Activities of Daily Living Scale (Lawton & Body, 1969) but they were not chosen for use in this study. Reasons were that either the scales did not target the ADL/IADL which were anticipated to be cued by the LRD or the scales did not appear to be sensitive enough to detect changes in perceived function for this study.

b) Comparison Task-Telephone Tasks Cued by a Written List vs. the LRD

The client-participant's ability to respond to the LRD was anticipated to be measured by comparing a baseline and intervention rating of the client-participant's ability to promptly and appropriately complete telephone tasks with cueing provided by a written list (Appendix F) compared to his/her performance when cued by reminders provided by the LRD. A written list was selected for comparison with the LRD, as this was the method most frequently used by health care professionals at the VCHA North Shore Community Health Centre to remind clients of prescribed recommendations for daily tasks. Willkomm and LoPresti (1997) also used telephone tasks to determine participants' ability to accurately and promptly respond to reminders.

c) Interviews

As there was a limited response to the quantitative measurement tools, additional qualitative data were obtained at the end of the intervention phase. Specifically, the PCP was asked if the client-participant responded both promptly and appropriately to LRD reminders and both the PCP and the client-participant were asked if the LRD improved the client-participant's ability to perform those tasks to which reminders were directed (Appendix H & M).

Perceived Caregiver Burden/Stress

a) Rating Scales

At baseline and at the end of the intervention phase, both the client-participant and the PCP rated their perception of the PCP's perceived burden/stress deriving from needing to remind the client-participant about the task(s) that were cued by the LRD (Appendix E. G, I & L). Level of stress was categorized as "*not stressed at all*", "*a little stressed*", "*occasionally stressed*", "*frequently stressed*" and "*always stressed*".

Although standardized assessments of burden are available, such as the Zarit Burden Interview (Zarit, Reever & Bach-Peterson, 1980), Caregiver Strain Index (Robinson, 1983), Caregiver Burden Scale (Pearlin, Mullan, Semple & Skaff, 1990) and the Relative's Stress Scale (Greene, Smith, Gardiner, & Timbury, 1982), this method of assessment was chosen because it was anticipated that the LRD would only impact those tasks towards which reminders were directed.

Additional Measures

a) Caregiver Contact Sheets

In addition to the above, it was important to determine if there was a change in the number of reminders provided by the PCPs and in the nature of interactions between the client-participant and the PCP as a result of using the LRD. Forms were developed by the researcher (Appendix J & K) for the PCP to record the date and time, reason for the contact/reminder, type of contact/reminder (i.e. telephone call, written reminder, prompted by another caregiver) and length of time required for the contact/reminder.

b) Use, Expectations, Perceived Benefits and Limitations of the LRD

Data on the perceptions, expectations, use, benefits and limitations of the LRD were obtained through interviews with both the client-participant and the PCP. Initial perceptions and reasons for obtaining the LRD were ascertained during the baseline interview. The follow up interview identified which ADL/IADL the LRD was actually used for, the perceived benefits and limitations, and perceived ability to use and comfort with using the LRD. Suggestions for improvements and whether the client-participant would chose to continue using the LRD were asked in the follow up interview as well. Client-participants were also asked if they used other household appliances for example, the stove, oven, television, microwave and radio, to determine if there was a relationship

with continued use of these appliances and acceptance to use the LRD. PCPs were also asked to discuss how the LRD benefited themselves and how the LRD may have impacted other caregivers, such as family/friends/health care worker/others and if, or how the LRD affected his/her relationship with the client-participant (Appendix H & M).

RESULTS

The small sample size, high rate of attrition and low completion rate of some measurement tools in this study precluded a statistical comparison of baseline and end-of-the-intervention phase data. The following section will begin with a description of the reasons given by potential client-participants for not taking part in the study. Data on the perceptions, expectations, perceived benefits and limitations and suggestions for the future development of verbal reminder devices given by participants will then be presented, together with examples from detailed case studies of the client-participants.

Reasons for Refusal to Participate in the Study

Only six client-participants actually had the LRD installed and agreed to record reminders. As shown in Table 3, the most common reason given for non-participation was that the potential client-participants could not afford or did not believe they needed the personal emergency response (PERs) feature of the LRD (n=6). There is a 43 dollar monthly fee for the LRD, 36 of those dollars goes toward the PERs feature. Although the LRD was provided at no charge to subjects during the study, potential participants indicated that they "did not see the point in trying the LRD", if they could not afford to pay for or need the PERs after the study was completed.

The second most common reason for refusal to participate in the study was that potential client-participants felt that they did not need a reminder system (n=4). One potential PCP and one client-participant indicated that while a reminder system might be beneficial, they declined to participate because the LRD "sounded too complicated". Some of the other reasons for non-participation related to potential PCPs not wanting to make a change to their own way of providing reminders in person or through phone calls (n=2) or potential client-participants not wanting to make changes to their home

environment (n=2). One potent client-participant indicated she was too concerned with other health issues to cope with any other change and one potential PCP did not want to change the client's PERs to the LRD.

Table 3. Reasons for Refusal by Client-Participants (C-P) or Primary Contact Persons (PCP) to Participate in the Study

Reasons	TOTAL	Study Phase					
		Approached by Health Care Professional		Initial Call From Researcher		Home Visit	
		PCP	C-P	PCP	C-P	PCP	C-P
Does not think he/she needs or can afford a personal emergency response system (PERs)	6		2	1	1		2
Client does not think he/she needs a reminder system	4		1		3		
LRD sounded too complicated	2	1	1				
Family member indicated they wanted to keep providing the reminders in person or through calls	2			2			
Does not want to change home environment	2		1		1		
Did not want to change PERs to LRD.	1			1			
Client concerned with other health issues or other changes	1			1			
Unknown	1		2				
TOTAL	18	1	7	5	5		2

Characteristics of Client-Participants and their Primary Contact Persons

Table 4 summarizes the socio-demographic characteristics and cognitive status of the 13 client-participants who agreed to a home visit and the one client-participant who had the LRD installed directly by Lifeline with no home visit.

As indicated in Table 4, the sample was primarily female (11 women and 3 men). The age of the group ranged from 74 to 93 years old with most of client-participants aged 80 or over (n=10). Most client-participants were widowed (n=11) and lived alone (n=12). Client-participants primarily had only high school education (n=6), although three had some college or were college graduates. A range of incomes were represented: four client-participants had high incomes in the $50,000 or more range and two had income levels from $30,000-$39,000, while 3 client-participants had an income of $10,000-$19,000.

Of the client-participants who had an LRD installed and agreed to recorded reminders (n=6), three obtained cognitive screening test scores which suggested the need for further testing for cognitive impairment and three had scores that were in the normal range.

The characteristics of the PCPs are also shown in Table 4. In general, the PCPs were female (12/14). They tended to be related to the client-participant as daughters (n=9). PCPs ranged in age from 41 to 71, with most between 50-60 years of age (n=6).

Table 4. Socio-Demographic Characteristics of Client-Participants and Primary Contact Persons

Demographic Variables Client-Participants	LRD with recorded reminders (n=6)	LRD installed Refused reminders (n=2)	LRD installed No Home Visit Refused reminders (n=1)	LRD installed: attrition (Death) (n=1)	No LRD installed: attrition (Care facility) (n=1)	Found ineligible during home visit (n=1)	Home visit refused (n=2)
Age							
70-79 years				1	1		
80-89 years	5	1	1				
90-99 years	1	1				1	
Unknown							2
Sex:	6 female	2 female	1 female	1 male	1 male	1 male	2 female
Education Background:							
Some high school	2						
High school grad	3	2			1		
College/University	1			1		1(some)	
Unknown			1				2
Income $							
10,000-19,000	2				1		
30,000-39,000	1	1					
50,000 or more	3			1			
Unknown		1	1			1	2
Marital Status:							
Widowed	5	1	1	1	1		2
Married	1						
Divorced						1	
Never married		1					
Cognitive Screening Tests:							
Suggests Normal	3				1		
Suggests Cognitive Impairment	3	1		1			
Normal Cognition (Medical Records)		1				1	1
Cognitive Impairment (Medical Records)			1				1
Present Living Arrangement:							
Lives alone	4	2	1	1	1	1	2
Lives with children	1						
Lives with spouse	1						
Primary Contact Person:							
Son	1				1		
Daughter	5		1	1			2
Family member		1					
Friend		1				1	
Age (50-60)	5	1					

Table 5 shows the case study number of those who had a home visit (n=13) and the one client-participant who the LRD installed with no home visit. See Appendix N for detailed case studies of each client-participant.

Table 5. Level of Participation and Case Study Number of Client-Participants

LRD Installed Recorded Reminders (n=6)	LRD Installed Refused Reminders (n=2)	LRD Installed No Home Visit Refused Reminders (n=1)	LRD Installed Home Visit Attrition due to death (n=1)	No LRD Installed Home Visit Attrition due to care facility (n=1)	No LRD Installed Home Visit Ineligible (n=1)	No LRD Installed Home Visit Refused (n=2)
#1 #4 #5 #2 #3 #13	#10 #6	#7	#8	#9	#11	#12 #24

Perception of Need for the LRD

Only two of the 13 client-participants who had the home visit, felt they needed reminders to do ADL/IADL. This was despite the fact that the screening tests and/or medical records suggested that half of the client-participants were cognitively impaired (n=7) and 10 of the PCPs or their designated healthcare professional felt that the client-participant had difficulty remembering to perform some aspect of ADL/IADL. Client-participant #13 echoed a common theme among the client-participants; "I don't need a reminder system. If I ever have any memory problems with medications or appointments I would use the LRD."

Throughout the study, only one client-participant (# 5) reported that she needed reminders. In the baseline interview she said, "I think it will be helpful, something to jog your memory." Another client-participant (# 2) initially indicated, "The reminders will be good". However, during the follow-up interview, she indicated that she would not continue to use the LRD as "I found the machine did help for reminding me to take my evening pill however, I don't need reminders". The perception of client-participants' lack of a need for reminders contrasted with the perception of eight PCPs who felt that the client-participants needed a reminder system. Many of the client-participants indicated that they thought the LRD could be helpful for other people or that they would consider it in the future, however, they did not need it at the present time.

Some client-participants were only motivated to try the LRD in the study because they wanted to have the personal emergency response system (PERs). Many client-participants were not really interested or did not believe they needed a reminder system (n=7). Client-participant #1 stated, "I am really getting the LRD for the home emergency response part" and client-participant # 3 said "the home emergency part would be helpful, I never thought about whether I would need reminders because my daughter is always around and takes me to all of my appointments". Four client-participants wanted aspects of both the LRD and PERs, and two client-participants did not want either systems, but had been encouraged by family members to trial the LRD.

Some client-participants commented that their initial impression of the LRD was that it appeared to be "confusing" and "harder and different from my own phone " (client-participant #2). Client-participant #10 had many questions during the initial home visit and stated, "This machine is too confusing".

Refusal to Record Reminders

Three of the ten client-participants who had the LRD installed refused to have reminders recorded. All three expressed concerns or described problems related to the technological design of the LRD. Client-participant #10, who refused to allow a reminder for the telephone tasks or any reminders for ADL/IADL, stated that her main concern was that the "chime will keep going and that will scare me". She stated during the follow-up interview that she did not feel comfortable with the LRD and did not "like the idea of the reminder continually chiming while I am away from my home".

Technological problems with the LRD occurred with client-participant #7 and client-participant #6. The PCP of client-participant #7 had contacted Lifeline directly to have the LRD installed prior to the home visit by the researcher. The installation had occurred while the client-participant was in the hospital. According to the PCP, the apartment manager informed her that the LRD reminder chime kept playing and that several neighbours complained that they heard it throughout the night. The PCP then disconnected the telephone and contacted Lifeline to determine how the reminder could be deleted. The LRD had been mistakenly installed with a reminder already programmed. As a result of this experience the daughter felt the LRD "would be too confusing" and with her mother's recent hospitalization, she did not think the client-participant could "handle any more changes to continue participating in the study".

Client-participant #6 requested that the LRD be disconnected after three days. The LRD had been installed with the enunciated dialling prompts turned on. This feature had the capability to announce each number as it was pressed. The client-participant reported that the LRD was a "nuisance, the volume was too loud and it scared me every time I pressed the buttons." The client-participant requested that the researcher come to

her home to turn this feature off. She reported that the "machine was too complicated" for her friends or care attendants to "figure out." Although the researcher deleted the enunciated dialling prompt, the client-participant still requested that the LRD be disconnected.

Anticipated and Actual Tasks Cued by the LRD and Rating Scales for ADL/IADL Performance and Caregiver Burden/Stress

Of the six client-participants who had LRD reminders, the client-participants and PCP initially anticipated they would use the device for the following reminders:

- appointments (n=4)
- medication management (n=4)
- exercise (n=1)
- daily check in with family (n=2)
- eating (n=1)
- bathing (n=1)
- important dates (n=1)

However, client-participants reported that they actually used the LRD for other reminders such as:

- appointments (n=1)
- medication management (n=5)
- exercise (n=1)
- important dates (n=1)
- daily check in (n=1)
- pet care (n=1)
- bathing (n=1)

Only client-participant #4 and #5, of the six client-participants with reminders recorded, used the LRD for all the same ADL/IADL they had anticipated they would use it for.

Only two client-participants and three PCPs completed the rating scales at baseline and the intervention phase. However, one client-participant actually used the LRD for different tasks than she had anticipated at baseline and therefore rated different tasks at the intervention period. There was no marked difference in the other client-participant's or the PCPs' rating of perceived ability to perform ADL/IADL and/or caregiver burden.

There were some differences, however, in how client-participants and their PCPs rated the PCPs' stress and the client-participant's ability during the baseline rating scales. Three of the PCPs rated their stress level as being higher than perceived by the client-participants at baseline. Also, three PCPs rated their perception of the client-participant's ability to remember to perform ADL/IADL lower than client-participants' had rated themselves during the baseline interview. There was no data from the intervention phase to determine if these perceptions continued as the rating scales were not completed either by these client-participants or their PCPs.

Telephone Tasks

Only four client-participants performed both the baseline and intervention telephone tasks. Client-participant #3 experienced technological problems that prevented her from completing the telephone tasks cued by the LRD. When the third telephone task reminder by the LRD went off, the client-participant immediately picked up the telephone to call the researcher and this in turn reactivated the recording. The client-participant then called the researcher six times "in the hope that this would stop

the message from playing". The client-participant then called her daughter to contact Lifeline to delete the reminders. The client-participant became increasingly frustrated and stated on voice mail to the researcher, "The message keeps playing and I keep calling you and it won't stop, I really need to eat my breakfast". According to the technicians at Lifeline, this problem had not occurred before and they stated that the reminder will keep playing unless there is a 30 second delay from the time the reminder is played and when the receiver is picked up. The client-participant then requested that the researcher delete the rest of the telephone task reminders.

It is noteworthy that in the case of three of the four for whom data are available, client-participants performed telephone tasks more accurately when cued by a written list then when prompted by the LRD, which is not in the expected direction anticipated by this study. For example, client-participant #2 completed all five telephone tasks that were cued by a written list, while she only completed one of the five telephone tasks that were cued by the LRD. According to the client-participant, she did not complete the telephone tasks cued by the LRD because she could not remember the researcher's telephone number even though it was stated in the reminder. The PCP of client-participant #2 reported that while the client-participant was completing the telephone tasks cued by a written list, she did not remember to call her daughter for a daily check in.

Caregiver Contact Sheets

The caregiver contact sheets were designed to collect data on the number and type of contact between the PCP and the client-participant at baseline and during the intervention period. Only one PCP (of client-participant #5) completed the daily contact sheets appropriately. These showed a marked change between baseline and the

intervention period. At baseline, the PCP reported that she was calling two times and her brother was calling one time per day at lunchtime for medication management. After the installation of the LRD these family members made no calls during this same time period. However, the LRD was only used for two weeks as the client-participant was then admitted into an extended care unit

Field Notes on Recorded Reminders

As part of the project, client-participants and PCPs were asked to record a reminder without prompting or instructions from the researcher, as this was standard practice that the LRD was installed without instructions for the reminder feature. None of the six client-participants and PCPs did so without help. Only two PCPs (those of client-participants #5 & #13) recorded reminders themselves and did so only after several prompts or repeat instructions from the researcher. While client-participant #4 was the only client-participant to self-record, her PCP indicated that this only happened after encouragement from family members. "My mom didn't want to record the reminders and asked me and my daughter to do it, but we encouraged her to do it herself. She wasn't comfortable talking into the machine and was nervous." The three remaining client-participants and their PCPs were prompted on several occasions to record a reminder. Yet, in all three cases, they requested that the researcher record it. The most common reasons given for not recording a reminder were that the client-participants and/or PCPs did not know how to record a reminder (n= 3) and that PCPs were too busy with other caregiving tasks to read the manual (n=2).

Follow up Interview with Client-Participants

Follow-up interviews were conducted with eight of the 10 client-participants who had an LRD installed. Of the six client-participants who agreed to LRD reminders on

their device, three indicated that the LRD had met their expectations (client-participant #1, #5 & # 2). However, client-participant #1 indicated that while it met with her expectations, she did not need reminders and found the calendar easier to use. Of these three client-participants, two indicated that the LRD had improved their ability to perform tasks to which reminders were directed. However, client-participant #2 stated that while the LRD helped with reminding her to take her evening medications, she would not continue using the LRD for two reasons. One reason was that the client-participant decided she did not need reminders and second, her medication regime changed and she was no longer required to take medications in the evenings. Client-participant #5 found the LRD improved her ability to take medications and was the only one to indicate that she would continue using the LRD after the study was completed, however, she was later admitted to an extended care unit.

Although, three client-participants had changes to their medication regime during the study, the recorded reminders were not changed or adjusted appropriately. Client-participant # 4 stated that the LRD did not help her to take her medications because the time of the reminder was incorrectly recorded to go off at eight pm and her medications were supposed to be taken prior to eight pm. When asked why the client-participant did not change the time of the reminder, she said, "I couldn't be bothered to change the time". Client-participants and PCPs indicated they either did not know how to change the reminders or they could not be bothered to adjust the pre-set times.

Two of the client-participants with recorded reminders indicated that they felt comfortable using the LRD. However, while client-participant #1 stated that she felt comfortable using the LRD, she continued to use her own telephone for daily use rather than the LRD. Many comments were negative, for example, client-participant #4 found

the LRD "sometimes annoying because I had to rush to get the telephone", client-participant #13 reported that "I wanted to throw it out the window", and client-participant #2 stated LRD reminders were "getting on my nerves".

Eight of the client-participants who had an LRD installed were asked whether they were using other home appliances. Among the seven who responded, there appeared to be limited use of other household appliance, which included; television (n=7), stove (n=6), oven (n=6) radio (n=3), microwave (n=3), and dishwasher (n=2). The sample was inadequate to determine if there was any association between use of other appliances and acceptance of the LRD.

When comparing the LRD to other methods for reminding including written lists, telephone calls or in person, none of the client-participants indicated the LRD was easier. One client-participant indicated that it was just as easy as getting a telephone call. Four of the six client-participants, who had recorded reminders, indicated that it was easier to have a reminder from a calendar. Client-participant #1 commented that her calendar is much easier than the LRD as "this is what I have been doing for years". One PCP commented that the calendar provided a more effective cueing method because the client-participant could see the reminder the day before or in the morning and had more time to prepare for an appointment.

In terms of improving the LRD, one client-participant recommended that the instructions on how to use the LRD be done in person and another client-participant stated that the LRD should be "more compact".

Follow-Up Interview with Primary Contact Persons

Eight of the 10 PCPs of a client-participant with an LRD installed, completed some aspect of the follow-up interview, which occurred at the end of the intervention phase. PCPs of three of the six client-participants with recorded reminders indicated the LRD met their expectations. However, only two of these PCPs felt that the LRD improved the client-participant's ability to perform the ADL/IADL to which the reminders were directed. This matched the perceptions of the two client-participants who had also indicated that the LRD improved their performance. However, client-participant #2 felt that the LRD helped her with medication management, while her PCP indicated that it helped with a daily check in call. In terms of medication management, the PCP indicated, it "was hard to determine if she really took her medications". In the case of client-participant #5 both she and her PCP reported that the LRD improved medication management.

The PCP of client-participant #5 was the only one to indicate that the LRD benefited another family member who was also calling on a daily basis with medication reminders and that it reduced reliance on health care services. According to this PCP, the client-participant was already receiving the maximum number of hours allocated for daily community health worker services, of which one of their tasks was providing medication reminders. The PCP stated that the LRD provided a viable solution for reminders instead of this task "falling back on the family to call or hiring additional services privately". The PCP noted that the client-participant was able to respond appropriately to two messages, but when three messages were played daily it appeared to "overwhelm" her. In general, the PCP stated that the client-participant was responding appropriately and promptly to the reminders. The PCP of client-participant #3 indicated that she was unable to tell if the client-participant was responding

appropriately to the reminders, "As I am not there when the reminders go off, so I can't tell you if she responds promptly or not". Her concern was "my mother might hear the reminder but then get distracted and I won't know whether she will take the medication or not".

Only the PCP of client-participant #5 indicated the LRD was easier than reminders in the form of a written list, a telephone call and/or in person. However, when another family member was staying with client-participant #5, he prompted her instead of relying on the device and this was the same for the PCP of client-participant #3, who decided to rely on the community health worker to cue her mother rather than the LRD.

Two of the PCPs stated that the LRD was easy to use and two stated that it was difficult. The PCP of client-participant #3 also indicated that the LRD was easy to learn and to use, yet she requested that the researcher record all reminders and did not do it herself.

Two of the PCPs stated the LRD had a positive effect on their relationship with the client-participant in terms of the reminder aspect. The PCP of client-participant #5 indicated that the family was relieved and saw the LRD as a long-term solution to keeping her mother in the home had she not been admitted to an extended care unit. While the PCP of client-participant #2 stated that the LRD reduced her stress, she indicated that she found calling or visiting her mother was"better" than using the LRD. Only one PCP of (client-participant #5) indicated that she would have continued to use the LRD if her mother had not been admitted to a care facility.

DISCUSSION

This study examined the benefits and limitations of the LRD. The two expectations of the researcher were that the client-participant and the primary contact person (PCP) would perceive that 1) an improvement in the client-participant 's ability to perform ADL/IADL occurred as a result of cueing by the LRD and 2) that there would also be a reduction of perceived burden/stress on the caregiver in regards to the same tasks. As it turned out, there was a high rate of refusal to participate in the study, limited use of the LRD by those who did participate and only one client-participant and their PCP reported benefits in terms of improvement in the client-participant's ability to perform IADL and reduced caregiver burden.

It seems that by the time the client-participants were willing to accept the LRD with the PERs component, it came at a time when they had declined both physically and cognitively and were in need of significantly more support to stay in the community and for some, a move to a facility was necessary. Because client-participants and PCPs were coping with physical and cognitive declines, environmental demands and the need for additional services, learning to use a reminder device on top of everything else was overwhelming. The fact that during the study, of the 13 client-participants who had a home visit, three were admitted to an extended care unit or were placed on a waiting list, one died and three were hospitalized, attested to the frail status of this sample.

The multiple functions of the LRD increased its complexity and may have contributed to its limited use. During recruitment and in the baseline interview , client-participants indicated that were reluctant to try the LRD because it appeared to be "too confusing" or "different from their own telephone". One of the researcher's reasons for considering the LRD was because it was incorporated into a familiar household item.

However, the adapted telephone was often viewed as another change, which had to be adjusted to. Several client-participants continued to use their own telephone for daily use rather than the LRD. The PERs aspect of the LRD was also viewed as requiring an adjustment. During the study, some client-participants appeared be very concerned about understanding the PERs feature, let alone the LRD reminder function. At the same time, the inclusion of the PERs feature also accounted for the primary reason for refusal. Potential client-participants only wanted to participate in the study if they anticipated they could afford or benefit from using the PERs as it accounted for $36 of the $42 monthly cost of the LRD.

Technological complications were the primary reason for refusal to allow recorded reminders. Client-participant # 6 rejected the LRD because she was unable to figure out how to reduce the volume or turn off the enunciated dialling prompt. Client-participant #7 withdrew from the study after a reminder was left on the LRD from the previous subscriber and the chime on the reminder button continued all night during her hospitalization. Client-participant #10 was concerned that the LRD would be "chiming, the whole time I am out of the house" if she was not at home at the time of the reminder.

In applying the Ecological Theory of Aging, it was anticipated that the LRD would act as a compensatory mechanism for prospective memory impairment by reducing the environmental press of the task to match the lower competency of the older adults with memory loss in performing ADL/IADL. However, results of this study suggest that the multiple functions and technological design of the LRD actually increased the environmental press of daily tasks which the LRD was directed to and therefore, did not match the lower competency of this frail sample and result in successful coping for most client-participants.

There were several reasons why five of the six client-participants who allowed recorded reminders did not find the LRD beneficial. Almost all client-participants believed they did not have memory loss that affected their ability to perform daily tasks and did not feel they would benefit from a reminder system. The exception was client-participant #5, who admitted that she had difficulty with remembering to perform some aspect of a daily task and would probably benefit from a reminder system. She was also the only one who found the LRD beneficial and wanted to continue using it

It was also possible that client-participant #2 and client-participant # 4, with greater levels of cognitive function (as indicated by results from the cognitive screening tests), and therefore higher competency, were already functioning at a level where their ability to perform daily tasks matched the press of the environment (i.e. area of adaptation in Lawton's Model). This could explain why these higher functioning client-participants lacked the motivation to use the LRD. They may have perceived that they were already coping with their ADL/IADL and had successful coping mechanisms in place and thus did not see a benefit in using the LRD. According to the Ecological Theory of Aging, the additional reminder mechanism that was part of the study requirements could have created negative effects for the higher functioning adults because it created a situation of low environmental press when competency was high.

Consistent use of the LRD was also affected by the fluctuations in the cognitive status of client-participants. For example, client-participant #3 appeared to be using the LRD appropriately, but when her cognition changed and she displayed lower competency, the PCP chose to rely on community health workers to prompt rather than relying on the LRD, as the LRD does not have the capability to monitor if users have completed the task that was being prompted by the system. Two other PCPs also

reverted to their previous method of reminding to make sure the client-participant was actually performing the task. The LRD was not sophisticated enough to monitor or adjust to the changing cognitive status of client-participants. This is also a limitation of the Ecological Theory of Aging, in that it describes the relationship between the older adult's level of competency and the environmental press of a task at a point in time and therefore, does not explain the use of the device for older adults with fluctuating cognition. Other models which describe the variable status and needs of the older adults with cognitive limitations may be more beneficial in predicting the use of reminder devices with this population.

Another reason why client-participants did not find the LRD beneficial or used it in a limited capacity may also have been due to insufficient training. Client-participants were trained on how to use the PERs feature and were given an extensive manual on how to use the LRD, but no direct training. Furthermore, volunteers who installed the LRD were not trained on using the reminder feature. Only one of the client-participants and two PCPs read the manual. Several client-participants indicated that it would have been easier to learn to use the LRD by demonstration and instruction rather than reading the manual. Given that some of the client-participants had cognitive impairment, reading an instruction manual may not have been within their scope of function.

Only one of the six client-participants and PCPs who agreed to a recorded reminder found the LRD beneficial in terms of improving ability in performing ADL/IADL and reducing caregiver burden. Another client-participant and PCP indicated that the LRD was beneficial in these areas, however, the benefits for this client-participant may be less significant as the PCP never recorded a reminder or requested that the researcher adjust the medication reminder to reflect changes in the client-participant's

medication regime. The PCP also stated that she could not tell if the client-participant was "taking her medications as prompted" and during the follow up interview they both stated that they did not want the LRD to be continued.

There may have been several reasons why client-participant #5 deemed the LRD beneficial. Her acceptance to use and desire to continue with the LRD may have been due to the fact that at the outset of the study she had already accepted that she needed a reminder system and was having difficulty with daily tasks. Motivation was also high for the PCP who indicated that she was actively seeking a solution to reduce the three daily calls provided by herself and her brother. This PCP was the only one to learn how to record reminders and adjust the reminders as required. Client-participant #5 also demonstrated less cognitive loss than other client-participants, thus she still had the ability to remember the verbal recording of the LRD and retain this information to perform the task. However, it should be noted that this client-participant only used the LRD for two weeks and then was admitted to an extended care unit.

The pilot study by Polfuss-Smith (2002) found the LRD to be beneficial in terms of improving care adherence and provision of care, improving independence and enhancing quality of life as reported by subscribers and their coordinators (n=10). However, participants in Polfuss-Smith's study consisted of adults ranging in age from 19-65 with primarily physical limitations. The reason why the LRD was considered a success by participants in the Polfuss-Schmidt (2002) study could have been because the sample was already relying on caregivers and equipment from a young age. Thus, they may have accepted the LRD as a tool to facilitate care more effectively into their lives. There may also have been greater acceptance of assistive devices among a younger population who are more open to and familiar with technology. Furthermore,

this group may have had the cognitive capability or greater stability of cognition to learn to use and manipulate the LRD. Essentially, the participants in the Polfuss-Schmidt (2002) study had greater levels of competency to cope and adapt with the demands of introducing the LRD into their environment.

There were several limitations to the study, which must be acknowledged. The most significant limitation was the small sample size. The sample was originally intended to be comprised of 15 older adults dwelling in the community and their primary contact persons. However, due to the high rate of refusal to try the LRD, attrition due to death or institutionalization and refusal to allow reminders to be recorded on the LRD, the study consisted of a small sample of only six client-participants and their PCPs. Therefore, the results from this study are tentative and should not be generalized to all older adults who use reminder devices and live in the community.

The complexity of the design of this study may have affected the outcome of the results by increasing the burden/stress for the PCP and making compliance with the study requirements challenging. Some client-participants and PCPs commented that there were too many tasks to be completed in the study and this may have affected the PCPs' and client-participants' available time to learn and use the LRD. Limiting the measurement tools included in the study may have also increased the completion rate of tasks. The caregiver contact sheet in particular had a very low completion rate. Simply asking the caregiver to estimate contact times with the client-participant rather than requesting daily recordings may have been more effective in collecting this information.

Another limitation of the measurement tools selected is that the rating scales provided limited data. It was initially anticipated that the rating scales would reflect a change in the client-participants' and PCPs' perception of caregiver burden and ability in

the ADL/IADL cued by the LRD. However, as the actual use of reminders was different from initially anticipated, the client-participant and PCP often rated different tasks at baseline and the end of the intervention phase. This could be rectified by completing a baseline rating scales on all ADL/IADL, to allow comparison with rating scales of those tasks that were actually cued by the LRD at the intervention phase.

Finally, additional pre-testing of the LRD may have alerted the researcher to some of the limitations of the device with this sample. Although some pre-testing was completed with two older adults with memory loss and at the home of the researcher, a longer pre-testing period may have demonstrated the technological complication of the LRD for this sample. Several training sessions and follow up appointments to monitor the use of the LRD may have reduced the client-participant's anxiety to use the LRD and increased compliance with the device.

CONCLUSIONS

The LRD was selected for this study as a possible compensatory technique for older community dwelling older adults that had prospective memory loss to improve their ability to perform daily tasks and thus, reduce caregiver burden. The study was originally intended to determine if there was change in either or both perceived independence and caregiver burden at baseline and at the end of intervention for 15 new subscribers to Lifeline's Reminder Device. While the study had 39 referrals, only 6 client-participants had the LRD installed and also allowed recorded reminders. Due to the small sample size and low completion rate of some measurement tools, a statistical analysis of measurement tools was not feasible and pre-post measures were supplemented with detailed case studies and qualitative data from additional sources such as the researcher's field notes and interviews with the client-participants and primary contact persons identifying the benefits and limitations of the LRD.

It was possible that the complexity of the research design may have increased burden/stress for the PCP and overwhelmed the client-participant and/or lead to a lower completion rate of some measurement tools and use of the LRD. As there was a small sample in this study, the conclusions should be interpreted with caution and are not generalizable to device use by older adults with cognitive limitations living in the community. However, the high rate of refusal to participate in the project or to allow recorded reminders, complexity of the LRD, and the limited use of this device by client-participants suggests that the LRD as designed at the time of the study had limited appeal or benefits for this client-population. Limited use by those client-participants who had higher cognition and no self-reported difficulty with an ADL/IADL, may be because they already had successful reminder systems in place and did not perceived a need for

the LRD. For those client-participants with screening tests which suggested cognitive impairment, the LRD appeared to be too complicated and yet not technologically sophisticated enough to monitor and guide performance or accommodate to the changing cognition of the user within their home environment.

Recommendation for Future Development of Reminder Systems

1) A device designed for prospective memory loss may be more effective and more widely accepted if it were less complicated and less costly than the LRD. A device with fewer features may be less prone to technological complications, thus increasing acceptance for initial learning and continued use. A higher level of acceptance by client-participants and PCPs might have occurred if the LRD did not have the PERs function. The addition of the PERs to the LRD increased the complexity of the device, meaning one more thing for client-participants to adjust to, and increased cost of the LRD. An adapted tape recorder with a preset alarm may still provide some of the benefits of the LRD in terms of cueing the older adult at the designated time with individualized reminders and using a familiar voice of the caregiver/subscriber. This would be a cheaper and less confusing alternative to the LRD.

2) Compliance and proper use of the device might be higher if the device is directed to only one ADL/IADL task, or if reminders are incorporated into the appliance in which the task is performed. An example would be a stove that automatically shuts off at a predetermined time or alerts the user of the time to turn the stove off.

3) The device should be more compact. Several client-participants commented that the LRD was too bulky and they did not know where they were going to put it. Compact devices could be placed near the task it was cueing and might increase compliance and accuracy when cueing the client to the appropriate ADL/IADL and ensuring performance of the task is completed. Another option may be to design a device that could be attached to the person, so that she/he could be directed to the task while listening to the reminder.

4) Older adults with cognitive limitations should be assessed by a health care professional to determine the most appropriate solution for reminders, as there are several reminder devices on the market. In order to ensure a higher level of success, clients should be assessed to determine if the device matches their cognitive, physical and sensory abilities. The results of this study suggest that clients and caregivers need practical training and ongoing monitoring to encourage use and to determine if the device continues to be appropriate to the needs of the older adult. Training and monitoring should be incorporated into the client's care plan if a reminder device is used.

5) The device should be marketed towards the general public rather than specifically to older adults with cognitive loss. How client-participants accepted the LRD appeared to be linked to how they perceived the LRD and the adverse affects of aging. The need for the LRD appeared to be a sign to the client-participants of their memory loss and declining ability to perform ADL/IADL independently. Therefore, compliance and acceptance of the LRD on an ongoing basis, in this project, required that the client-participant had to be aware and willing to acknowledge these losses. If the LRD were marketed as a helping

tool to all older adults, rather than identifying memory loss as a predictor of use, perhaps more adults would accept it into their daily routines. Devices such as the Palm Pilot are widely accepted by the general public because they are not marketed to 'forgetful people'. As such, the Palm Pilot is viewed as a tool used to enhance the performance of any capable individual.

6) In the future, the LRD may have greater compliance and acceptance as younger generations are more familiar with using technological devices in ADL/IADL. To prepare for greater acceptance by older adults, the device should be introduced when there is no or very mild cognitive loss and cognition is fairly stable so that the user still has the capability to learn and incorporate their LRD into their regular routine.

7) While a simpler device may be easier for some older adults with cognitive impairment, there are several limitations to these reminder devices. The LRD did not give feedback as to whether the client-participant was actually performing the specific tasks or not and client-participants could not modify the reminder feature for their specific needs and preferences. Reminder systems with the capability of artificial intelligence may be a long-term solution for these older adults as they have less capability to manipulate, adjust and learn new reminder devices. These systems could potentially accommodate to the declining or fluctuating status of older adults with cognitive limitations.

REFERENCES

Barron, W.M. (1980). Failed Appointments: Who misses them, why they are missed, and what can be done? *Primary Care, 7*, 563-574.

Bravo, G. & Hebert R. (1997). Age and education-specific reference values for the Mini-Mental and Modified Mini-Mental State Examinations derived from a non-demented elderly population. *International Journal of Geriatric Psychiatry, 12*, 1008-1018.

Canadian Study of Health and Aging Working Group. (1994). Canadian study of health and aging study methods and prevalence of dementia. *Canadian Medical Association Journal, 150*(6), *899-912.*

Canadian Study of Health and Aging Working Group. (2000). The incidence of dementia in Canada. *Neurology, 55*(1), 66-73.

Cooper, J.K., Love, D.W., & Raffoul, P.R. (1982). Intentional prescription nonadherence (non-compliance) by the elderly. *Journal of the American Geriatrics Society, 30*, 329-334.

Einstein, G.O., McDaniel, M.A., Richardson, S.L., Guynn, M.J. & Cunfer, A.R. (1995). Aging and prospective memory: examining the influences of self-initiated retrieval processes. *Journal of Experimental Psychology: Learning, Memory and Cognition, 21*, 996-1007.

Gitlin, L., & Corcoran, M. (1993). Expanding caregiver ability to use environmental solutions for problems of bathing and incontinence in the elderly with dementia. *Technology and Disability, 2*(1), 12-21.

Gitlin, L., Corcoran, M., Winter, L., Boyce, A., & Hauck, W. (2001). A randomized, controlled trial of a home environmental intervention: Effect on efficacy and upset in caregivers and on daily function of persons with dementia. *The Gerontologist, 41*(1), 4-14

Grace, J., Nadler, J., White, D. A., Guilmette, T.J., Giuliano, A. J., Monsch, A. U. & Snow, M. G. (1995). Folstein vs Modified Mini-Mental State Examination in geriatric stroke. *Archives in Neurology, 52,* 477-484.

Graham, J.E. & Rockwood, K. (1997). Prevalence and severity of cognitive impairment with and without dementia in an elderly population. *Lancet, 349,* 1793-1796.

Granger, C.V., Hamilton, B.B., Keith, R.A., Zielezny, M. & Sherwin, F.S. (1986) Advances in functional assessment for medical rehabilitation. *Topics in Geriatric Rehabilitation, 1,* 59-74.

Greene, J.G., Smith, R., Gardiner, M., & Timbury, G.C. (1982). Measuring behavioral disturbance of elderly demented patients in the community and its effects on relatives: A factor analytic study. *Ageing, 11,* 121-126.

Henry, J., MacLeod, M.S., Phillips, L.H., & Crawford, J. (2004). A meta-analytic review of prospective memory and aging. *Psychology and Aging, I9,* 27-39.

Huppert, F.A., Johnson, T., Nickson, J. (2000). High prevalence of prospective memory impairment in the elderly and in early-stage dementia: Findings from a population-based study. *Applied Cognitive Psychology, 14*(1) S63-S81.

Klein, R.M., & Bell, B. (1982). Self-care skills: Behavioural measurement with Klein-Bell ADL scale. *Archives of Physical Medicine and Rehabilitation, 63,* 335-338.

Koch, J., W. (1984). Emergency response system assists in discharge planning. *Dimensions in Health Service, 11,* 30-31.

LaMarre, C. J. & Patten, S.B. (1997). Evaluation of the modified mini-mental state examination in a general psychiatric population. *Canadian Journal of Psychiatry. 36*(7).

Lawton, M. P. & Brody, E.M. (1969). Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontology, 9,* 179-186.

Lawton, .M. (1998) Environment and aging: Theory revisited. In Scheidt, R.J, & Windley, P.G. (Eds). *Environment and aging theory* (pp. 1-32). Westport, CT: Greenwood Press.

Leirer, V.O., Morrow, D.G., Pariante, G.M., & Doksum, T. (1989). Increasing influenza vaccination adherence through voice mail. *Journal of American Geriatric Society, 37,* 1147-1150.

Leirer, V.O., Morrow, D.G., Tanke, E.D., & Pariante, G.M. (1991). Elder's nonadherence: Its assessment and medication reminding by voice mail. *The Gerontologist, 31*(4), 514-520.

Leirer, V.O., Tanke, E.D., & Morrow, D.G. (1993). Commercial cognitive/memory systems: A case study. *Applied Cognitive Psychology, 7,* 675-689.

LoPresti, E.F., Mihailidis, A., & Kirsch, N. (2004). Assistive technology for cognition rehabilitation and compensation: State of the art. *Neuropsychological Rehabilitation,14* (1/2), 5-39.

Macharia, W.M., Leon, G., Rowe, B.H., Stephenson, B.J., & Haynes, B. (1992). An overview of interventions to improve compliance with appointment keeping for medical services. *Journal of the American Medical Association, 167,*1813-1817.

Mann, W., Hurran, D., & Tomita, M. (1993). Comparison of assistive device use and needs of home-based older persons with different impairments. *American Journal of Occupational Therapy, 47*(11). 980-987.

Maylor, E.A. (I 990). Age and prospective memory. *The Quarterly Journal Experimental Psychology, 42A,* 471-493.

Maylor, E. A. (1993). Aging and forgetting in prospective and retrospective memory tasks, *Psychology and Aging, 8*, 420-428.

Maylor, E.A. (1996). Age-related impairment in an event-based prospective-memory task. *Psychology and Aging, 11*, 74-78.

McDowell, B., Kristjansson, G., Hill, B. & Hebert, R. (I997). Community screening for dementia: The Mini Mental State Exam (MMSE) and Modified Mini-Mental State Exam (3MS) compared. *Journal of Clinical Epidemiology, 50*(4), 377-383.

Messecar, D. (2000). Caregiver's ability to make environmental modifications. *Journal of Gerontological Nursing, 12*, 32-42.

Mittelman, M., Ferris, S., Steinberg, G., Shulman, E., Mackell, J., Ambinder, A., & Cohen, J. (1993). An intervention that delays institutionalization of Alzheimer's disease patients: Treatment of spouse-caregivers. *The Gerontological Society of America, 33*(6), 730-740.

Moscovitch, M., & Winocur, G. (1992). The neuropsychology of memory and aging. In F.I.M. Craik & T.A. Salthouse (Eds),. *The Handbook of Aging and Cognition* (pp. 315-372). Hillsdale, NJ: Lawrence Erlbaum.

Nochajski, S., Tomita, M., & Mann, W. (1996). The use and satisfaction with assistive devices by older persons with cognitive impairments: A pilot intervention study. *Top Geriatric Rehabilitation, 12*(2), 40-53.

Pearlin, L.I., Mullan, J.T., Semple, S.J. & Skaff, M. (1990). Caregiving and stress process: An overview on concepts and their measures. *Gerontologist, 30*(5), 583-594.

Polfuss-Schmidt, P. (2002, January). Lifeline with reminders. Pilot study. Powerpoint Presentation for Guelph Services for Persons with Disabilities, Guelph, Ontario.

Robinson, B.C. (1983). Validation of a caregiver strain index. *Journal of Gerontology, 38*, 344-348.

Rodriguez, L. (1991). Personal response systems: The Canadian perspective. *International Journal of Technology and Aging, 4*(1), 13-16.

Roush, R.E., Teasdale, T., Murphy, J.N. & Kirk, S.M. (1995). Impact of a personal emergency response system on hospital utilization by community residing elders. *Southern Medical Journal, 88*(5), 917-922.

Roush, R. & Teasdale, T. (2002). Study shows that personal response services make a measurable difference. *Lifeline Connections, Fall,* 1-2.

Schultz, R., O'Brien, A., Bookwala, J., & Fleissner, K. (1995). Psychiatric and physical morbidity effects of dementia caregiving: Prevalence, correlates, and causes. *The Gerontologist, 35*(6), 771-791.

Shulman K., Shedletsky, R., & Silver, L. (1986). The challenge of time: Clock-drawing and cognitive function in the elderly. *International Journal of Geriatric Psychiatry, 1,* 135-140.

Tanke, E.D. & Leirer, V.0. (1994). Automated telephone reminders in tuberculosis care. *Medical Care, 32*(4), 380-389.

Teng, E.L., & Chang-Chui, H. (1987). The Modified Mini-Mental State (3MS) Examination. *Journal of Clinical Psychiatry, 48* (8), 314-317.

Tombaugh, T.N., Hubley, A.M., McDowell, I. & Kristjansson, B. (1996). Mini-Mental State Examination (MMSE) and the Modified MMSE (3MS): A psychometric comparison and normative data. *Psychological Assessment, 8*(1), 48-59.

Tuokko, H., Hadjistravropoulos, T., Miller, J. A., & Beattie., B.L. (1992). The clock test: A sensitive measure to differentiate normal elderly from those with Alzheimer

disease. *Journal of the American Geriatric Society, 40*, 589-584.

Touminen, J. D. (1988). Prescription drugs and the elderly in BC. *Canadian Journal on Aging, 7,*174-182.

Watzke, J. (1994). Personal emergency response systems: Canadian data on subscribers and alarms. In Gutman, G. & Wister, A. (Eds). *Progressive accommodations for seniors* (pp. 147-166). Vancouver: Simon Fraser University Gerontology Research Centre Press.

Willkomm, T. & LoPresti, E. (1997). Evaluation of an electronic aid for prospective memory tasks. Proceedings of the Rehabilitation Engineering Society of North American (RESNA).

Zarit, S.H., Reever, K.E. & Bach-Peterson, J. (1980). Relatives of the impaired elderly: Correlates of feelings of burden. *Gerontologist, 20*, 649-655.

APPENDIX A. LETTER OF ETHICAL APPROVAL

APPENDIX A*

SIMON FRASER UNIVERSITY

OFFICE OF RESEARCH ETHICS

BURNABY, BRITISH COLUMBIA
CANADA V5A 1S6
Telephone: 604-291-3467
FAX: 604-268-6789

August 14, 2003

Ms. Mandy Shintani
Graduate Student
Gerontology
Simon Fraser University

Dear Ms. Shintani:

Re: Efficacy of the Lifeline Reminder Device (LRD) with older adults

The above-titled ethics application has been granted approval by the Simon Fraser Research Ethics Board, at its meeting on July 28, 2003 in accordance with Policy R 20.01, "Ethics Review of Research Involving Human Subjects".

Sincerely,

Dr. Hal Weinberg, Director
Office of Research Ethics

* For inclusion in thesis/dissertation/extended essay/research project report, as submitted to the university library in fulfillment of final requirements for graduation. Note: correct page number required.

SIMON FRASER UNIVERSITY

OFFICE OF RESEARCH ETHICS
ROOM 2105 STRAND HALL

BURNABY, BRITISH COLUMBIA
CANADA V5A 1S6
Telephone: 604-291-3467
FAX: 604-268-6789

September 10, 2003

Ms. Mandy Shintani
Graduate Student
Gerontology
Simon Fraser University

Dear Ms. Shintani:

Re: Efficacy of the Lifeline Reminder Device (LRD) with older adults
Revision

In response to your request dated September 4, 2003, I am pleased to approve, on behalf of the Research Ethics Board, the minor revisions to include that the project be done in one phase, that being the original third phase which consists of 15 subscribers and 15 caregivers and that new subscribers will be screened with the Clock Drawing Test. It is understood that participants will also be asked to complete telephone tasks consisting of calling the researcher two times per day cued by a written list for the first week and again on week 3 of the study cued by the Lifeline Reminder Device. Also, that the consent form has been revised to include these changes made to the research protocol of the above referenced Request for Ethical Approval of Research originally approved on June 11, 2003.

Best wishes for success in this research.

Sincerely,

Dr. Hal Weinberg, Director
Office of Research Ethics

c: Dr. Gloria Gutman, Supervisor
/jmy

APPENDIX B. LIFELINE'S REMINDER DEVICE

Source: Mandy Shintani, 2004.

APPENDIX C. REASONS FOR REFUSAL OR INELIGIBILITY TO PARTICIPATE

Initials of client	Reason for ineligibility or why the client did not want to trial the LRD or participate in the study.

Name:

What is your professional background?

What was your initial perception of the LRD?

APPENDIX D. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE CLIENT-PARTICIPANTS

1. Age at last birthday?_____

2. Gender

    a) female

    b) male

3. What is your educational background?

    a) Primary school

    b) Some high-school

    c) High-school grad

    d) Some college/university

    e) College/university degree

    f) Graduate studies

4. What is your total annual household income?

    a) 0-$5,999

    b) $6,000-$9,999

    c) $10,000-$19,999

    d) $20,000-$29,999

    e) $30,000-$39,999

    f) $40,000-$49,999

    g) $50,000 or more

5. What is your marital status?

    a) Married or living with a partner

    b) Divorced/separated

    c) Widowed

    d) Never-married (single)

    e) Other_____

6. What is your present living arrangement?

    a) Lives alone

    b) Lives with spouse/partner

    c) Lives with children

    d) Lives with other family member/friend

    e) Lives in an assisted living residence

    f) Other_____

APPENDIX E. INTERVIEW & BASELINE RATING SCALES: CLIENT-PARTICIPANTS

---

1. I am going to read you a list of reasons other people have given for obtaining the LRD. Please tell me which, if any, was the reason for you getting one (if the primary contact person obtained the device, skip to question 2).

Expected Reasons
❑ Missing appointments
❑ Not taking medication properly
❑ Forgetting important social activities and dates
❑ Not prepared for appointments
❑ Not adhering to exercise or therapy
❑ Nutritional problems
❑ Forgetting changes in daily schedule
❑ Poor hygiene
❑ Loneliness
❑ Forgetting date and time
❑ Forgets to call caregiver for a daily check-in.
❑ Other

2. What was your initial perception of the LRD, when it was introduced to you?

3. How did you find out about the LRD?

4. What do you hope the LRD will accomplish?

Please rate your perception of how you feel or think at this time.

Appointments

How frequently do you think you forget appointments?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is, with reminding you about your appointments?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to attend appointments?

1----------3----------5

Not at all confident Extremely confident

Medication Management

How often do you think you miss taking some of your medications?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to take your medications?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident are you in your ability to take medications?

1----------3----------5

Not at all confident Extremely confident

Social/Leisure Activities

How frequently do you think you forget social/leisure activities or important dates?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you about social/leisure activities?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember social/leisure activities?

1----------3----------5

Not at all confident Extremely confident

Meal Preparation

How frequently do you forget to prepare three meals a day?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to prepare three meals a day?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to prepare three meals a day?

1----------3----------5

Not at all confident Extremely confident

Exercise Therapy

How frequently do you forget to do your prescribed exercises?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to do your exercises?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to do your exercises?

1----------3----------5

Not at all confident Totally confident

Other ADL/IADL

How frequently do you think you forget to _____?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/neighbour is, with reminding you to ____

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to do _____?

1----------3----------5

Not at all confident Extremely confident

APPENDIX F. SAMPLE TELEPHONE TASKS

Please call Mandy everyday for the next 5 days,

1. On October 1 at 9:00 a.m., please call (604) 980-1812 and say, " Hi Mandy, it is Mrs. Brown and I'm calling because you asked me to".

2. On October 2 at 2:00 p.m., please call (604) 980-1812 and say, " Hi Mandy, it is Mrs. Brown and I'm calling because you asked me to."

3. On October 3 at 11:00 a.m., please call (604) 980-1812 and say, " Hi Mandy, it is Mrs. Brown and I'm calling because you asked me to."

4. On October 4 at 4:00 p.m., please call (604) 980-1812 and say, " Hi Mandy, it is Mrs. Brown and I'm calling because you asked me to."

5. On October 5 at 10:00 a.m., please call (604) 980-1812 and say, " Hi Mandy, it is Mrs. Brown and I'm calling because you asked me to."

APPENDIX G. FOLLOW-UP RATING SCALES: CLIENT-PARTICIPANTS

What tasks did you receive reminders for?

	Actual Use
☐	Appointment reminders
☐	Medication Management
☐	Social/Leisure Activities
☐	Nutrition
☐	Preparing for Transportation
☐	Exercise/Therapy
☐	Daily check-in
☐	Other

Appointments

How frequently do you think you forget appointments?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is, with reminding you about your appointments?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to attend appointments?

1----------3----------5

Not at all confident Extremely confident

Medication Management

How often do you think you miss taking some of your medications?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to take your medications?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident are you in your ability to take medications?

1----------3----------5

Not at all confident Extremely confident

Social/Leisure Activities

How frequently do you think you forget social/leisure activities or important dates?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you about social/leisure activities?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember social/leisure activities?

1----------3----------5

Not at all confident Extremely confident

Meal Preparation

How frequently do you forget to prepare three meals a day?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to prepare three meals a day?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to prepare three meals a day?

1----------3----------5

Not at all confident Extremely confident

Exercise Therapy

How frequently do you forget to take do your prescribed exercises?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/client is with reminding you to do your exercises?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to do exercises?

1----------3----------5

Not at all confident Totally confident

Other ADL/IADL

How frequently do you think you forget to do _____?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you think your relative/friend/neighbour is, with reminding you to _____?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your ability to remember to _____?

1----------3----------5

Not at all confident Extremely confident

APPENDIX H. FOLLOW-UP INTERVIEW: CLIENT-PARTICIPANTS

1 Did the LRD meet with your expectations?

Yes ____

No ____

Why or why not?

2. Did the LRD improve your ability to perform the tasks in which reminders were directed?

Yes ____

No ____

Why or why not?

3. How long did it take for you to learn to use and understand the reminders?

Immediately after instructions___

Day___

Days___

Week __

Weeks___

Never learned____

4. Was it difficult or easy to learn to use the LRD?

Easy___

Average__

Hard___

5. Did you feel comfortable using the LRD?

Yes____

No____

Why?

6. Do you still use other home appliances?

Television

Video Machine

Radio

Microwave

Stove

Oven

Stereo

Dishwasher

Others?

Do you still feel comfortable using these items?

7. Compared to other techniques you receive for reminding, is the LRD, harder, easier or the same?

Written list

Harder__easier__the same___

Calls from family/friends/healthcare workers

Harder__easier__the same___

In person from PCP

Harder__easier__the same____

In person from family/friends/healthcare workers

Harder__easier__the same____

8. Did it have a positive effect, negative effect or no effect on your relationship with the PCP?

Positive____

Negative___

No effect___

Why?

9. Do you have any suggestions for improving or changing the LRD?

In terms of the

Training

Volume

Features of the Telephone

Recording Reminders

Chime for Reminders

Recorded Reminders

10. Will you continue using the LRD?

Yes___

No___

Why or why not?

11. If Lifeline funded this device, would you consider paying for the service now?

Yes___

No____

Why or why not?

APPENDIX I. INTERVIEW & BASELINE RATING SCALES: PRIMARY CONTACT PERSONS

What is your relationship to the client-participant?

Age:

Location to the client-participant:

---

1. I am going to read you a list of reasons other people have given for obtaining the LRD. Please tell me which, if any, was the reason for you getting one (if the client-participant obtained the device, skip to question 2).

Expected Reasons
❑ Missing appointments
❑ Not taking medication properly
❑ Forgetting important social activities and dates
❑ Not prepared for appointments
❑ Not adhering to exercise or therapy
❑ Nutritional problems
❑ Forgetting changes in daily schedule
❑ Poor hygiene
❑ Loneliness
❑ Forgetting date and time
❑ Forgets to call for daily check-in
❑ Other

2. What was your initial perception of the LRD, when it was introduced to you?

3. How did you find out about the LRD?

4. What do you hope the LRD will accomplish?

Please rate your perception of how you feel or think at this time.

Appointments

How frequently do you think your relative/friend/client forgets his/her appointments?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel assisting your relative/friend/client with remembering appointments?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to attend appointments?

1----------3----------5

Not at all confident Extremely confident

Medication Management

How often do you think your relative/friend/client misses taking some of his/her medications?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel assisting your relative/friend/client with remembering to take his/her medications?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to take medications?

1----------3----------5

Not at all confident Extremely confident

Social/Leisure Activities

How frequently do you think your relative/friend/client forgets social/leisure activities or important dates?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel assisting your relative/friend/client with remembering social/leisure activities?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember social/leisure activities?

1----------3----------5

Not at all confident Extremely confident

Meal Preparation

How frequently do you think your relative/friend/client forgets to prepare three meals a day?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to prepare **three meals a** day?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to prepare three meals a day?

1----------3----------5

Not at all confident Extremely confident

Exercise Therapy

How frequently do you think your relative/friend/client forgets to do his/her prescribed exercises?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to do their exercises?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to do their exercises?

1----------3----------5

Not at all confident Extremely confident

Other ADL/IADL

How frequently do you think your relative/friend/client forgets to do _____?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to do _____?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to do _____?

1----------3----------5

Not at all confident Extremely confident

APPENDIX J. BASELINE PHASE-CAREGIVER CONTACT SHEET

5-day period

Date and Time	Reason for Contact/Reminder	Time required for Contact/Reminder	Type of Contact/Reminder

Possible reasons for contact/reminder: social call, medication management, reminder to eat, exercise, meal preparation, appointments, reminder of social/leisure activities, transportation, financial, health related.

Type of contact/reminder: in person, written reminder on a note or calendar, telephone, through a neighbour/friend/other caregivers/home support worker/health care professional.

1. Do you think this time period reflected a typical week? Yes____ No____

2. If no, on a typical week, how often do you contact the participant? _____

APPENDIX K. INTERVENTION PHASE-CAREGIVER CONTACT SHEET

5-day period

Date and Time	Reason for Contact/Reminder	Time required for Contact/Reminder	Type of Contact/Reminder

Possible reasons for contact/reminder: social call, medication management, eating a meal, exercise, meal preparation, appointments, reminder for social/leisure activities, transportation, financial, health related.

Type of contact/reminder: Lifeline Reminder Device, in person, written reminder on a note or calendar, telephone, through a neighbour/friend/other caregivers/home support worker/health care professional.

1. Do you think this time period reflected a typical week? Yes___ No____

2. If no, on a typical week, how often do you contact the participant? _____

APPENDIX L. FOLLOW-UP RATING SCALES: PRIMARY CONTACT PERSONS

What tasks did you focus reminders to?

Actual Use	
❑	Appointment reminders
❑	Medication Management
❑	Social/Leisure Activities
❑	Nutrition
❑	Preparing for Transportation
❑	Exercise/Therapy
❑	Daily check in
❑	Other

Appointments

How frequently do you think your relative/friend/client forgets his/her appointments?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed to you feel assisting your relative/friend/client with remembering appointments?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always

How confident do you feel about your relative/friend/client's ability to attend appointments?

1 ----------3---------- 5

Not confident Extremely confident

Medication Management

How often do you think your relative/friend/client misses taking some of his/her medications?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel assisting your relative/friend/client with remembering to take his/her medications?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to take medications?

1----------3----------5

Not at all confident Extremely confident

Social/Leisure Activities

How frequently do you think your relative/friend/client forgets social/leisure activities or important dates?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel assisting your relative/friend/client with remembering social/leisure activities?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember social/leisure activities?

1----------3----------5

Not at all confident Extremely confident

Meal Preparation

How frequently do you think your relative/friend/client forgets to prepare three meals a day?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to prepare three meals a day?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to prepare three meals a day?

1----------3----------5

Not at all confident Extremely confident

Exercise Therapy

How frequently do you think your relative/friend/client forgets to do their prescribed exercises?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to do their exercises?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to do their exercises?

1----------3----------5

Not at all confident Extremely confident

Other ADL/IADL

How frequently do you think your relative/friend/client forgets to do _____?

- Never
- Almost Never
- Occasionally
- Frequently
- Always

How stressed do you feel reminding your relative/friend/client to do _____?

- Not stressed at all
- A little stressed
- Occasionally stressed
- Frequently stressed
- Always stressed

How confident do you feel about your relative/friend/client's ability to remember to do _____?

1----------3----------5

Not at all confident Extremely confident

APPENDIX M. FOLLOW-UP INTERVIEW: PRIMARY CONTACT PERSONS

1. Did the LRD meet with your expectations?

   Yes____

   No_____

   Why or why not?

2. Did the LRD improve the client-participant's ability to perform the tasks in which reminders were directed?

   Yes___

   No____

   Why or why not?

3. Do you think the LRD benefited

   a) the client-participant

      Yes___

      No___

   b) If yes, how?

   c) the PCP

      Yes____

      No_____

d) If yes, how?

e) Other involved friends or family members

Yes___

No____

f) If yes, how?

g) Health care system

Yes___

No____

h) If yes, how?

4. Do you think the client-participant responded appropriately to the reminders?

Yes___

No____

If no, explain.

5. Do you think the client-participant responded promptly to the reminders?

Yes____

No____

If no, explain.

6. Do you have any suggestions for improvement or change?

7. Did it have a positive effect, negative effect or no effect on your relationship with the participant?

   Positive____

   Negative___

   No effect___

   Why?

8. Was it difficult or easy to learn to use the LRD?

   Easy___

   Average___

   Hard___

9. Compared to other techniques you use for reminding, is the LRD harder, easier or the same to use?

   Written list

   Harder__easier__the same___

   Calling the participant

   Harder__easier__the same___

   In Person

Harder__easier__the same____

Through a friend/neighbour/healthcare worker

Harder__easier___the same___

10. Will you continue using the LRD?

Yes___

No___

Why or why not?

11. If Lifeline continued to fund this device, would you continue using it?

Yes___

No____

Why or why not?

APPENDIX N. CASE STUDIES

Client-Participants with the LRD Installed with Recorded Reminders

Client-Participant #1

Socio-demographic: Female, 90 years old, high school education, over $50,000, widowed, lives with son.

Cognitive Screening Tests:

3MS score: 95/100

Clock Drawing: 1

Results: No indication of need for further testing for cognitive impairment.

Interview: Anticipated use of LRD: appointments and a reminder to tell her when her son was away for the weekend. Initial impression of the LRD was that she "didn't think her memory was bad enough it to require it". She reported "I am really getting the LRD for the home emergency response part".

Rating Scales:

Baseline rating scales: "*never forgot appointments*", her PCP was " *not stressed at all*" and rated her ability to remember appointments to be 5/5.

Follow-up rating scales: Rated a different IADL than in baseline.

Telephone Tasks: The client-participant's performance was better when cued by the LRD.

Reminders: The researcher contacted the client-participant on two occasions to request that she and/or the PCP record a reminder. No reminders were placed on the LRD in the fifth week of the intervention period. During the second call, the client-participant indicated that her son had reviewed the manual but stated, "He couldn't think of a reminder to record." The client-participant indicated that she "didn't know how to record a reminder and thought it would be easier for you [the researcher] to do it". Reminders were used for exercise and important dates rather than appointments. No reminders were recorded by the client-participant or PCP.

Follow-up Interview: The client-participant indicated that the LRD met with her expectations, "it just reminded me I had something to do". She stated it was easy to respond to the reminders and rated "*average*" for the difficulty in using the LRD. The client-participant indicated that she understood how to record reminders after the researcher showed her, as "I am the kind of person who finds that reading the manual isn't as effective as being shown in person how to do something".

Although, the client-participant indicated she felt comfortable using the LRD, she reported that she continued using her own telephone rather than the LRD for daily use. Client-participant stated she did not need reminders and found using her calendar much easier than the LRD as "this is what I have been doing for years": The LRD had a positive effect on her relationship with her son only in terms of the PERs. Recommendations: "More instructions rather than giving a manual as people benefit more from instructions rather than reading". Continued Use: No for the LRD, but wanted a PERs.

PCP

Socio-demographics: Male, 57 years, son, lives with the client-participant.

Interview: Anticipated use: appointments. Initial Impression: "The most beneficial aspect of the LRD is the PERs" for the times he was working or away for the weekend. He anticipated that his mother would benefit more from the reminders as her memory declined.

Rating Scales:

Baseline rating scales: The PCP's rating was close to the client-participant's baseline rating scale.

Caregiver Contact Sheets: No contact sheets were completed by the PCP.

Follow-Up Interview: Not completed. Client-participant indicated the PCP was too busy with personal reasons.

Client-Participant # 4

Socio-demographics: Female, 87 years old, high school grad, $30,000-39,999, widowed, lives alone

Cognitive Screening Tests:

3MS score: 92/100,

Clock Drawing: 1

Results: No indication for further testing for cognitive impairment

Interview: Anticipated Use: appointments and medications. She hoped the LRD would result in her taking her weekly medication on time.

Rating Scales:

Baseline rating scales: "*almost never*" forgot her appointments; PCP was "*not stressed at all*" and rated her ability to attend appointments as 4/5. Medication management: "*almost never*" forgot to take her medications, PCP was "*not stressed at all*" and that her ability to take medications was 4/5.

Follow-up rating scales: Similar to the baseline rating scales.

Telephone Tasks: There were no marked differences in the client-participant's ability to complete telephone tasks cued with the written list, in which she made 5/5 calls on time compared to the LRD in which 4/5 calls were made on time.

Reminders: The researcher called two times to encourage the client-participant and PCP to record a reminder. This client-participant was the only one in the study who recorded reminders. Her PCP reported, "my mom didn't want to record the reminders and asked me and my daughter to do it, but we encouraged her to do it herself. She wasn't comfortable talking into the machine and was nervous, however she enjoyed learning to use it." Reminders were recorded for appointments and medication management.

Follow-Up Interview: The client-participant indicated that the LRD did meet with her expectations but " I don't need it, I know several ladies in the building that this machine would be good for." She stated that it did not improve her ability to take her medications

as she had set the time incorrectly and couldn't be bothered to change the time". She found the reminders "sometimes annoying, because I had to rush to the telephone". She said the machine was easy for her to learn and she felt comfortable with using it, but felt that other people would have difficulty". The client-participant indicated that she was used to her calendar and this was easier than the LRD. It had no effect on her relationship with her PCP. Recommendation: The LRD should be more compact. Continued Use: No for the LRD but will continue with a PERS.

PCP

Socio-demographics: 58 year old, daughter, lives in another city.

Interview: Anticipated Use: appointments and medications. Initial Impression: "LRD will add to what mom does, it is a wonderful experience for her to try something electronic that she usually does on paper". The PCP stated the PERs feature of the LRD will "give me a peace of mind" and the LRD will "provide another good organizational skill for my mother".

Rating Scales:

Baseline rating scales: PCP rated close to client-participant's baseline rating scales.

Follow-up rating scales: Similar ratings compared to baseline.

Caregiver Contact Sheets: not completed

Follow-Up Interview: PCP stated that LRD met her expectations; however felt it should be for someone "in the beginning stages of Alzheimer's. I don't think my mom needs it". Stated the LRD did not improve her mother's ability to take her weekly medications because "it was scheduled at the wrong time". She stated that it did not benefit her mom or herself. She found that "my mother is more prepared for appointments when she writes them down, because she can see in advance that she has to get ready. A couple of times, my mother wasn't as prepared for appointments with the LRD compared to when she wrote the reminder in her calendar." She felt that her mother responded appropriately to the reminders. It had a positive effect on her relationship with her mother because it was something "we could learn together". She found it "hard to learn,

unless you do it with someone" and found that it was easier to use a written list, as that was what she does everyday. Continued Use: No for the LRD, but requested a PERs .

Client-Participant # 5

Socio-demographics: 81 years old, female, widowed, college/university, lives alone, $50,000 or more for income.

Cognitive Screening Testis:

MMSE: 94/100
Clock Drawing: 1
Result: No indication for further testing for cognitive impairment.

Interview: Anticipated Use: medication reminder. Reported "I think it will be helpful, something to jog your memory". "I am concerned about where I would put it.

Rating Scales:

Baseline rating scales: "*almost never*" forgets taking her medications, her PCP was "*not stressed at all*" and her ability was 4/5 to remember medications.

Follow-up rating scales: unable to complete as client-participant was admitted to an extended care unit.

Reminders: Another PERs was already in place, which had to be disconnected before the LRD could be installed. Reminders recorded by PCP for medications and feeding her pet.

Telephone Tasks: Client-participant only called on 1x and reported that she had attempted to call the researcher "but the operator said your number cannot be reached". The client-participant stated that she gave up after trying several times. She reported that this frequently happens with her telephone. She refused telephone tasks cued by the LRD because she was feeling "overwhelmed" with other physical concerns. Client-participant indicated at this time that she did find the reminders helpful and the reminders had improved her ability to take medications at lunch.

Follow-up Interview: unable to conduct interview as client-participant was admitted to an extended care unit.

PCP.

Socio-demographics: Daughter, age 53, lives in another city.

Interview: Anticipated Use of LRD: Three reminders for lunchtime medications. Initial Impression: "it was wonderful, just what she needed". If she doesn't have her lunch medications, it is very difficult for her walk and to think."

Rating Scales:

Baseline rating scales: Rated lower for remembering her medications to and rated higher for stress and ability.

Follow-up rating scales: unable to complete due to other caregiving tasks.

Caregiver Contact Sheets: The PCP indicated that she called the client-participant two times and her brother called once per day during the lunchtime period for reminders for medications. In the intervention caregiver contact sheet, the PCP indicated that she and her brother were not calling the client-participant at all during lunchtime for the two weeks they had used the LRD. However, when her brother was staying with the client-participant prior to her admission to the extended care unit, he provided medication reminders in person.

Follow-Up Interview: Unable to complete full interview as PCP was still feeling stressed from all of the time needed for admitting her mother into an extended care unit. The daughter indicated her mother had been receiving the maximum amount of home support services in which one of the duties they performed was reminders for medications. The LRD provided a "viable solution" for reminders at lunchtime rather then this task "falling back on the family to call or hiring additional services privately." The PCP stated they were "relieved " to have the LRD and viewed the system as a long term solution to keeping her mother in the home had she not been admitted to an facility due to her physical changes. The PCP stated that she initially had to spend time adjusting the reminders to her mother's capabilities as she found three reminders to be

overwhelming but discovered that her mother could respond appropriately to the medication regime with two reminders. While her brother was staying with the client-participant, he had noted that on one occasion, she appeared to be confused and kept pressing the reminder button "thinking it would turn the LRD off". She stated "this thing drives me crazy sometimes". The PCP also reported that initially the client-participant was confused when the LRD was installed and replaced the old PERs, that had been installed several years ago from another company. Apparently the client-participant had to adjust to "this change in devices" and was reluctant to use the PERs feature for a while. Recommendations: The PCP suggested that she would have positioned the LRD closer to where her mother spent most of her time and recommended more direct training during instalment. The PCP was unaware the LRD came with a manual. *Continued Use*: She reported that they would have retained the LRD if the client-participant had not gone into a facility.

Client Participant #2

Socio-demographics: 89 years old, female, high school grad, 10,000-19,000 income, widowed, lives alone,

Cognitive Screening Tests:

3MS: 74/100

Clock Drawing: 1

Result: Test results and impaired function indicate need for further testing for cognitive impairment.

Interview: Anticipated use: appointments, medications, daily check -in and nutrition. Initial Impression: "A bit confusing" and appeared to be "harder to use and different from her own machine", however stated "the reminders would be good".

Rating Scales:

Baseline rating scales: "*occasionally*" forgets taking her medication, her PCP is "*always stressed*" with reminders for medications and she rated her ability to remember to take medications as being 3/5. Meal preparation: "never" forgets to

prepare three meals per day, PCP is "a little stressed" and rated her ability to remember as 3/5.

Follow-up rating scales: Not completed as client-participant was becoming too agitated with the interview questions.

Field Notes: The LRD was installed and three days later the daughter called to say that the client-participant was " very distressed and found the loud computer voice very annoying". The enunciated dialling prompt (verbal announcement of each number as it is pressed) was left on when the LRD was delivered and they "could not figure out how to turn it off" and requested for the researcher to "fix the machine". The researcher came to the home and took off the play back feature. During week three, the PCP reported that her mother was not wearing the home emergency response button as she had seen a television show indicating the device was "radioactive".

Telephone Tasks: Client-participant was more successful in completing telephone tasks cued by a written list than by a telephone tasks cued by the LRD. She indicated that she "couldn't remember the researcher's telephone number from the recorded reminder". The PCP called the researcher to report that while her mother was remembering to complete the telephone task cued by the written list she did not remember her daily check in call.

Reminders: PCP requested for the researcher to assist the client-participant to record all the reminders. Two reminders were recorded for medications and one for a daily check in call. The client-participant and the PCP wanted the recording to be in the user's voice. The PCP indicated "it's better that it is in her voice, otherwise she will feel like I am just telling her what to do".

Follow-up Interview: The client-participant indicated the reminders from the LRD "were getting on my nerves" and "ringing so much when I was in my bed". " I found the machine did help for reminding me to take my evening pill, however, I don't need reminders". The client-participant stated she did not feel comfortable with recording and using the LRD. The only appliance she still uses in her home is her television. The client-participant stated that reminders from people and a written list are easier for

reminding than the LRD. " I have always used a daily schedule". Continued Use: No to the LRD, but wanted to have a PERs.

PCP

Socio-demographics: Daughter, 67 years old, lives near client-participant.

Interview: Anticipated use: daily check in, medications and nutrition. Initial Impression: Primarily wanted it for the PERs and that " a few reminders are great".

Rating Scales:

Baseline rating scales: Medication Management: Ratings were close to the client-participant. Meal Preparation: rated higher for forgetting "always" forgetting to prepare three meals per day, higher ratings for stress "always stressed" with reminding, same rating for ability 3/5.

Follow-up rating scales: Rated the same as at baseline.

Caregiver Contact Sheets: Completed incorrectly.

Reminders: The researcher requested on two occasions for the PCP to record reminders. The PCP stated she "hadn't had time to read the manual and stated it would be easier for the researcher to put on the first reminders". For the duration of the study, the PCP recorded no additional reminders.

Follow-Up Interview: The LRD met with her expectations and improved her mother's ability to complete a daily check in call. However, the PCP indicated that it was "hard to determine if it helped with her medications", because she was not there when the devices was alerting her mother. Her mother's medication routine had changed and she no longer required the medication the reminder was pertaining to. However, the PCP did not delete this reminder. She stated that she thought the client-participant responded promptly to the reminders and appropriately, however, the client-participant felt "nervous with all the buttons". The LRD had a positive effect on her relationship with the client-participant in terms of "less stress". She rated the LRD "hard" to learn and found calling her mom or visiting her in person "better" than using the LRD. Continued Use: The PCP stated they had request for a PERs but did not want the LRD.

Client-Participant # 3

Socio-demographics: 81 years old, female, some high school, $10,000-19,999, widowed, lives alone.

Cognitive Screening Tests:

3MS: 77/100

Clock Drawing: 1

Results: Testing and impaired function indicated need for further testing for cognitive impairment.

Interview: Anticipated use: exercise and hygiene. Initial impression of the LRD is that the "PERs would be helpful, I never thought about whether I would need reminders because my daughter is always around and takes me to all of my appointments".

Rating Scales:

Baseline rating scalse: she "almost never" forgets to take a shower, her PCP is "not stressed at all" and she feels "extremely confident to remember to take a shower".

Follow-up rating scales: did not complete, as client-participant could not remember receiving any recorded reminders pertaining to ADL/IADL.

Telephone Tasks: The client-participant completed all telephone tasks cued by a written list with two calls on time and three calls were late. Telephone tasks cued by the LRD were on time for the first two calls. At the time of the third telephone task reminder, the client-participant immediately picked up the telephone to call the researcher and this reactivated the recording. The client-participant continued to call the researcher six times in the "hope that this would stop the message from playing" and then called her daughter to contact Lifeline to delete the reminder. The client-participant became increasing frustrated and stated on the researcher's voice mail, "The message keeps playing and I keep calling you and it won't stop, I really need to eat my breakfast". According to the technicians at Lifeline, this problem had not occurred before and stated the reminder will keep playing unless there was a 30 second delay from the time the

reminder is played and when the receiver is picked up. The client-participant requested for the researcher to delete the rest of the telephone task reminders.

Reminders: The researcher contacted the client-participant and PCP two times during the study to request they record reminders. As no reminders had been recorded by the fifth-week of the study, the client-participant agreed for the researcher to record reminders for bathing and for medications.

Follow Up Interview: The client-participant stated that she did not remember having any reminders for taking a shower or for medications, even though these reminders were still playing daily. She stated, "I remember calling you and putting a message on your answering machine, but I didn't have any reminders for showers or taking my medication. I really don't need it, my memory is okay, and I only forget the odd time". The client-participant indicated she learnt how to respond to the reminders immediately but stated "it was annoying when it continued to ring and I'd have to stop what I was doing". The LRD was rated as "hard" in terms of recording reminders. Client-participant indicated that reminding using a written list was easier than the LRD and the same difficulty as receiving calls from family members. She felt the LRD had no effect on her relationship with her daughter. She stated that the LRD is a "reminder of what is wrong with me". Continued Use: No to the LRD but plans to continue with a PERs.

PCP

Socio-demographics: Daughter, 56 years old, lives in Vancouver.

Interview: Anticipated use: exercise. Initial impressions of the LRD were that "my mother does not need it because she has me".

Rating Scales:

Baseline rating scales: Similar ratings to client-participant's baseline rating scales.

Follow- up rating scale: Rated another task than at baseline.

Caregiver Contact Sheets: Not completed. Stated she was too busy with other caregiving tasks.

Follow-Up Interview: The PCP stated that while the LRD met with her expectations, however, "it wasn't good for my mother, after being hospitalized she received daily home support and they cued her on her medications, my mother's short-term memory declined too much for the LRD". The PCP indicated that the LRD did not improve her mother's ability to take medications as she did not rely on the LRD because "my mother might hear the reminders but then get distracted and I won't know whether she will took the medications or not." The PCP felt that it benefited her mother to receive a reminder of her medications, however, it did not benefit herself because she continued to call her mother a few times each day. The PCP indicated she was unable to tell if the client-participant responded appropriately or promptly to the reminders, as "I am not there when the reminders go off, so I can't tell you if she responds promptly or not". The PCP stated the LRD had no effect on her relationship with the client-participant and while the PCP stated it was easy to learn, she never recorded any reminders during the study. Compared to other techniques, the PCP found calling her mom was easier than the LRD. She reported that she will not continue with the LRD but planed to request for a PERs.

Participant # 13

Socio-demographics: Age: 88, female, some high school, 50,000 or more, married, lives with spouse.

Cognitive Screening Tests:

3MS: 79

Clock Drawing: 2

Result: Screening tests and impaired function indicated need for further testing for cognitive impairment.

Interview: Anticipated reasons for using the LRD: none. Initial impression: "I don't need a reminder system, if I ever have any memory problems with medications or appointment I would use the LRD." "It seems easy to use." "I don't know why my daughter thinks I need the reminder system or the PERs."

Rating Scales:

Baseline rating scales: "*never*" misses any appointments, her PCP is "*not stressed at all*" and rated her ability as 5/5. Stated the same ratings for medication management.

Follow-up rating scales: not completed.

Telephone Tasks: refused to completed telephone tasks.

Reminders: Researcher called the PCP two times to encourage use of the reminder feature.

Follow-Up Interview: Client-participant indicated that the LRD did not meet with her expectations and did not improve her ability to take medications. "Initially the reminder went off in the middle of the night at 3 a.m. and my daughter had to adjust it. When the reminder went off I ignored it and turned it off. I was so annoyed with it, I wanted to throw it out the window". Stated that the LRD did not help because "I always remember to take my medications because my memory is still good. It would help other people who needed it". Stated that she understood how to use the reminders immediately and that it was easy to use the LRD, however, she did not respond to the reminders or record one. She stated that she did not feel comfortable using the LRD and continued to use her own telephone. She stated a calendar was easier to use than the LRD. The device had no effect on her relationship with her daughter. "I know my daughter means well, but I don't need this telephone device." Continued Use: No for the LRD and the PERs.

PCP:

Socio-demographics: 50 years old, daughter, lives in the same home temporarily

Interview: Anticipated use: medications, appointments, daily check in and special dates. Initial impression: "I will have to remind myself to use the machine" and "it will be another mechanism for helping my mother's memory". The daughter stated that "I am always reminding my mother but she does not realize it".

Rating Scales:

Baseline rating scales: Rated lower than the client-participant for remembering "*almost never*" forgets appointments, rated higher for stress, she is "*frequently stressed*" and rated her mother's ability lower at 3/5. Medication management: rated lower for remembering "*occasionally to frequently*" forgets her medication, rated higher for stress, she is "*frequently to always stressed*" and rated her mother's ability lower at 3/5. Stated that she was very stressed because she was doing allot of reminding for her mother and had a full time job.

Follow-up rating scales: PCP indicated that she was too busy to complete rating scales.

Caregiver Contact Sheets: Not completed.

Follow-Up Interview: Stated that her mother "had a difficult time with it". Her mother had problems with the LRD "going off in the middle of the night and I'm not sure why that happened". PCP stated that "so far the LRD has not been helpful, it might work better for a specific appointment rather than daily medications. It would have been more helpful if someone could have gone in and explained it to us when it was installed. I don't have time to read the manual".

Client-Participants with LRD Installed with Home Visit (Refused Reminders)

Client-Participant # 10

Socio-demographics: 87 years old, female, high school grad, $30,000-$39,999, never married, lives alone

Cognitive Screening Tests:

Refused MMSE and Clock Drawing Test.
Medical Records indicated no cognitive impairment.

Interview: Anticipated Use: reminder to call sister every day and for important social activities. Initial impression: "Hopefully, I don't reach a point where I need these reminders. However, I am not sure it would remind me when I need one". Client-

participant had several questions regarding what would happen if the phone got off the hook, "this is too confusing" or whether the "phone will call directly to Telus".

Rating Scales:

Baseline rating scales: "*never*" forgot social leisure activities, her PCP was "*not stressed at all*" with reminding her and rated confidence in her ability as 5/5.

Follow up rating scales: not completed as client-participant refused reminders.

Telephone Tasks and Reminders: Completed 4/5 telephone tasks cued by a written list. Did not want to have recorded reminder for the telephone tasks with the LRD. "Chime will keep going and that will scare me". Stated: I don't like the idea of the reminder continually chiming while I am away from my home." Stated: " I am afraid to touch the machine and I don't want to use it, because I am afraid that a bunch of people will come". Also refused for other reminders to be recorded on the LRD.

Follow-Up Interview: "I don't feel I need reminders, it would have been more of a hassle than a help. I won't like it if it kept on ringing until I got back, I am out of the house quite a bit and it is not portable. LRD did not improve ability to perform tasks, as reminders were not recorded. Stated that she thought the machine was easy, however repeatedly asked how she should respond when "the PERs people call". Appeared to be very concerned with the PERs feature "I am worried if the children came by and pressed any of the buttons". Does not feel comfortable using the LRD. Reported that it is easier to use a written list and calendar than LRD. The LRD had a positive effect in terms of the PERs feature "gave me alot of security because it is right on my hand and I don't need to rely on people as much". Continued Use: No for the LRD but will continue using a PERs.

PCP

Socio-demographics: Niece, 41 years, lives in the same city.

Interview: Anticipated Use: None, as "my aunt does not need any reminders".

Initial Impression: "Helpful for other people, I won't use it right now, because I like to call her directly and I don't think she needs it. If she thought she needed it, she would use it because she wants to stay in her own home. My aunt does not like machines and automatic voices. The PERs will keep her in the home longer."

Baseline rating scales: Similar rating as client-participant's baseline rating scales.

Caregiver Contact Sheets: Not completed as participant refused recorded reminders.

Follow-Up Interview: The LRD met with our expectations in terms of the PERs. The PERs benefited my aunt and myself by providing alot of security, as she lives alone. Stated that "my aunt was very concerned with using the PERs feature and she did not think she needed any reminders".

Client-Participants #6

Socio-demographics: Age 91, female, high school grad, income-not provided, widowed, lives alone

Cognitive Screening Tests:

3MS: 77.

Clock Drawing: 3

Results: Test results and impaired function indicate need for further testing for cognitive impairment.

Interview: Anticipated use: medications and nutritional problems. Wants LRD for PERs component. Initial impression: "It is a stupid idea because I have a brilliant mind. It is a good idea for other people but I don't need one yet".

Rating Scales:

Baseline rating scales: "*never*" forgets taking some of her medications, her PCP is "*not stressed at all*", and her confidence in her ability is 5/5. In terms of meal preparation; she "*never*" forgets to prepare a meal, her PCP is "*occasionally stressed*" and rated her confidence in her ability as 5/5.

Follow-up rating scales: not completed as client-participant did not have recorded reminder.

Telephone Tasks Cued by a Written List: Client-participant completed 4/5 calls with 2 calls that were late.

Reminders: After the LRD had been installed for three days, the client-participant stated that she "wanted to get rid of the LRD". The LRD had been installed with the enunciated dialling prompt on and she stated it was a "nuisance." "The volume is too loud and it scared me every time I pressed the buttons." Client-participant indicated, "The machine was too complicated for her friend or care attendant to figure out". The researcher went to the home and put down the volume of the ringer and turned off the enunciated dialling prompt. However, the client-participant still requested for the machine to be disconnected.

Follow-Up Interview: The client-participant indicated that the LRD did not meet with her expectations. Although the researcher attempted to focus the client-participant to the reminder aspect, she kept commenting about the PERS, "not any good, I am well enough and not serious enough that I can't call 911 on my own, I can lean on an item if I have an attack. I am fed up with the machine". Client-participant found it "hard" to use. Did not feel comfortable using the LRD, "initially scared the life out of me". Stated she would not use the LRD because "my mind is stronger than others and they are not as bright as I am."

PCP

Socio-demographics: 72 years old, friend, lives in the building.

Interview: Anticipated use: nutritional problems. Initial Impression: "It was a good idea and I'm not the brightest to remember either".

Rating Scales:

Baseline rating scales: Similar to the client-participant's baseline rating scales.

Follow-Up Interview: " I knew it wasn't going to work, she is that type of person, very independent and she saw the machine as indicating that she wasn't okay. She has her own way of doing things, so stubborn". The PCP stated that she felt "better" when the LRD was installed for the PERs aspect. She stated that LRD was "too big and loud". She stated it had no effect on their relationship. Stated the LRD was "easy" in terms of the big buttons and thought that might be helpful in terms of the client-participant's visual loss. " I was afraid I would break it and I did not want to adjust it. " Stated the client-participant did not want to use the LRD or continue with a PERs.

Client-Participant (LRD Installed Directly by Lifeline) No Home Visit, Refused Reminder

Client-Participant #7

Socio-demographics: Age: 87 years old, female, lives alone, widowed. income status-unknown, education-unknown.

Cognitive Screening Tests:

Did not have a home visit.
Medical records indicated cognitive impairment.

Reminders: A case manager at the VCHA North Shore Community Health Centre asked the PCP if they wanted to participate in the study. The daughter then called directly to Lifeline and the LRD was installed prior to the home visit with the researcher. The LRD was installed when the client-participant had been admitted to the hospital. The daughter indicated that the apartment manager had called to say that the "message chime kept playing all night and that several neighbours had complained". The daughter had to disconnect the LRD and then asked Lifeline to delete the reminder. The LRD had been installed with a recorded reminder from the last user and the family was unaware of this at the time of the instalment. As a result of this experience, the daughter stated the LRD would be too confusing for the client-participant and that "too many other things had happened" with her mother and that she didn't think she could handle any more changes to participate in the study.

PCP

Socio-demographics: Daughter, lives in the same city, age unknown.

Follow-Up Interview: The PCP stated that the, "test button was very loud" and "too complicated." Stated that her mother had difficulty with understanding PERs and would not have been able to handle the reminders as well". Reported that the volunteer did not explain the LRD. They felt that it would have been "easy" to figure out the LRD because they work with "technology all the time." Stated the LRD increased their stress and it had a negative effect on their relationship with client-participant. Indicated that her mother prefers using notes on the calendar because she can look at it." Stated the client-participant had difficulty with even using her microwave. Recommendations: Suggested that the volunteer provide instructions. Continued Use: No to the LRD but will continue with a PERs.

Client-Participant with LRD installed, Attrition-Deceased

Client-Participant # 8

Socio-demographics: 78 years old, male, college/university, $50,000 or more, widowed, lives alone.

Cognitive Screening Tests:

3MS: 80/100
Clock Drawing: 2
Results: Tests indicate need for further testing for cognitive impairment.

Interview: Anticipated Use: Medications. Initial Impression: It is a "good idea, I am not sure I am at the point where I need reminders". Primarily wanted the LRD for the PERs component.

Rating Scales:

Baseline rating scales: He "*almost never*" forgot to make medications, his PCP is "*occasionally stressed*" with reminding him to take medications and rated his confidence in his ability as being 1/5.

Reminders: LRD installed and daughter called to report that the client-participant had been admitted to an Assisted Living Residence. Two weeks later the client-participant died.

Client-Participant with Home visit, No LRD Installed. Attrition-Extended Care Facility

Client-Participant # 9

Socio-demographics: Age: 74 years old, male, high school grad, 10-19,000, widowed, lives alone.

Cognitive Screening Tests:

3MS: 87
Clock Drawing: Score: 1
Results: No indication for further testing for cognitive impairment.

Interview: Anticipated Use: Daily check in call. Initial impression of the LRD: "I don't need it but it could be helpful to remind me to call my son." Indicated he is obtaining the LRD primarily for the PERs aspect.

Baseline rating scales: "*frequently*" forgets to call his son, his son was "*not stressed at all*" with reminding him to call, and rated confidence in his ability as being 3/5.

Telephone Tasks: Completed three telephone tasks cued by a written list and then was admitted to hospital awaiting placement.

PCP

Socio-demographics: 52-year-old son lives in the same city.

Interview: Anticipated Use: nutritional problems. Initial Impression: "pretty good. If people have the system, it could cover allot of bases."

Rating Scales:

Baseline rating scales: Rated his stress higher than the client-participant's baseline rating scales.

Client-Participant with Home Visit, Ineligible

Client-Participant #11

Socio-demographics: 93 years old, male, some college, divorced, lives alone, income unknown,

Cognitive Screening Tests:

3MS: unable to complete due to visual limitations.

Clock Drawing: unable to draw due to visual limitations.

Medical Records: No cognitive impairment.

Interview: Anticipated use of LRD: medications. Initial Impression: "I don't believe in the machine, my instinct is that this is just a machine, not a person. I don't even talk to any answering machines. Stated he would only want the machine for the PERs

Reminders: Client-participant could not see or feel the yellow button to activate the reminder. Could not identify any of the buttons on the telephone. Researcher attempted to build up button with plastic, this did not result in the client-participant being able to identify the reset button. Stated he did not want the LRD because he won't know which medications to take. The client-participant wanted a care attendant to give him the medications as he stated that the "medications would fall out of his hands and then he can't find them".

PCP

Socio-demographics: Friend, lives in the same city, but a long drive away.

Interview: PCP reported "there will be a problem with seeing the buttons on the telephone and he may not be able to hear telephone". The PCP reported that she had tried telephoning the client-participant to take his medication but he could not find the right medications. Another problem was that the client-participant had hearing difficulty

and also was too visually impaired to use his bubble packed medications. He could not push his pills out of his bubble pack or identify the proper ones to take.

Caregiver Contact Sheets: In the baseline caregiver contact sheets, the PCP stated that the client-participant had home support services for two times per day to for assistance with medications.

Client-Participants who had a home Visit but Refused LRD

Participant #12

Socio-demographics: Age unknown; female, widowed, lives alone, income-unknown.

Cognitive Screening Tests:

Medical Records indicated no cognitive impairment.

Interview: Client-participant stated that she primarily wanted the LRD for the PERs aspect. Stated that she didn't think she needed any reminders. She "felt the PERs would not be helpful, as her seizures had improved".

PCP

Socio-demographics: Daughter, other characteristics unknown.

Participant # 24

Socio-demographics: Age unknown, female, widowed, lives alone, income unknown.

Cognitive Screening Tests:

Medical Records indicated cognitive impairment.

Interview: Client-participant indicated that she did want a PERs or LRD and stated she did not want to participate in the study.

PCP

Socio-demographics: Daughter, other characteristics unknown.