KEEPPING THE ELDERLY SAFE AND WELL AT HOME

A CASE FOR ASSISTIVE TECHNOLOGY INCLUDING

TELECARE

Telecare has been defined as "the continuous, automatic and remote monitoring of real time emergencies and lifestyle changes over time in order to manage the risks associated with independent living".

"Care is allowing people to live where they want, ... taking people out of institutions back into their own homes. One objective of telecare is to facilitate access to health and social services in clients' own homes. These services are bundled into a care package that includes medication, different therapies, home visits and assistive technology (ranging from simple home adaptations to Smart Home technology). ... The goal of telecare is to optimise resources rather than to minimise cost, thus face-to-face contact is supported and augmented, not replaced".


What is government's responsibility in supporting the use of assistive technology that helps the elderly remain safe and well at home and out of more costly hospital and nursing home care?

Bob Schutte
Long Term Care Facility Worker
Victoria, British Columbia
e-mail: schutte_robert@hotmail.com

June 5, 2007
KEEPING THE ELDERLY SAFE AND WELL AT HOME
A CASE FOR ASSISTIVE TECHNOLOGY INCLUDING TELECARE

SUMMARY:

In England, the Department of Health has estimated that about 35% of the residents of nursing homes need not be there. They may suffer some combination of age related sensory, mobility and cognitive impairments that make independent living more hazardous. Yet they do not need 24 hour nursing home care 'just in case' they might be injured at home. In Canada, as in the UK, the proportion of such elderly in the population is rising. At the same time, the availability of informal caregivers is falling due to demographics and the scattering of extended families in the modern economy.

Whenever the need for 24 hour monitoring is crucial in the choice between the nursing home and living at home, most elderly would prefer 'just in time' treatment. Telecare technology can accomplish this today with a variety of non-intrusive electronic sensors that monitor critical activities of daily living and home environment conditions. A telecare control unit can automatically notify care responders if it detects an accident, health hazard or alarming deviation from lifestyle norms. Of course, electronic monitoring may not be enough. The elderly may also need conventional home care and support services, plus safety related home modifications and a range of low-tech assistive devices.

England and Scotland have currently budgeted capital grant funding totaling $212 million for preventive telecare technology. Government expects this funding to be entirely paid for out of health care savings. Telecare pilot projects in the UK have demonstrated annual hospital care savings over double the amount invested in keeping the elderly safe and well at home. When such projects include the avoided cost of nursing home care, savings over triple the amount invested are seen. Telecare clients were able to live independently at home longer and required emergency medical treatment less often. When hospitalized, they could be discharged earlier. Elderly clients enjoyed greater security and independence and informal caregivers greater peace of mind and respite.

Governments in Canada must also stem the rising cost of avoidable hospital and nursing home care of the elderly. Assistive technology including telecare can help the elderly remain safe and well at home. As in the UK however, government leadership will likely be necessary to guide a new vision of eldercare into the future.
INTRODUCTION:

Today, as the proportion of elderly in the population rises, governments in Europe already foresee that institutional approaches will become prohibitively costly. The success of modern health care is creating a growing population of frail elderly. At least one in five persons over eighty will also suffer some form of age related cognitive impairment that threatens independent living. The scattering of extended families in the modern economy also leaves an increasing number of elderly persons living alone. Health authorities will increasingly need residential nursing facilities for those who truly need 24 hour nursing care. Keeping the elderly safe and well at home as long as possible will become the prime goal of eldercare.

Increased government funding for conventional home care and support services together with safety related home modifications and a range of stand-alone assistive devices will be necessary. The above interventions however, do not address a crucial aspect of keeping the elderly safe and well at home. Often there is also eventually a need for adequate monitoring of the activities of daily living and home environment conditions to prevent accidents and respond to hazard or injury in a timely way. Informal caregivers cannot always be present and may not be available at all. Paid, full time, live-in caregivers are costly and unwelcome to elderly persons used to their independence. What the elderly need is 'just in time' rather than 'just in case' treatment.

A-I) TELECARE versus PERS(Personal Emergency Response System)

Wearable push-button and stationary pull-cord type communication devices already exist to fill this gap by alerting an emergency response service. A Canadian study of Personal Emergency Response System(PERS) users found 25% fewer hospital admissions and 2.5 fewer hospital bed days per user compared to a control group of non-PERS users. Wearable fall-detectors also exist to automatically send an emergency signal should a fall occur. Wearable devices fall short however, if the elderly person refuses or forgets to wear them. Stationary home pull-cord devices avoid this drawback but do not help when the elderly person has fallen or become unconscious and cannot reach or use the device. In any case, such devices may not help when elderly persons are also reluctant to call for help because they do not wish to be a burden or appear incapable to others. Elderly persons may also suffer impaired cognition, sight, hearing or smell. As a result, they may not recognise hazardous conditions in the home environment and fail to use a PERS device in a timely way.

Telecare systems can overcome the drawbacks of PERS devices. They automatically alert care responders without the active participation of elderly clients. Telecare has been defined as "the continuous, automatic and remote monitoring of real time emergencies and lifestyle changes over time in order to manage the risks associated with independent living". Telecare is essentially an automated personal emergency response system.

'Smart house' wireless telecare sensor and communication devices support both age related frailty and a degree of cognitive impairment. The system monitors no intrusive visual or sound data. Monitoring goes on 24/7 with alarm conditions resulting in automatic
communication to one or more care responders. The responders may be a group of nearby relatives, friends or neighbours to be contacted in order or a professional call centre. The communication signal from a telecare control unit in the home may use land-line telephone, pager or cellular phone networks.

For example, bed-occupancy sensors both detect and prevent unsafe conditions. When an elderly person does not go to bed or rise from bed at normal times for that person, the system can raise an alarm. When an elderly person rises during normal sleeping hours, it can automatically turn on lights along the way to the bathroom to help prevent a fall. If the elderly person does not return to bed in a timely way after rising during the night, the system can raise an alarm. To validate alarm conditions, care responders can establish voice communication with elderly clients through the home control unit when an alarm is raised.

In general, telecare systems help assure safe, independent living by monitoring:

a) activities of daily living (ADL), including:
   ♦ inactivity interval (lack of motion in rooms, i.e. possible fall or unconsciousness);
   ♦ untimely egress (wandering);
   ♦ bed occupancy times and night lighting needs;
   ♦ timed voice medication reminders and client confirmations;

b) home environment conditions including:
   ♦ security (windows and outside doors left open);
   ♦ smoke, localised high temperature;
   ♦ low temperature (heating system failure or maladjustment);
   ♦ high humidity, flood;
   ♦ carbon monoxide, cooking gas hazard;
   ♦ house electrical power or communication outage.

A-II) PREDICTIVE TELECARE:

Whenever monitoring is the crucial requirement, the 'just in time' response of PERS and Telecare systems is a viable alternative to 'just in case' nursing home confinement. Suppose, however, that real time home sensor data from activities of daily living were to be stored and analysed by computer software over time. The system could then use these lifestyle norms to detect significant deviations or trends in ADL data and highlight alarming changes before significant harm comes to an elderly client. Such a predictive, or
'just before', capability is the hallmark of a 'second generation' telecare system. Typically, it augments rather than replaces real time automated and user-activated alarm systems. Realistically, such monitoring is far less intrusive than that seen in most residential nursing homes.

A typical result of such monitoring would include:

♦ mobility indicators such as easy chair and room occupancy durations; time between exiting one room and entering another; time to respond to a telephone or doorbell;

♦ wellness indicators such as time spent in the bathroom and in bed;

♦ nutrition indicators such as usage of food cupboard and refrigerator doors, cutlery drawers and electrical kitchen equipment(e.g. stove, microwave, kettle);

♦ other occupation indicators such as usage of wardrobe doors, radio, television and washing machine.

Dr. Kevin Doughty in the UK has invented one such 'second generation' telecare system, the "Modular intelligent domiciliary alarm system (MIDAS)". Doughty is currently deputy director of the Centre for Usable Home Technology, University of York. "Dr. Doughty's interest in non-invasive sensing arose from his experience of running a residential care home for six years". He came to believe that "None of the patients really needed to be there...". UK based telecare technology provider Tunstall Group Ltd has recently brought his work to market as "MIDAS II Lifestyle Reassurance". The system requires data from a minimum of ten electronic sensors of various types to track activities of daily living.

In the United States, where there is no national health care system support for telecare as such, at least four companies are currently marketing second generation telecare systems. These are offered by Living Independently Inc.(QuietCare), Healthsense division of Redwing Technologies(eNeighbour), GrandCare Systems Inc.(GrandCare) and Lusora Health Systems(Lisa). Additionally, General Electric, which has marketed a semi-automated PERS called CareGard for a dozen years, has lately been market testing a true second generation telecare system called "Home Assurance".

Telecare technology alone is not a magic bullet, however. An effective approach must also include home care and support services, safety related home modifications, and other assistive devices as needed. However, because of the crucial role of telecare technology, in the UK the term 'telecare' has essentially come to mean this comprehensive approach. Comprehensive telecare will reduce the scope of institutional approaches because it is less costly while also delivering greater benefits to the elderly. Specifically, it can be expected to:

♦ reduce ambulance calls and hospital acute care bed-days due to falls, uncared for illness, harmful home environment conditions, malnutrition and other preventable sources of injury;
♦ save additional hospital bed-days by reducing delayed hospital discharges due to lack of appropriate home care and monitoring services;

♦ reduce or eliminate care-giver hours required just for monitoring activities of daily living and home environment conditions and give informal caregivers needed respite;

♦ defer the costs and adverse mental health consequences of long term care institutionalisation as long and as much as possible;

♦ preserve the privacy, dignity and sense of independence of elderly persons as long and as much as possible.

B) RECENT UK GOVERNMENT ACTION ON TELECARE:

In August 2006, the Scottish Executive announced a countrywide roll-out of a comprehensive eldercare support program including telecare. In doing so, it allocated £8 million to a project targeted to serve 75,000 elderly people, some 9000 with dementia. The government will allocate this funding to local Health and Social Care Partnerships specifically to purchase and implement telecare systems. The funding takes the form of capital grants because the government is convinced that telecare will produce a significant net saving to the publicly funded health care system.

In July 2004 the government of England announced an £80 million Preventative Technology Grant to run for 2 years from April 2006. In July 2005, the Department Of Health published a guide to the use of the grant money called "Building Telecare in England." "The grant is designed to help local authorities and their partners address the challenges of a changing and aging society with increased expectations, such as the right to have choice about services, control over their delivery and the right to be able to live independently at home with dignity for life".

In a speech introducing this guide, MP Liam Byrne insisted, "it is simply not realistic to continue to deliver [elder] care and support services in the way we do at present". Clearly, the government of England expects its investment in telecare to be more than paid for by "reducing the number of avoidable admissions to residential/nursing care and hospital". Just the estimated possible 30% annual reduction in night falls by elderly people due to telecare technology would result in an ambulance and acute care bed cost saving of £260 million per year. Byrne also asserted that, according to Department of Health research, "we also know that as many as 35% of elderly persons in England who already live in residential/nursing care... might want to be supported to live at home or in extra care housing schemes through the use of telecare".

Government support for Telecare implementation in the UK initially relied on the evidence of the technology providers and a small number of significant pilot projects. However, Dr. Kevin Doughty has proposed a "Telecare Evaluation Framework" and the Department of Health in England remains proactive on the evaluation of telecare.

In November 2006 the DH released details of its planned Whole System Long Term Conditions Demonstrator Programme. Up to three large pilot projects involving up to 6000
telehealth and telecare clients will be run for at least two years. The project will focus telecare on frail elderly with complex health and social care needs and telehealth[remote monitoring of vital signs] on patients of any age suffering from one of several chronic diseases. The project will be subject to a rigorous 'real time' evaluation process.

In January 2007, the Commission for Social Care Inspection reported that, as of 31 March 2006 survey, all but 6 of the 150 local Councils with Social Care Responsibilities(CSSR) in England had deployed telecare solutions in some form. Occupational therapy includes assessing needs for assistive technology, including telecare, in the home. Kevin Reel is education development manager of the College of Occupational Therapists in the UK. He was recently quoted as follows: "Telecare is proven to give people more control and independence in their homes, and as OT service providers we have a great opportunity to help make this a reality for our clients".

C) TELECARE PROJECTS IN THE UNITED KINGDOM:

It is clear from the following project results that important benefits to the elderly were delivered by telecare. They were able to live independently at home longer and required emergency medical treatment less often. When hospitalized, they could be discharged earlier. Elderly clients enjoyed greater security and informal caregivers greater peace of mind and respite. Public health care cost savings were also significantly greater than the cost of keeping the elderly safe and well at home.

C-1) Safe At Home Project

Northamptonshire Council in England sponsored this controlled clinical trial. It focused exclusively on individuals with some degree of cognitive impairment or dementia.

Project Outline:

Sample: Treatment group, 233 individuals in Northamptonshire living with various degrees of dementia compared with a control group of 173 individuals in Essex with similar age, and gender profiles and MMSE scores who did not receive assistive technology including telecare;

Treatment: Over 21 months, need assessed installation of a variety of conventional assistive devices such as calendar clocks, pull cords and night-lights and safety indicated home modifications; 15% of service users also received selected wireless monitoring sensors linked with a telecare response centre; variables monitored included lack of motion, untimely egress, room/equipment usage, etc. plus smoke, temperature extremes, flood, gas, power/communication outage, etc. on a need assessed basis

Results: The treatment group costs for subjects who later entered residential or nursing care(distinct facilities in the UK) plus intermittent hospital care was £1,061,621 compared with the control group cost of £2,853,247 for a gross saving of £1,791,626. The total treatment cost was £286,853 for a net saving of £1,504,773 or a net saving of £6,458 per treatment person over the 21 study months. During the study period, subjects in the control group were 4 times more likely to permanently enter a residential or nursing care facility than members of the treatment group.
The control group total cost was 2.1 times more over 21 months or 1.2 times more annually than treatment group costs. However, a significant part of the treatment costs might be characterised as one-time. If spread over the remaining at-home time of the treatment subjects, the net annual saving would likely be higher. On an annualised basis, the health care cost saving in the treatment group was 2.9 times greater than the amount invested.

C-II) Opening Doors For Older People Project

West Lothian Council in Scotland implemented this project, Europe's largest telecare project to date. This project assisted thousands of elderly persons, including some with dementia, to remain at home. It retrofitted many existing homes with telecare and built some new public housing with telecare technology already in place. The project was not a controlled clinical trial but rather a cost-benefit analysis for the implementation area. The Council also contracted the University of Stirling to independently evaluate users' and care-givers' satisfaction with the project interventions over three years. A crucial element of the project model is the 'health and social care partnership'. A co-ordinated project team delivers all local health care and social work services to the elderly.

Project Outline:

*Project Group:* starting in 1999, by May 2006 some 2,150 elderly persons (65+ years old), some with dementia, living at home were included;

*Project Interventions:* by March 2003, participating households were supported with a 'community package' which included telecare technology, a 24/7 Council run alarm response facility called the Home Safety Service, and 10 hours/week of at home health care services. In January 2006, the Council dropped its means tested £4.87/week user fee for the community package because it was deemed to be reducing elderly user take-up and costing more through lost health care savings. Take up tripled after the user fee was dropped.

*Results:* in 2005, the average project intervention group person was costing the Council £7,121 each annually while keeping them out of long term care facilities in which each person would have cost the Council £21,840 instead; in 2004, the 'community package' group was also credited with 3,364 acute care hospital bed days saved for an annual saving of £1.9 million; the cost of the community package had a payback period of 7 months and a recurring total annual saving effect of £1.4 million for the group served. In 2005, the University of Stirling study of user and carer group reaction to the interventions was also largely positive.

The project's current target is to keep 10,000 elderly people at home with the aid of telecare. At current annual cost levels for home care and support versus institutional care in Scotland, the project only needs to keep 40 people out of institutional care per year to break even.

C-III) OTHER TELECARE PROJECTS IN THE UK

By the end of 2006, several other significant pilot projects incorporating telecare had already been reported on. They included Kent County(100 users), North Cumbria(739
users) and Sandwell Metropolitan Borough (100 users), in England and Fold Housing Association (153 users) in Northern Ireland.

Durham County Council established the "People at Home and In Touch" telecare pilot project in December 2003 to develop a model for countywide rollout. The Council provided Telecare and other assistive devices to 148 elderly users, some with dementia, evaluated over a 6 month period. Elderly clients enjoyed an improved quality of life and informal care-givers more respite and peace of mind. The pilot also demonstrated the full range of desired health care cost savings. Results included an estimated 1,783 residential care bed days saved for a net saving of over £66,000, over double the amount invested.

Croydon Council and the South London and Maudsley NHS Trust launched their pilot Aztec project specifically for people with dementia in February 2004. The Council estimates around 2,400 people in the borough suffer some form of cognitive impairment in any given year. The pilot included over 80 complex cases. Project packages included a variety of stand-alone assistive devices and telecare sensors linked with a 24-hour response team operated by Croydon Careline, a community alarm service. The project deployed over 50 different stand-alone assistive devices, some as simple as thermostat covers to prevent inappropriate heating adjustment. The average package included between four and five such devices. Equipment and installation cost ranged from £20 to £1,800 per user.

The South London and Maudsley NHS Trust awarded the Aztec Project the 'Clinical Governance Award' for 2005 in its 'Managing Risk' category. The project also established a demonstration facility with the full range of telecare and stand-alone assistive devices. It uses this centre to train staff and show people with physical frailties or dementia what assistive technology can do for them and their care-givers.

The project also demonstrated cost effectiveness. Barbara Dunk, Croydon's Head of Occupational Therapy, addressed a national telecare conference on the project in 2006. She reported that, "The average telecare package cost over £1,100 per service user but achieved savings of over £7,000 per service user. When care package costs are subtracted from nursing or residential care fees that would otherwise apply, this is equivalent to annual savings of £12,000 per service user". Without assistive technology including telecare, every one of the pilot project clients would have gone into residential or nursing care facilities. Croyden has now rolled out the project service for all in need and not just for people with dementia.

D) IMPLICATIONS FOR BRITISH COLUMBIA AND CANADA:

The Premier's Council on Aging and Seniors' Issues published its final report, "Aging Well in British Columbia", December 1, 2006. The chapter entitled "Supporting Independence" put forward "a new vision for home support services". It focused on "prevention, maintaining quality of life, and avoiding the high cost - financial and human - of institutional care...". The report recommended more government assistance for home support services and claimed it would also reduce total eldercare costs.

The Premier's Council on Aging based the above recommendation on a recent Canadian study that took the form of a controlled natural experiment. It found conventional home care and support cost less than institutional care. The study results showed that
institutional care cost 1.3 times more than conventional home care and support for the highest care level group and 2.8 times more for the lowest care level group. (D.2, 3, 4)

The Premier's Council also noted the option of "assisted living" housing and care. In the public sector, this is an alternative for persons meeting the entry criteria "that they are no longer safe to live at home, but do not need 24-hour nursing care in a residential facility". In 2004/2005, the BC health system subsidised only 1400 older people in such residences. In BC however, candidates for assisted living facilities must also meet the criterion that they are "able to direct their own care". In the UK, not only frail elderly but also those with a risk manageable degree of cognitive impairment or dementia are being maintained in their own homes with the aid of telecare.

This report's new vision did not emphasize the significant contribution even low-tech assistive devices and home modifications can make to maintaining the safety and quality of life of older people who desire to remain living at home. (D.5, 6) Home modifications for independent living support is available through the Canada Mortgage and Housing Corporation. Their 'Home Adaptations for Senior's Independence (HASI)' program provides forgivable loan assistance to eligible seniors. (D.9) The report also did not mention the burgeoning role in eldercare of telecare assistive technology in the United Kingdom. Several controlled clinical trials and cost-benefit studies there have demonstrated the more cost effective alternative. It is home care and support, together with assistive technology including telecare. Annual health care savings over triple the amount invested in keeping the elderly safe and well at home have been demonstrated. (C-I; II; III)

In July 2001, Dr. James Barlow was leading a £1.2 million research project on Telecare Planning and Implementation at the University of Sussex, Science and Technology Policy Research Unit, in the UK. He also spoke at the 12th Annual John K. Friesen Conference on gerontology held at Simon Fraser University in Vancouver, BC. In doing so, he outlined the "Vision of Telecare" then emerging in the United Kingdom. "Care is allowing people to live where they want, ... taking people out of institutions back into their own homes. One objective of telecare is to facilitate access to health and social services in clients' own homes. These services are bundled into a care package that includes medication, different therapies, home visits and assistive technology (ranging from simple home adaptations to Smart Home technology). ... The goal of telecare is to optimise resources rather than to minimise cost, thus face-to-face contact is supported and augmented, not replaced". (D.7) In the following five years, this vision of telecare has advanced rapidly to action on the ground in the UK. England and Scotland have currently budgeted capital grant funding equivalent to $212 million (Canadian) for telecare. In Canada, there is to date little evidence of such a vision.

Health Canada, for example, "is engaged in research and policy analysis on home and community care across Canada". Their "eHealth" webpage uses this term to mean "the application of information and communications technologies in the health sector". Further, "within the home care setting, examples include teleconsults and remote vital signs monitoring systems used for diabetes medicine, asthma monitoring and home dialysis systems". Their "Home and Community Care" webpage also declares among its goals to "Assist people in remaining as independent as possible". Among the list of services indicated as available to this end, however, both user activated personal emergency response systems and Telecare (automated PERS) systems are noticeably absent.
This is consistent with the conclusion of a March 2006 BCIT market survey of "Home Monitoring Technologies" for Industry Canada. "The principal finding is that growth in the RPM [remote patient monitoring] field will likely occur most rapidly in the remote monitoring of chronic diseases [telehealth] sector". The vision of telecare, outlined by Dr. James Barlow from the UK in 2001, shrinks in this market survey to a minor sector called "Tracking of Patient Location". Company profiles include a Canadian company, Vigil Health Solutions, that markets this core telecare technology for dementia patients exclusively in long term care facilities rather than in their own homes. Only one Canadian project aims to help keep the elderly out of institutions. The Toronto Rehabilitation Institute currently engages in research on "home based computer systems that use artificial intelligence to promote independence and ensure the safety of older people living at home".

An aging population in Canada finds health authorities everywhere fighting rising costs. A significant contributor is the rising cost of avoidable hospital and nursing home care of the frail elderly and/or those with some degree of cognitive impairment. Assistive technologies including telecare can help such elderly people remain safe and well at home. By all accounts, this is what the vast majority of elderly persons want.

The role of Canadian governments in aiding the elderly to 'age in place' in their chosen homes and neighbourhoods can be summarised as follows:

- increased government funding for conventional home care and support services as recommended by Premier's Council on Aging and Senior's Issues report "Aging Well in British Columbia" (D.1)

- continued if not increased support and more local delivery of safety related home modifications for the elderly, as per CMHC's "Home Adaptations for Seniors' Independence(HASI)" program (D.9)

- new support to local authorities for currently available assistive technology including telecare systems taking the form of capital grants to be paid for out of health care savings (B.1,2,3)

- government bulk purchasing of assistive technology including telecare from officially qualified suppliers(B.2,3)

- elimination of user fees for telecare response services that reduce potential savings to the health care system because of lower participation by poor or habitually thrifty elderly persons(C-II.9)

- government mandated availability of telecare support technology and emergency response services to all persons over age 65 living alone(C-II.1)

- government direction to local social and health care authorities that eldercare be delivered by integrated social and health care partnerships rather than independent agencies(C-I.1, 5; B.1)
The impediments to constructive action in this area certainly include the inertia inherent in existing health care funding and institutional arrangements. Assistive technology that helps prevent a need for health care does not yet come within the meaning of 'health care' in this country. In Canada, as in the UK, government leadership will likely be necessary to guide a new vision of eldercare into the future.

REFERENCES

A-I) References:
2) "A Review of Approaches to Mobility Telemonitoring of the Elderly in Their Living Environment", Clodhna Ni Scanaill (Biomedical Electronics Laboratory, Univ. Of Limerick, Ireland) et al, Annals of Biomedical Engineering, 2006, V.34(4), pp 547-563
3) "Telecare and Older People", Teresa Poole, 2006, pp 26, background paper to the Wanless Social Care Review report, "Securing Good Care for Older People", web document at www.kingsfund.org.uk/publications

A-II) References:
2) "Practical Solutions for the integration of community alarms, assistive technologies and telecare", memorandum by Kevin Doughty and Gareth Williams, 2005, pp 17, includes description of their MIDAS system, web document at The United Kingdom Parliament website, www.publications.parliament.uk
3) "Strategic Approaches to Telecare", Dr. Kevin Doughty, Centre for Usable Home Technology(CUHTEC), University of York, presentation at the Media Resource Centre, Llandrindod Wells, Wales, May 12, 2006, web document at www.cih.org/cymru
4) "Embracing technology will help elderly's independence", Northern Specialist Group, Health Informatics Now, March 2007, pp 20-21, web document at www.bcshif.org
5) "MIDAS II lifestyle reassurance", Tunstall Group Ltd., 2006 solutions sheet, web document at www.tunstallgroup.com
6) QuietCare Home Health Security System, Living Independently Inc., see info at www.quietcare.com
7) eNeighbour, Healthsense, a division of Red Wing Technologies, see info at www.healthsense.com
8) GrandCare, GrandCare Systems , see info at www.grandcare.com
9) LISA, Lusora Healthcare Systems, see info at www.lusora.com
10) "Home Assurance", General Electric Global Research, info at www.ge.com/research

B) References:
1) "Older people empowered by new technology", news release, Scottish Executive, 15/08/2006, web document at www.scotland.gov.uk
5) "Large scale telecare pilot details published", E-Health Insider, 03 Nov 2006, web document at www.ehiprimarycare.com
7) "Survey on telecare from local authority CSCI Performance Reports 2006, Care Services Improvement Partnership, Health and Social Care Change Agent Team, January 2007, web document with links to 150 CSSR telecare profiles at www.cat.csp.org.uk/telecare

C-I) References:
2) "Safe at Home 2: Case Study", Tunstall Group Ltd., web article at www.tustallgroup.com
3) "Technology effective in dementia home care" E-Health Insider Primary Care, 29Nov2005, web article, www.ehiprimarycare.com
4) "Telecare Matters for Dementia", James Buckley, CEO Tunstall Group Ltd., May 24, 2006, web article at www.justgo.org

C-II) References:
1) "Smart technology and community care for older people: innovation in West Lothian, Scotland", Alison Bowes and Gillian McColgan with David Bell, University of Stirling, August 2006, web document at www.ageconcernscotland.org.uk
2) "West Lothian Council 'Opening Doors for Older People' Project", pp.13-17, part of "The Caring Home" a conference presentation by Suzie Jones, Telecare Support Manager, Tunstall UK, Feb.7, 2006, web document at www.integerproject.co.uk
4) "University research points to positive impact of telecare", West Lothian Council news release, Apr.21, 2005, web document at www.westlothian.gov.uk
5) "Smart support at home: the integration of telecare technology with primary and community care systems", David Kelly, director of West Lothian community health and care partnership, British Journal of Health care Computing & Information Management, V.22(3), pp. 19-21, April 2005
6) "West Lothian Case Study", part of "Potential Impact of Telecare on Quality of Life for the Aging" a Tunstall conference presentation, June 23, 2004, web document at www.whiterose.ac.uk; data from "Smart Support at Home - The Impact of Telecare Technology on Primary and Community Care Systems in West Lothian", West Lothian Council, unpublished, 2004
7) "Project Review, Opening Doors for Older People Project", 2003, web document at www.tunstall.co.uk
8) "Dementia Care", West Lothian Council case study, 2003, web document at www.tunstall.co.uk

C-III) References:
1) "Piloting Telecare in Kent County Council: The Key Lessons", Andy Alaszewski and Rose Capello, Centre For Health Services Studies, University of Kent, December 2006, web document at www.kent.ac.uk
2) "People at Home and In Touch", Pam Mills, project officer, Durham County Council, County Beacons, Issue 46, web document at www.lga.gov.uk/ccn/beacons; see also ref. C-II.9, p. 8-9
3) "People at Home and In Touch, Broadband and Social Housing - Increasing Digital Access and Supporting Assistive Technology", Pam Mills, power point presentation, 30 January 2006, web document at www.sustainit.org/publications
4) "Dementia Care", Croydon Council case study, 2005, Tunstall Group Ltd., web document at www.tunstallgroup.co.uk
6) "The Aztec Project: providing assistive technology for people with dementia and their carers in Croydon", Dunk, B. & Doughty, K., presentation at the Lang & Buisson 'Telecare and Assistive Technology Conference', 2006, as reported on in reference (7) below;

D) References:
1) "Aging Well in British Columbia", Premier's Council on Aging and Seniors' Issues, Ministry of Community Services, December 1, 2006, web document at www.cserv.gov.bc.ca/seniors/council/docs
4) "New study back's seniors' home care: Facility care more costly, Victoria researcher finds", Katherine Dedyna, Victoria Times Colonist, Nov.30, 1999
5) "Effectiveness of Assistive Technology and Environmental Interventions in Maintaining Independence and Reducing Home Care Costs for the Frail Elderly", William C. Mann et al, Archives of Family Medicine, V.8(3), 1999, pp. 210-217

6) "Home Modifications, Assistive Devices can cut homecare costs: savings are quadrupled, study finds", American Society on Aging, web article, www.asaging.org

7) "The Potential of Information and Communication Technology for In-home Care Delivery" and "Telecare Planning and Implementation", Dr. James Barlow, Seniors' Housing Update, V.11(1), Gerontology Research Centre, Simon Fraser University, January 2002, issue devoted to the proceedings of the 12th Annual Jonn K. Friesen Conference, July 9-10, 2001

8) "Home Monitoring Technologies in the Community/Home Care Environment", prepared for Industry Canada by the Health Technology Research Group, British Columbia Institute of Technology, March 2006, pp 62

9) "Home Adaptations for Seniors' Independence (HASI), Canada Mortgage and Housing Corporation, program info available at www.cmhc.ca/prfias/hasi

10) "eHealth" and "Home and Continuing Care", Health Canada, Health Care System web pages at www.hc-sc.gc.ca/hcs-sss

11) "Intelligent systems will help elderly patients at home", interview with Dr. Alex Mihaailidis of the Intelligent Assistive Technology and Systems Lab, Toronto Rehabilitation Institute, in Canadian Healthcare Technology, Feb. 5, 2007, at www.canhealth.com