There is no doubt that we are living in an aging society and when you start to think of how many Canadians will be diagnosed with some form of dementia, the numbers starts to become overwhelming. According to Statistics Canada, in 2009 there were 4.7 million seniors living in Canada. This number is expected to grow to between 9.9 million and 10.9 million by 2036. The Alzheimer’s Society of Canada published “The Rising Tide” in 2010 sounding the alarm on the increasing number of people that will be diagnosed with some form of dementia. In 2008, 480,600 people in Canada were diagnosed with dementia. This number is expected to swell to 1,125,200 people by 2038. By 2038, there will be 257,800 new dementia cases per year, or 1 in every 2 minutes in Canada. It is becoming more evident that these numbers are disturbing and it is understandable why there is so much focus on this segment of the population.

There have been different technologies developed that have attempted to assist those with dementia in some form, such as providing prompts for basic tasks, like taking medications at the appropriate time. However, many of these devices are perceived as not being user friendly or the outcomes are not what one had anticipated. Many of these technologies were not developed with the older adult in mind, even less for those with some form of cognitive impairment. In fact, a lot of these technologies were more appropriate for a younger adult population, such as those that suffered from a stroke or brain injury.

The concept of Context-Aware Design or Context-Aware Systems was developed to address this discrepancy. Context can be viewed as “...any information that can be used to characterize the situation of entities (whether a person, place, object) that is considered relevant to the interaction between a user and an application, including the user and the application themselves” (Mihailidis, A., 2002). Context-aware systems do not simply consist of data in and garbage out, but instead it remembers or senses information about the individual that best defines the situation or event and makes use of it later. This is accomplished by monitoring the individual with the use of sensors or sensor-like technology. This in turn can assist in detecting patterns and any irregularities in the data.

Context-aware systems take into consideration the special needs of each individual person, particularly someone that has dementia, where their needs fluctuate on a daily basis, and can develop assistive devices tailored that take these factors into consideration. It utilizes minimal interaction to gain contextual information by the use of sensors or ambient technology, and it can also be applied to developing devices that would mimic a human caregiver. These technological devices would provide the person with dementia more independence and dignity. These systems also allow for “aging in place.” One example of this would be if there were pressure sensors on a bed that would activate a light when that detects the bed is no longer occupied, and when the person enters the bathroom the lights turn on.

At the Glenrose there is the Independent Living Suite, or the ILS as it is known. It is a self contained suite within the hospital designed to replicate an apartment style living situation. It is equipped with a living room, bedroom, a three piece bathroom, and a fully functional kitchen. It provides the clinicians at the Glenrose the unique opportunity to have patients there for a trial basis simulating their living situation as if they were in their own home environment, but in a controlled setting. This allows the clinician to determine whether or not the patient exhibits any unsafe behaviour that would assist in identifying any deficits in ADL’s (activities of daily living) and help determine what their level of care needs would be after discharge.

Sensors were placed throughout the entire suite to provide data. Some of the sensors indicated when the refrigerator, oven, cupboard and microwave doors were opened and for how long; how long the coffee maker, oven, microwave and toaster were activated; and when the lights were turned on and off. There were sensors in the bathroom to determine when the faucet was turned on, indicating that the patient had washed his or her hands. Sensors also indicated whether or not medications had been taken and at what time.

The information gathered can reveal some interesting insights. It can provide information when the toilet was flushed indicating that toileting occurred as well as data collected on how often someone gets up in the night. This can provide the clinician with valuable information about the patient and their nocturnal habits. For example, would the patient be getting up several times during the night in their own home safely? Do they need their medications adjusted so this night-time activity can be reduced? With the patient toileting themselves several times during the night, are they having a restful day, or are they over...
tired and becoming increasingly confused because of this excessive activity during the night? These kinds of behaviours can lead to an increased number of falls for the elderly and safety becomes a major issue. Data such as this can help the clinician in determining what would be the best level of care required for this individual and what kind, if any, assistance they will need when they are discharged from hospital.

There are other studies in progress in regards to sensors and the older adult population. One research is looking at sensing physiological changes in an older person prior to a fall occurring. There is also a gerotechnology focus group that is examining at developing new and unique technologies based on the older adult’s needs, not making a technology fit to the needs of the older adult.

The possibilities and uses of context-aware systems, particularly with the use of sensors, are rapidly expanding. This technology is greatly needed in part to our ever growing aging population and the increasing number of older adults being diagnosed with some form of dementia.

References:

